

GENETIC RESOURCES, CHROMOSOME ENGINEERING,  
AND CROP IMPROVEMENT SERIES



**Volume 1**

# GENETIC RESOURCES, CHROMOSOME ENGINEERING, AND CROP IMPROVEMENT

**Grain Legumes**



EDITED BY  
RAM J. SINGH AND PREM P. JAUHAR

# Genetic Resources Chromosome Engineering And Crop Improvement Grain Legumes Volume I

**Ram J. Singh, Prem P. Jauhar**



## **Genetic Resources Chromosome Engineering And Crop Improvement Grain Legumes Volume I:**

Genetic Resources, Chromosome Engineering, and Crop Improvement Ram J. Singh, Prem P. Jauhar, 2005-03-16 The first book in this new series discusses grain legumes which rank only second to cereals in supplying calories and protein to the world's population. With each chapter written by an internationally renowned scientist, the book reviews the role of alien germplasm for the domestication of each major legume crop. Discussion for each crop covers origin, germplasm exploration and maintenance, taxonomy, germplasm enhancement through chromosome engineering, mutation breeding, and contributions of biotechnological methods. *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 grass. **Genetic Resources, Chromosome Engineering, and Crop Improvement** Ram J. Singh, Prem P. Jauhar, 2005-03-16 The first book in this new series discusses grain legumes which rank only second to cereals in supplying calories and protein to the world's population. With each chapter written by an internationally renowned scientist, the book reviews the role of alien germplasm for the domestication of each major legume crop. Discussion for each crop covers origin, germplasm exploration and maintenance, taxonomy, germplasm enhancement through chromosome engineering, mutation breeding, and contributions of biotechnological methods. *Genetic Resources, Chromosome Engineering, and Crop Improvement: Grain Legumes* serves as the standard reference for improving the yield for legumes. **Genetic Resources, Chromosome Engineering, and Crop Improvement** Ram J. Singh, Prem P. Jauhar, 2006-01-13 Summarizing landmark research, Volume 2 of this essential series furnishes information on the availability of germplasm resources that breeders can exploit for producing high-yielding cereal crop varieties. Written by leading international experts, this volume offers the most comprehensive and up-to-date information on employing genetic resources. **Genetic Resources, Chromosome Engineering, and Crop Improvement** Ram J. Singh, 2006-11-07 The second book in this new series discusses grain legumes which rank second only to cereals in supplying calories and protein to the world's population. Genetic Resources, Chromosome Engineering, and Crop Improvement Ram J. Singh, Prem P. Jauhar, 2005-03-16 The first book in this new series discusses grain legumes which rank only second to cereals in supplying calories and protein to the world's population. With each chapter written by an internationally renowned scientist, the book reviews the role of alien germplasm for the domestication of each major legume crop. Discussion for each crop covers origin, germplasm exploration and maintenance, taxonomy, germplasm enhancement through chromosome engineering, mutation breeding, and contributions of biotechnological methods. *Genetic Resources, Chromosome Engineering, and Crop Improvement: Grain Legumes* serves as the standard reference for improving the yield for legumes. **Genetic Resources, Chromosome Engineering, and Crop Improvement** Ram J. Singh, Prem P. Jauhar, 2005-03-16 The first book in this new series discusses grain legumes which rank only second to cereals in supplying calories and protein to the world's population. With each

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**Biology and Breeding of Food Legumes** Aditya Pratap, Jitendra Kumar, 2011 Food legumes are important constituents of the human diet and animal feed where they are crucial to a balanced diet supplying high quality proteins These crops also play an important role in low input agricultural production systems by fixing atmospheric nitrogen Despite systematic and continuous breeding efforts through conventional methods substantial genetic gains have not been achieved With the rise in demand for food legumes pulses and increased market value of these crops research has focused on increasing production and improving the quality of pulses for both edible and industrial purposes Biology and Breeding of Food Legumes covers the history origin and evolution botany breeding objectives and procedures nutritional improvement industrial uses and post harvest technology and also recent developments made through biotechnological intervention

**Genetic Resources, Chromosome Engineering, and Crop Improvement** Ram J. Singh, Prem P. Jauhar, 2005-03-16 The first book in this new series discusses grain legumes which rank only second to cereals in supplying calories and protein to the world's population With each chapter written by an internationally renowned scientist the book reviews the role of alien germplasm for the domestication of each major legume crop Discussion for each crop covers origin germplasm exploration and maintenance taxonomy germplasm enhancement through chromosome

