



MOLECULAR BREEDING ACHIEVEMENTS IN CROP IMPROVEMENT

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Molecular Techniques In Crop Improvement

Mirza Hasanuzzaman



Molecular Techniques In Crop Improvement:

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 Techniques in Crop Improvement Shri Mohan Jain,D.S. Brar,2013-10-14 Plant breeding aims at the genetic enhancement of crops through the application of principles of Mendelian Genetics and modern tools and techniques of cell and molecular biology Many breeding programs focus on the improvement of traits such as high yield multiple resistance to major diseases insect pests and tolerance to abiotic stresses and improved quality The improved varieties must also fit into the crop rotation systems of different eco agricultural regions for the production of feed fiber food and industrial products The value of new plant varieties in increasing food production has been demonstrated time and again and perhaps the best of all in the Green revolution which was based on the semi dwarf rice and wheat varieties in Asia Recent advances in molecular genetics have opened new opportunities to speed up plant breeding Molecular markers have become important tools in the hands of plant breeders for enhancing the selection efficiency for various agronomic traits Plant breeding has in fact entered in an era of genomics The isolation cloning and moving of genes from diverse biological sources into plant genomes holds promise to broaden the gene pool of crops and tailor plant varieties for specific traits that determine yield quality and resistance to biotic and abiotic stresses This book is a sequel to our previous one on Somaclonal Variation and Induced Mutations in Crop Improvement

Molecular Techniques in Crop Improvement S. Mohan Jain (ed),2010

Molecular Techniques In Crop Improvement Singh Phundan,2022

Molecular Techniques in Crop Improvement at a Glance Phundan Singh,2022 Present book has been designed to provide comprehensive information related to Molecular Techniques in one compact volume of 20 chapters Hope this book would be useful to the students teachers and researchers engaged in the field of Genetics Plant Breeding and Biotechnology

Crop Improvement Khalid Rehman Hakeem,Parvaiz Ahmad,Munir Ozturk,2013-06-13 The improvement of crop species has been a basic pursuit since cultivation began thousands of years ago To feed an ever increasing world population will require a great increase in food production Wheat corn rice potato and few others are expected to lead as the most important crops in the world Enormous efforts are made all over the world to document as well as use these resources Everybody knows that the introgression of genes in wheat provided the foundation for the Green Revolution Later also demonstrated the great impact that genetic resources have on production Several factors are contributing to high plant performance under different environmental conditions therefore an effective and complementary use of all available technological tools and resources is needed to meet the challenge

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

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

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 conventional crop improvement programme Very often the desired variation is unavailable in the right combination or simply does not exist at all However plant breeders have successfully recombined the desired genes from cultivated crop germplasm and related wild species by sexual hybridization and have been able to develop new cultivars with desirable agronomic 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 environmental pollution and global warming 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 milestone in enhancing variation and also indicated the potential applications 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

Mutations, In Vitro and Molecular Techniques for Environmentally Sustainable Crop Improvement M. Maluszynski, K.J. Kasha, 2002-05-31 This publication contains the results of an FAO IAEA Coordinated

Research Project CRP on Radiation Induced Mutations and Other Advanced Technologies for the Production of Crop Mutants Suitable for Environmentally Sustainable Agriculture Induced mutation techniques and other biotechnological approaches are major tools for creating variability and selection of stress resistant or tolerant genotypes Additionally scientists have become intensely interested in mutations as a means to widen and deepen our understanding of genome structure and gene function Induced Mutations and Molecular Techniques for Crop Improvement International Atomic Energy Agency, 1995 Proceedings of a symposium jointly organized by the IAEA and FAO Vienna 19-23 June 1995 The aim of the symposium was to review current aspects of mutation and molecular biology techniques for use in crop improvement and to bridge the gap between practical plant breeding and molecular techniques Problems of crop improvement worldwide and their possible solution were discussed It was concluded that use of all available approaches including mutation and molecular biology techniques will be crucial to future plant breeding programmes in order to meet the world's food production challenges

