

Wheat Introgression
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Alien Introgression in Wheat

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Book And Alien Introgression Wheat Cytogenetics Molecular

**Márta Molnár-Láng, Carla
Ceoloni, Jaroslav Doležel**



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Alien Introgression in Wheat Márta Molnár-Láng, Carla Ceoloni, Jaroslav Doležel, 2015-11-20 This book provides an overview of the latest advancements in the field of alien introgression in wheat The discovery and wide application of molecular genetic techniques including molecular markers in situ hybridization and genomics has led to a surge in interspecific and intergeneric hybridization in recent decades The work begins with the taxonomy of cereals especially of those species which are potential gene sources for wheat improvement The text then goes on to cover the origin of wheat breeding in connection with alien introgressions and the problems of producing intergeneric hybrids and backcross derivatives These problems can include crossability sterility and unequal chromosome transmission The work then covers alien introgressions according to the related species used as well as new results in the field of genomics of wild wheat relatives and introgressions

Alien Introgression in Wheat Márta Molnár-Láng, Carla Ceoloni, Jaroslav Doležel, 2015 This book provides an overview of the latest advancements in the field of alien introgression in wheat The discovery and wide application of molecular genetic techniques including molecular markers in situ hybridization and genomics has led to a surge in interspecific and intergeneric hybridization in recent decades The work begins with the taxonomy of cereals especially of those species which are potential gene sources for wheat improvement The text then goes on to cover the origin of wheat breeding in connection with alien introgressions and the problems of producing intergeneric hybrids and backcross derivatives These problems can include crossability sterility and unequal chromosome transmission The work then covers alien introgressions according to the related species used as well as new results in the field of genomics of wild wheat relatives and introgressions

The Oxford Handbook of Agricultural History Jeannie M. Whayne, 2024 Agricultural history has enjoyed a rebirth in recent years in part because the agricultural enterprise promotes economic and cultural connections in an era that has become ever more globally focused but also because of agriculture's potential to lead to conflicts over precious resources The Oxford Handbook of Agricultural History reflects this rebirth and examines the wide reaching implications of agricultural issues featuring essays that touch on the green revolution the development of the Atlantic slave plantation the agricultural impact of the American Civil War the rise of scientific and corporate agriculture and modern exploitation of agricultural labor

Aegilops: Promising Genesources to Improve Agronomical and Quality Traits of Wheat Peter Shewry, Marianna Rakszegi, István Molnár, Eva Darko, Vijay Kumar Tiwari, 2020-09-02 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

Wheat

Evolution and Domestication Moshe Feldman, Avraham A. Levy, 2023-10-03 This open access book covers a century of research on wheat genetics and evolution starting with the discovery in 1918 of the accurate number of chromosomes in wheat. We re-evaluate classical studies that are pillars of the current knowledge considering recent genomic data in the wheat group comprising 31 species from the genera *Amblyopyrum*, *Aegilops*, *Triticum* and other more distant relatives. For these species we describe morphology, ecogeographical distribution, phylogeny as well as cytogenetic and genomic features. For crops we also address evolution under human selection, namely pre-domestication cultivation and domestication. We re-examine the genetic and archeological evidence of where, when and how domestication occurred. We discuss unique aspects of genome evolution and maintenance under polyploidization in natural and synthetic allopolyploids of the wheat group. Finally, we propose some thoughts on the future prospects of wheat improvement. As such, it can be of great interest to wheat researchers and breeders as well as to plant scientists and students interested in plant genetics, evolution, domestication and polyploidy.

Advances in Rice Genetics Gurdev S. Khush, D. S. Brar, B. Hardy, 2003 Genetics and breeding of agronomic traits. Genetic diversity, evolution and alien introgression. Molecular markers, QTL mapping and marker-assisted selection. Genomics. Gene isolation and function. Tissue culture and transformation. Genetics of rice pathogens.