engineering mutation breeding and contributions of biotechnological methods Genetic Resources Chromosome Engineering and Crop Improvement Grain Legumes serves as the standard reference for improving the yield for legumes Climate Change and Management of Cool Season Grain Legume Crops Shyam Singh Yadav, David L. McNeil, Robert Redden, Sharanagouda A. Patil, 2010-06-03 This book covers all aspect of legume production management technologies plant ecological response nutrients management biological nitrogen fixation molecular approaches potential cultivars biodiversity management under climate change Also covered are various aspects of legume management under climate change such as production management technology ecology physiology and crops response to nutrients drought salinity and water use efficiency Biodiversity management molecular approaches and biological Nitrogen fixation climate change and strategies This book presents the most comprehensive and up to date review of research on different cool season grain legume crops nutrients management biotic and abiotic stresses management agronomical approaches for drought management salinity drought weed management and water use efficiency impact on international trade around the world *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture* Food and Agriculture Organization of the United Nations, 2010-01-01 Plant genetic resources provide a basis for food security livelihood support and economic development as a major component of biodiversity The Second Report on the State of the World s Plant Genetic Resources for Food and Agriculture demonstrates the central role plant genetic diversity continues to play in shaping agriculture growth in the face of climate change and other environmental challenges It is based on information gathered from Country Reports regional syntheses thematic studie s and scientific literature documenting the major achievements made in this sector during the past decade and identifying the critical gaps and needs that should urgently be addressed The Report provides the decision makers with a technical basis for updating the Global Plan of Action on Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture It also aims to attract the attention of the global community to set priorities for the effective management of plant genet ic resources for the future Purchase a print copy **The Beans and the Peas** Aditya Pratap, Sanjeev Gupta, 2020-11-22 The Beans and the Peas From Orphan to Mainstream Crops presents a comprehensive literature resource on the most important food legume crops previously known as orphans but which are increasingly becoming mainstream as their production opportunities have been improved through genetic improvement and biotechnology and their role as an important nutrient source gains urgency This book focuses on 12 important food legumes and discusses all relevant aspects on their economic importance crop statistics botany and their general description It also provides exhaustive information on plant genetic resources and their use genetic improvement resistance to biotic and abiotic stresses improved varieties agronomy seed system and use of information and communication tools in each individual food legume Development of innovative biotechnological tools genetic transformation and the genome sequencing information has also been covered in each chapter providing the readers with state of the art information on pulses All

chapters have been supported by relevant figures illustrations and tables which make the contents accessible and easy to understand Each of the chapters has been authored by globally known scientists researchers presenting up to date information on various aspects of food legumes This book provides a current and comprehensive treatise to the readers and will be tremendously helpful in furthering their academic and research pursuits Provides a single volume resource on the most important food legumes having a prominent role in food and nutritional security Written by experts with a focus on providing foundational information for further research and development Presents both theoretical aspects and application based case studies Supported by relevant figures illustrations and tables

**Wild Crop Relatives: Genomic and Breeding Resources** Chittaranjan Kole,2011-02-24 Wild crop relatives are now playing a significant part in the elucidation and improvement of the genomes of their cultivated counterparts This work includes comprehensive examinations of the status origin distribution morphology cytology genetic diversity and available genetic and genomic resources of numerous wild crop relatives as well as of their evolution and phylogenetic relationship Further topics include their role as model plants genetic erosion and conservation efforts and their domestication for the purposes of bioenergy phytomedicines nutraceuticals and phytoremediation Wild Crop Relatives Genomic and Breeding Resources comprises 10 volumes on Cereals Millets and Grasses Oilseeds Legume Crops and Forages Vegetables Temperate Fruits Tropical and Subtropical Fruits Industrial Crops Plantation and Ornamental Crops and Forest Trees It contains 125 chapters written by nearly 400 well known authors from about 40 countries

**The Challenge of Protein Crops as a Sustainable Source of Food and Feed for the Future** Antonio M. De Ron,Francesca Sparvoli,José J. Pueyo,Didier Bazile,2017-05-03 Grain legumes together with quinoa and amaranth pseudocereals and other crops are attractive candidates to satisfy the growing demand for plant protein production worldwide for food and feed Despite their high value many protein crops have not been adequately assessed and numerous species are underutilized Special attention has to be paid to genetic diversity and landraces and to the key limiting factors affecting yield including water deficiency and other abiotic and biotic stresses in order to obtain stable reliable and sustainable crop production through the introduction and local adaptation of genetically improved varieties Legumes the main protein crops worldwide contribute to the sustainable improvement of the environment due to their ability to fix nitrogen and their beneficial effects on the soil They play a key role in the crop diversification and sustainable intensification of agriculture particularly in light of new and urgent challenges such as climate change and food security In addition the role of legumes in nutrition has been recognized as a relevant source of plant protein together with other benefits for health Chapters dealing with common bean lupine soybean lentil cowpea and Medicago are included in this book Most contributions deal with legumes but the significant number of papers on different aspects of quinoa gives an idea of the increasing importance of this protein crop Pseudocereals such as quinoa and amaranth are good sources of proteins Quinoa and amaranth seeds contain lysine an essential amino acid that is limited in other grains Nutritional evaluations of quinoa

indicate that it constitutes a source of complete protein with a good balance among all of the amino acids needed for human diet and also important minerals vitamins high quality oils and flavonoids Other protein crops also included in this book are hemp cotton and cereals maize wheat and rice Although cereals protein content is not high their seeds are largely used for human consumption In this book are included articles dealing with all different aspects of protein crops including nutritional value breeding genetic diversity biotic and abiotic stress cropping systems or omics which may be considered crucial to help provide the plant proteins of the future Overall the participation of 169 authors in 29 chapters in this book indicates an active scientific community in the field which appears to be an encouraging reflect of the global awareness of the need for sustainability and the promising future of proteins crops as a source of food and feed