Haploids in Crop Improvement II Constantine E. Don Palmer, Wilfred A. Keller, Kenneth J. Kasha, 2006-01-27 Doubled haploid technology is an important tool for plant breeding It allows for significant time reduction in the achievement of homozygous breeding lines of value in crop improvement This volume provides an excellent overview of haploid induction and the application of doubled haploids The authors emphasize advances made in the understanding of microspore embryogenesis but treat also advances in gynogenesis and the manipulation of parthenogenetic haploid development The text contains a thorough discussion of the application of haploidy to the improvement of a number of species from various families including Brassicaceae Poaceae and Solanaceae The various methods applicable to these species are described in detail Each chapter contains critical evaluation of the scientific literature and an extensive list of references This volume is ideally suited for plant breeders geneticists and plant cell biologists *Agricultural Crop Improvement* Azamal

Husen, 2025-01-03 Larger amounts of nutritious food are required to feed the growing world population which is a great challenge due to water shortages and reduced crop plant yield To overcome this issue there must be improvement in crop plant production systems *Agricultural Crop Improvement Plant and Soil Relationships* addresses key issues of crop plant yield and production with molecular and physiological interventions to evolve future strategies that will overcome these challenges faced by the agricultural sector Features Investigates modern and traditional agricultural techniques including nanomaterials nanosensors genetic engineering molecular breeding nutrient and plant hormone interactions microbiome engineering soil enzymes biostimulants and intercropping Explores how technologies and scientific advancements from biotechnology information technology and environmental science are revolutionizing sustainable farming practices *Agricultural Crop Improvement Plant and Soil Relationships* is a valuable source of information for researchers and extension workers involved in sustainable crop plants improvement and practices and a useful resource for students and scientists working on aspects of agriculture botany plant science crop physiology crop biotechnology and microbiology **Genome**

Editing Technologies for Crop Improvement Kaijun Zhao, Rukmini Mishra, Raj Kumar Joshi, 2022-08-01 This book compiles the relevant information related to genome editing tools and their roles in crop improvement. The book contains a brief introduction about various genome editing tools and their application in major crops. It discusses the genome editing approaches and the strategies used for genome editing in different crops. Some of the chapters cover the detailed methodology of sgRNA design, vector construction and transformation in different crops followed by data analysis. A few chapters focus on the applications of genome editing tools towards crop improvement. This book will be of particular interest to plant biologists working in the field of genome editing and crop breeders. It will provide valuable information and useful material for our readers' experimental work. Innovations in Climate Resilient Agriculture Rajni Rajan, Faheem Ahmad, Kuldeep Pandey, 2025-07-16 This book discusses how modern technology interacts with agriculture soil and plants for the production of robust crops and emphasises aspects of climate change susceptibility, adaptation and amelioration for agricultural sustainability. Examples of such technologies that could have a significant impact on all facets of sustainably increasing agricultural productivity include genome editing, gene mapping, nanotechnology, hydroponics, IoT, artificial intelligence and UAVs. The book also presents the importance of computer modelling using artificial intelligence, robotics and other cutting edge methods in the development of climate smart crops for long term food security improvement in vulnerable agricultural systems impacted by climate change. The primary audience for the book is professional scientists as well as advanced undergraduates and graduate students. It is also intended for the agricultural productivity sector including nanotechnologists, plant biotechnologists, horticulturists, physiologists and agronomists, breeders, entomologists, plant pathologists, food policy analysts and agricultural data scientists. **Agronomic Crops** Mirza Hasanuzzaman, 2020-03-09 Agronomic crops have been a source of foods, beverages, fodders, fuels, medicines and industrial raw materials since the dawn of human civilization. Over time, these crops have come to be cultivated using scientific methods instead of traditional methods. However, in the era of climate change, agronomic crops are increasingly subjected to various environmental stresses which results in substantial yield loss. To meet the food demands of the ever-increasing global population, new technologies and management practices are being adopted to boost yield and maintain productivity under both normal and adverse conditions. To promote the sustainable production of agronomic crops, scientists are currently exploring a range of approaches which include varietal development, soil management, nutrient and water management, pest management etc. Researchers have also made remarkable progress in developing stress tolerance in crops through various approaches. However, finding solutions to meet the growing food demands remains a challenge. Although there are several research publications on the above-mentioned problems, there are virtually no comprehensive books addressing all of the recent topics. Accordingly, this book which covers all aspects of production technologies, management practices and stress tolerance of agronomic crops in a single source, offers a highly topical guide. *Principles of Tropical Agronomy* Sayed N.