Development and Molecular Cytogenetic Characterization of Alien Introgressions Conferring Resistance to Hessian Fly and Fusarium Head Blight in Wheat Ronell Joey Carcallas Cainong, 2014 Hexaploid wheat *Triticum aestivum* L. 2n 6x 42 AABBDD is a recent polyploid and originates from a limited number of founder genotypes. Domestication bottlenecks further reduced genetic diversity. The wheat gene pool, which consists of landraces and wild relatives such as rye (*Secale cereale* L.), *Leymus racemosus* Tien and *Elymus tsukushiensis* Honda, is a rich source of genetic diversity. Agronomically important traits can be transferred from these gene pools to wheat through chromosome engineering. This dissertation describes chromosome engineering and pre-breeding efforts for resistance to Hessian fly and Fusarium head blight (FHB) in wheat. The germplasm with a whole arm rye translocation T2BS 2R 2L contains the highly effective Hessian fly resistance gene H21 and an unnamed powdery mildew resistance gene. Directed chromosome engineering was used to shorten the whole arm rye segment. The recovered wheat rye recombinant chromosome T2BS 2BL 2R 2L had a shorter rye segment but still contained the H21 gene and was transferred through backcrosses to adapted winter and spring wheat cultivars. This study released the germplasm KS09WGGRC51, which is used in wheat breeding programs in the U.S.A. Two novel sources of FHB resistance were identified in *L. racemosus* and *E. tsukushiensis*. *Fhb3* present in the wheat *L. racemosus* T7AL 7Lr 1S Robertsonian translocation was transferred into the adapted Kansas winter wheat cultivar Fuller. The wheat *E. tsukushiensis* disomic addition translocation line confers FHB resistance. Ph1b-induced homoeologous recombination was used to produce wheat *E. tsukushiensis* recombinants. The distal and interstitial recombinants were identified using molecular markers and genomic in situ hybridization (GISH). A combination of molecular cytogenetic analyses determined that the distal recombinant involved

wheat chromosome 1A and a small distal segment originating from the E tsukushiensis chromosome arm 1E superscript ts 1S resulting in the recombinant chromosome T1AL 1AS 1E superscript ts 1S The interstitial recombinant involves an unidentified wheat chromosome and appears to be highly rearranged Both recombinants confer high levels of type II FHB resistance resistance to spread within the head based on point inoculations in the greenhouse To date these two recombinants are the smallest alien introgression with FHB resistance in common wheat This germplasm material has been released as KS14WGRC61 The distal recombinant can be used directly for breeding of FHB resistant cultivars worldwide

Cereal Research Communications ,2005 Cytogenetics Marcelo L. Larramendy,Sonia Soloneski,2019-05-10

Cytogenetics Past Present and Further Perspectives discusses events that influenced the development of cytogenetics as a specialty within biology with special attention paid to methodological achievements developed worldwide that have driven the field forward Improvements to the resolution of chromosome analysis followed closely the introduction of innovative analytical technologies In that sense this book reviews and provides a brief account of the structure of chromosomes and stresses the high structural conservation in different species with an emphasis on aspects that require further research However it should be kept in mind that the future of cytogenetics will likely depend on improved knowledge of chromosome structure and function

Advances in Agronomy ,2013-09-11 Advances in Agronomy continues to be recognized as a leading reference and a first rate source for the latest research in agronomy As always the subjects covered are varied and exemplary of the myriad of subject matter dealt with by this long running serial Maintains the highest impact factor among serial publications in agriculture Presents timely reviews on important agronomy issues Enjoys a long standing reputation for excellence in the field

Advances in Wheat Genetics: From Genome to Field Yasunari Ogihara,Shigeo Takumi,Hirokazu Handa,2015-09-15 This proceedings is a collection of 46 selected papers that were presented at the 12th International Wheat Genetics Symposium IWGS Since the launch of the wheat genome sequencing project in 2005 the arrival of draft genome sequences has marked a new era in wheat genetics and genomics catalyzing rapid advancement in the field This book provides a comprehensive review of the forefront of wheat research across various important topics such as germplasm and genetic diversity cytogenetics and allopolyploid evolution genome sequencing structural and functional genomics gene function and molecular biology biotic stress abiotic stress grain quality and classical and molecular breeding Following an introduction 9 parts of the book are dedicated to each of these topics A final 11th part entitled Toward Sustainable Wheat Production contains 7 excellent papers that were presented in the 12th IWGS Special Session supported by the OECD With rapid population growth and radical climate changes the world faces a global food crisis and is in need of another Green Revolution to boost yields of wheat and other widely grown staple crops Although this book focuses on wheat many of the newly developed techniques and results presented here can be applied to other plant species with large and complex genomes As such this volume is highly recommended for all students and researchers in wheat sciences and related