*Broadening the Genetic Base of Grain Legumes* Mohar Singh, Ishwari Singh Bisht, Manoranjan Dutta, 2014-10-28 Grain legumes play significant and diverse role in the farming systems and provide nutrition security to the largely vegetarian and relatively poorer people around the world These are ideal crops for achieving three simultaneous developmental goals viz reducing poverty improving human health and nutrition and enhancing ecosystem resilience Globally grain legumes are the second most important crop group next only to cereals but a large proportion of area of it is under rainfed low input systems as compared to cereals contributing to lower yields The other important factor responsible for reduced yield in grain legumes is the narrow genetic base of the present day pulse varieties In order to break the yield barriers of these cultivars new sources of genes alleles need to be identified and suitably incorporated into the adapted background The information on various aspects of grain legume improvement although has been considerable in the recent past these information are highly scattered and not available at one place The present book consists of comprehensive and latest crop wise information on important grain legumes of the world including their distribution gene pool systematics status of genetic and genomic resources production constraints traits of importance crop improvement methodologies both conventional as well as contemporary and future strategies to be adopted for comprehensive grain legume improvement in various agro ecological target areas of the globe The chapters have been contributed by eminent crop experts from across the world engaged in research in their respective crops for the past several years thus providing a rare insight into the crop specific constraints and prospects drawing from their rich overall experience The book therefore will be a useful source of information to the grain legume researchers students policy planners and developmental experts alike

**Gene Flow Between Crops and Their Wild Relatives** Meike S. Andersson, M. Carmen de Vicente, 2010-02 Reviewing the relevant scientific and technical literature this work summarizes the current state of the art knowledge related to gene flow and introgression the permanent incorporation of genetic information from one set of differentiated populations into another between genetically modified crops and their wild relatives They analyze the biological framework for protecting the genetic integrity of indigenous wild relatives of crops in centers of crop origin and diversity focusing on the issues of emission dispersal and deposition of pollen and or seed the

likelihood and extent of gene flow from crops to wild relatives and stabilization and the spread of traits in wild species The material is organized into crop chapters each of which covers general biological information of the crop the most important crop wild relatives together with information about their ploidy levels diverse genomes centers of origin and geographic distribution the crop s potential for hybridization with its wild relatives pollen flow studies related to pollen dispersal distances and hybridization rates the current state of the genetic modification technology regarding that crop and research gaps The crop chapters discuss banana and plantain barley canola and oilseed rape cassava manioc and yucca chickpea common bean cotton cowpea finger millet maize and corn oat peanut and groundnut pearl millet pigeonpea potato rice sorghum soybean sweet potato batata and camote and wheat and bread wheat *North American Crop Wild Relatives, Volume 2* Stephanie L. Greene, Karen A. Williams, Colin K. Khoury, Michael B. Kantar, Laura F. Marek, 2019-03-14 The plant species that humans rely upon have an extended family of wild counterparts that are an important source of genetic diversity used to breed productive crops These wild and weedy cousins are valuable as a resource for adapting our food forage industrial and other crops to climate change Many wild plant species are also directly used especially for revegetation and as medicinal and ornamental plants North America is rich in these wild plant genetic resources This book is a valuable reference that describes the important crop wild relatives and wild utilized species found in Canada the United States and Mexico The book highlights efforts taken by these countries to conserve and use wild resources and provides essential information on best practices for collecting and conserving them Numerous maps using up to date information and methods illustrate the distribution of important species and supplement detailed description on the potential value these resources have to agriculture as well as their conservation statuses and needs There is broad recognition of the urgent need to conserve plant diversity however a small fraction of wild species is distinguished by their potential to support agricultural production Many of these species are common even weedy and are easily overshadowed by rare or endangered plants Nevertheless because of their genetic proximity to agriculturally important crops or direct use they deserve to be recognized celebrated conserved and made available to support food and agricultural security This comprehensive two volume reference will be valuable for students and scientists interested in economic botany and for practitioners at all levels tasked with conserving plant biodiversity

**Legumes: Physiology and Molecular Biology of Abiotic Stress Tolerance** Prakash Muthu Arjuna Samy, Anandan Ramasamy, Viswanathan Chinnusamy, B. Sunil Kumar, 2023-02-02 This edited volume provides state of the art overview of abiotic stress responses and tolerance mechanisms of different legume crops viz chickpea mung bean lentil black gram cowpea cluster bean soybean and groundnut Legumes play an important role in human nutrition and soil health through fixation of nitrogen Legume production and productivity are vulnerable to different abiotic stresses A proper understanding about the physiological and molecular basis of the legume crops is essential for genetic improvement of abiotic stress tolerance This book consists of 15 chapters covering physiological and biochemical basis molecular



physiology molecular breeding genetics genomics transgenics epigenetics of drought saline high temperature and nutrient deficiency stresses and the role of microRNAs in abiotic stress tolerance This volume offers new perspectives in legume crop abiotic stress management and is useful for various stakeholders including post graduates students scientists environmentalists and policymakers

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