Azam-Ali, Geoffrey R. Squire, 2002 This book is concerned with the principles by which crop management can influence how plants use environmental resources It synthesizes current knowledge in plant physiology environmental physics soil science and climate to provide a framework for studying crop production in tropical environments History of Plant Breeding Rolf H. J. Schlegel, 2017-12-15 While there has been great progress in the development of plant breeding over the last decade the selection of suitable plants for human consumption began over 13 000 years ago Since the Neolithic era the cultivation of plants has progressed in Asia Minor Asia Europe and ancient America each specific to the locally wild plants as well as the ecological and social conditions A handy reference for knowing our past understanding the present and creating the future this book provides a comprehensive treatment of the development of crop improvement methods over the centuries It features an extensive historical treatment of development including influential individuals in the field plant cultivation in various regions techniques used in the Old World and cropping in ancient America The advances of scientific plant breeding in the twentieth century is extensively explored including efficient selection methods hybrid breeding induced polyploidy mutation research biotechnology and genetic manipulation Finally this book presents information on approaches to the sustainability of breeding and to cope with climatic changes as well as the growing world population Genetic Resources, Chromosome Engineering, and Crop Improvement: Ram J. Singh, 2009-01-15 In recent decades livestock producers have moved away from open grazing for a number of reasons none having to do with the health of consumers Genetic Resources Chromosome Engineering and Crop Improvement Forage Crops demonstrates how state of the art technology can encourage the raising of livestock in open pastures where they can be fed gra **Crop Improvement in the Era of Next-Generation Sequencing** Manohar Chakrabarti, Umesh K. Reddy, Nabanita Chattopadhyay, 2025-02-27 To feed the burgeoning world population global food production must increase drastically This is becoming more challenging with the imminent threats of global climate change especially the incidences of abiotic stresses such as drought heat and salinity are predicted to increase soon Global climate change may also affect plant biotic interactions Additionally modernization in underdeveloped and developing countries is expected to decrease available land for agricultural usage Thus to achieve sustainable agricultural development it is imperative to produce more food without using additional land and other valuable resources including water These necessitates should develop novel rapid and robust crop improvement methods that complement traditional plant breeding approaches Crop improvement strategies to tackle future challenges necessitate the elucidation of underlying genes and gene regulatory networks The dwindling cost of next generation sequencing and the emergence of novel sequencing approaches such as long read sequencing technology e g PacBio Oxford Nanopore and others are transforming agricultural research at an unprecedented rate is opening a plethora of opportunities in turbocharging crop improvement initiatives Recent advances in next generation sequencing will continue to play a pivotal role in future crop improvement efforts However the progress of genomic technologies has not been uniformed world wide Thus it is now relevant to compile

a collection of recent advancements in the field of structural functional and comparative genomics and its relevance to crop improvement so that it is disseminated to a broader audience

This book delves into Molecular Techniques In Crop Improvement. Molecular Techniques In Crop Improvement is an essential topic that must be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Molecular Techniques In Crop Improvement, encompassing both the fundamentals and more intricate discussions.

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- This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Molecular Techniques In Crop Improvement.

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