plant sciences and for those who are interested in stable food production and food security *Alien Gene Transfer in Crop Plants, Volume 1* Aditya Pratap, Jitendra Kumar, 2013-11-01 Genetic engineering and biotechnology along with conventional breeding have played an important role in developing superior cultivars by transferring economically important traits from distant wild and even unrelated species to the cultivated varieties which otherwise could not have been possible with conventional breeding There is a vast amount of literature pertaining to the genetic improvement of crops over last few decades However the wonderful results achieved by crop scientists in food legumes research and development over the years are scattered in different journals of the World The two volumes in the series Alien Gene Transfer in Crop Plants address this issue and offer a comprehensive reference on the developments made in major food crops of the world These volumes aim at bringing the contributions from globally renowned scientists at one platform in a reader friendly manner The 1st volume entitled Alien Gene Transfer in Crop Plants Innovations Methods and Risk Assessment will deal exclusively with the process and methodology The contents of this volume have been designed to appraise the readers with all the theoretical and practical aspects of wide hybridization and gene transfer like processes and methods of gene transfer role of biotechnology with special reference to embryo rescue genetic transformation protoplast fusion and molecular marker technology problems such as cross incompatibility and barriers to distant hybridization and solutions to overcome them Since wild and weedy relatives of crop plants may have negative traits associated with them there are always possibilities of linkage drag while transferring alien alleles Therefore problems and limitations of alien gene transfer from these species will also be discussed in this series Further the associated risks with this and assessment of risks will also be given due weightage **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

Molecular Markers as Selection Tools for Introgression of Alien Disease Resistance Into Wheat Kenan Yalvac,1998 **Plant Cytogenetics** M. J. Puertas,2005 Cytogenetics and Genomics Physical Mapping Microdissection and microcloning of plant chromosomes Organization and evolution of highly repeated satellite DNA sequences in plant chromosomes Unraveling the genome structure of polyploids using FISH and GISH examples of sugarcane and banana Diversity of a major repetitive DNA sequence in diploid and polyploid Triticeae Variability of the chromosomal distribution of Ty3 gypsy retrotransposons in the populations of two wild Triticeae species Nuclear genome size and genomic distribution of ribosomal DNA in Musa and Ensete Musaceae taxonomic implications Cytogenetics and Genomics Physical Mapping Microdissection and microcloning of plant chromosomes Organization and evolution of highly repeated satellite DNA sequences in plant chromosomes Unraveling the genome structure of polyploids using FISH and GISH examples of sugarcane and banana Diversity of a major repetitive DNA sequence in diploid and polyploid Triticeae Variability of the chromosomal distribution of Ty3 gypsy etrotransposons in the populations of two wild Triticeae species Nuclear genome size and genomic distribution of ribosomal DNA in Musa and Ensete Musaceae taxonomic implications Long range organization of plant satellite repeats investigated using strand specific FISH Cytogenetic mapping in maize 3D Analysis of chromosome architecture advantages and limitations with SEM High resolution physical mapping of the secalin 1 locus of rye on extended DNA fibers Recent development of image analysis methods in plant chromosome research Nuclear and Chromosome Organization McClintock's controlling elements the full story Ribosomal DNA heterochromatin in plants The positioning of rye homologous chromosomes added to wheat through the cell cycle in somatic cells untreated and treated with colchicine Movement ability of rye terminal neocentromeres The simple ultrastructure of the maize kinetochore fits a two domain model Molecular analysis of holocentric centromeres of Luzula species The controversial telomeres of lily plants Novel phosphorylation of histone H3 at threonine 11 that temporally correlates with condensation of mitotic and meiotic chromosomes in plant cells Minichromosomes derived from the B chromosome of maize Differentiating plant cells switched to proliferation remodel the functional organization of nuclear domains Chromosome organization in wheat endosperm and embryo Cell Division Mitosis and Meiosis A strategy to investigate the plant meiotic proteome Plant chromosome homology hypotheses relating rendezvous recognition and reciprocal exchange Recombination nodules in plants Understanding the cytological diploidization mechanism of polyploid wild wheats Synaptic behaviour of hexaploid wheat haploids with different

effectiveness of the diploidizing mechanism Meiotic mutations in rye *Secale cereale* L Strategies for the study of meiosis in rye Centromere specific repetitive sequences from *Torenia* a model plant for interspecific fertilization and whole mount FISH of its interspecific hybrid embryos Genome evolution of allopolyploids a process of cytological and genetic diploidization Allopolyploidy a shaping force in the evolution of wheat genomes The genome organization and diversification of maize and its allied species revisited evidences from classical and FISH GISH cytogenetic analysis Architecture and evolution of dinoflagellate chromosomes an enigmatic origin The relationships among lemons limes and citron a chromosomal comparison Biogeographic distribution of polyploidy and B chromosomes in the apomictic *Boechera holboellii* complex Robertsonian translocations in wheat arise by centric misdivision of univalents at anaphase I and rejoining of broken centromeres during interkinesis of meiosis II Molecular cytogenetics and tandem repeat sequence evolution in the allopolyploid *Nicotiana rustica* compared with diploid progenitors *N. paniculata* and *N. undulata* Identification of individual chromosomes and parental genomes in *Brassica juncea* using GISH and FISH Cytogenetics and Plant Breeding Wheat cytogenetics in the genomics era and its relevance to breeding Recent developments in durum wheat chromosome engineering Production of alien chromosome additions and their utility in plant genetics Recent progress in barley improvement using wild species of *Hordeum* Detection of alien chromatin introgression from *Thinopyrum* into wheat using S genomic DNA as a probe A landmark approach for *Thinopyrum* genome research Characterization of derivatives from wheat *Thinopyrum* wide crosses Development and characterization of potato *Solanum brevidens* chromosomal addition substitution lines Limitations of in situ hybridization with total genomic DNA in routine screening for alien introgressions in wheat Cytogenetics of *Hordeum chilense* current status and considerations with reference to breeding Cytogenetics of *Triticum x Dasypyrum* hybrids and derived lines A decade of chromosome painting in *Lolium* and *Festuca* Central cell nuclear cytoplasmic incongruity a mechanism for segregation distortion in advanced backcross and selfed generations of *Allium cepa* L x *Allium fistulosum* L x *A. cepa* interspecific hybrid derivatives

Chromosome Rearrangements and Homoeologous Pairing ,1997* Utilisation of Molecular Markers in the Selection and Characterisation of Wheat-alien

Recombinant Chromosomes Imtiaz Ahmed Khan,1996 his is a comprehensive study of induced homoeologous recombination along most of the complete genetic length of two homoeologous chromosomes in the Triticeae 7A of common wheat and 7Ai of *Agropyron* intermedium using co dominant DNA markers Chromosome 7Ai was chosen as a model alien chromosome because it has been reported to carry agronomically important genes conferring resistance to stem rust and barley yellow dwarf virus on its short and long arms respectively *Alien introgression and breeding of synthetic wheat* Wei Zhang,2019

Physiological, Molecular, and Genetic Perspectives of Wheat Improvement Shabir H Wani,Amita Mohan,Gyanendra Pratap Singh,2020-12-17 World population is growing at an alarming rate and may exceed 9.7 billion by 2050 whereas agricultural productivity has been negatively affected due to yield limiting factors such as biotic and abiotic stresses as a

result of global climate change Wheat is a staple crop for 20% of the world population and its yield needs be augmented correspondingly in order to satisfy the demands of our increasing world population Green revolution the introduction of semi dwarf high yielding wheat varieties along with improved agronomic management practices gave rise to a substantial increase in wheat production and self sufficiency in developing countries that include Mexico India and other south Asian countries Since the late 1980 s however wheat yield is at a standoff with little fluctuation The current trend is thus insufficient to meet the demands of an increasing world population Therefore while conventional breeding has had a great impact on wheat yield with climate change becoming a reality newer molecular breeding and management tools are needed to meet the goal of improving wheat yield for the future With the advance in our understanding of the wheat genome and more importantly the role of environmental interactions on productivity the idea of genomic selection has been proposed to select for multi genic quantitative traits early in the breeding cycle Accordingly genomic selection may remodel wheat breeding with gain that is predicted to be 3 to 5 times that of crossbreeding Phenomics high throughput phenotyping is another fairly recent advancement using contemporary sensors for wheat germplasm screening and as a selection tool Lastly CRISPR Cas9 ribonucleoprotein mediated genome editing technology has been successfully utilized for efficient and specific genome editing of hexaploid bread wheat In summary there has been exciting progresses in the development of non GM wheat plants resistant to biotic and abiotic stress and or wheat with improved nutritional quality We believe it is important to highlight these novel research accomplishments for a broader audience with the hope that our readers will ultimately adopt these powerful technologies for crops improvement in order to meet the demands of an expanding world population **Genetic**

Analyses of Wheat and Molecular Marker-Assisted Breeding, Volume 1 Jichun Tian,Zhiying DENG,Kunpu

Zhang,Haixia Yu,Xiaoling Jiang,Chun Li,2015-10-22 The book mainly describes the QTL mappings and efficacy analyses that are associated with wheat productivity quality physiology and various stress resistances and provides summaries of results from studies conducted both at home and abroad It presents comparable data and analyses helping readers to arrive at a more comprehensive understanding of the latest development in this field The book provides a wealth of novel information broad range of applications and in depth findings on crop genetics and molecular breeding making it valuable not only for plant breeders but also for academic faculties senior researchers and advanced graduate students who are involved in plant breeding and genetics Dr Jichun Tian is a professor at the Department of Agronomy Shandong Agricultural University Tai an China

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