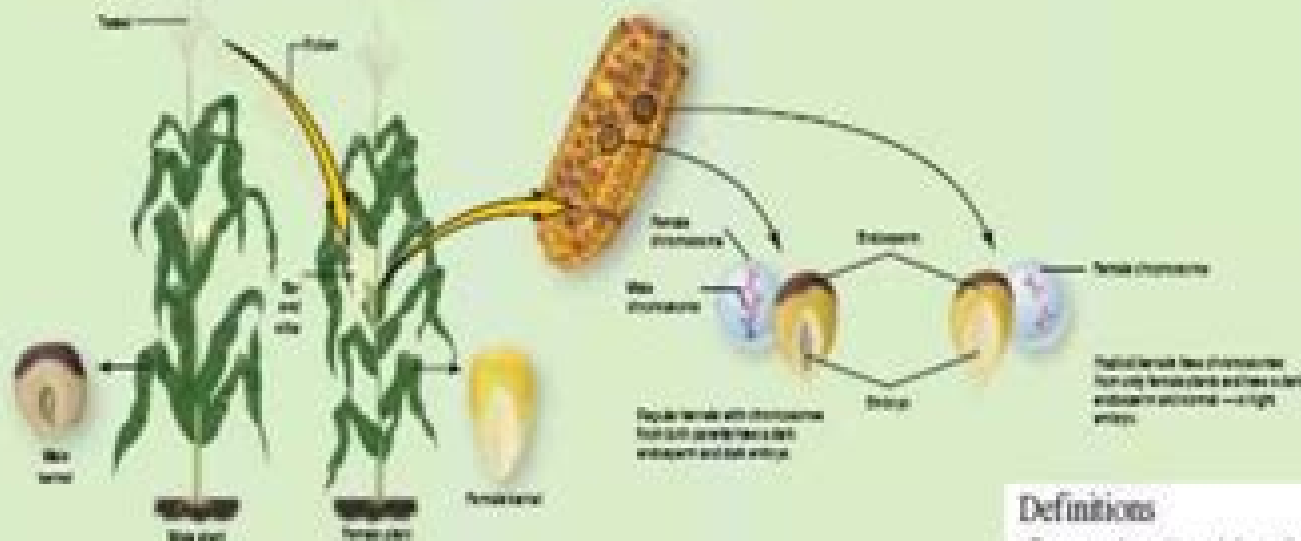


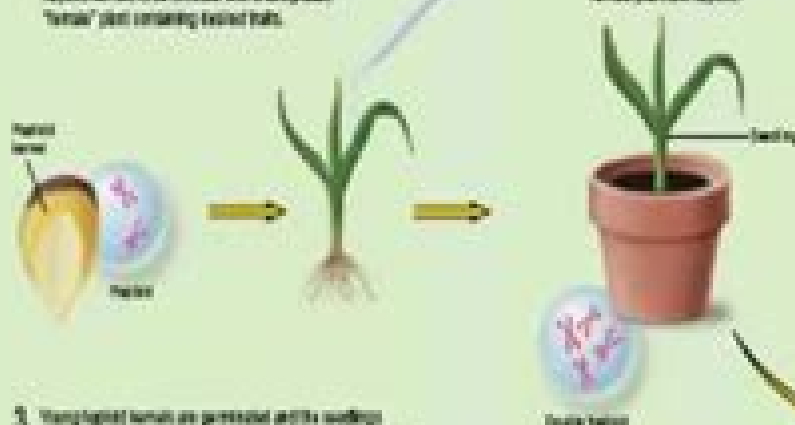
Doubled Haploids

Gaining speed and greater genetic purity when developing inbreds



1 Like all plants, corn is comprised of both male and female chromosomes. On a corn plant, the male chromosome is located in the tassel — female chromosomes include the ear and silks. When creating doubled haploids, breeders develop a unique "male" plant that creates haploid female to be crossed with a designated "female" plant containing desired traits.

2 The corn produces ears containing units of regular and haploid female. Ears are harvested by hand and haploid female are selected based on appearance. Female, containing only genetic material from the female plant are haploid.



3 Young haploid female are germinated and the seedlings are then treated with a compound that doubles their genetic material making them genetically pure plants — meaning they contain only genes from their female parent.

4 The seedlings are then transplanted to outdoor nurseries for further research and development.

Definitions

- **Chromosome** Long stringy set of genes that carry heredity information.
- **Haploid** A cell containing one set of chromosomes.
- **Homozygous** Having identical genes or traits.
- **Hybrid** The product of a cross between genetically unlike individuals.
- **Inbred** Fully homozygous line.



5 From this field, researchers select the best possible plants to be an elite parent for a Pioneer commercial hybrid.

Haploids In Crop Improvement Ii

Toshiyuki Nagata, Y.P.S. Bajaj



Haploids In Crop Improvement II:

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 Haploids in Crop Improvement II C. E. Don Palmer, Wilfred A. Keller, Ken J. Kasha, 2005-02-14 Overview of Haploidy Pathways to Microspore Embryogenesis The Role of Stress in the Induction of Haploid Microspore Embryogenesis Microspore Embryo Induction and Development in Higher Plants Cytological and Ultrastructural Aspects Biochemical and Molecular Aspects of Haploid Embryogenesis Storage Product Metabolism in Microspore Derived Cultures of Brassicaceae Chromosome Doubling and Recovery of Doubled Haploids Utilization of Microspore Derived Embryos Haploids in the Improvement of Solanaceous Species Haploids in the Improvement of Crucifers Haploids in the Improvement of Poaceae Haploids in the Improvement of Woody Species Haploids in the Improvement of Miscellaneous Crop Species Cucurbitaceae Liliaceae Asparageceae Chenopodiaceae Araceae and Umbelliferae Haploids in the Improvement of Numbers of the Linaceae and Asteraceae Challenges and Limitations to the Use of Haploidy in Crop Improvement Somatic Hybridization in Crop Improvement II Toshiyuki Nagata, Y.P.S. Bajaj, 2012-12-06 This richly illustrated volume describes how somatic hybrids can contribute to the improvement of crops It comprises 24 chapters dealing with interspecific and intergeneric somatic hybridization and cybridization providing valuable tools for plant breeders **Somaclonal Variation in Crop Improvement II** Y. P. S. Bajaj, 2012-12-06 In continuation of Somaclonal Variation and Crop Improvement I 1990 this volume is comprised of twenty four chapters dealing with somaclonal variants showing resistance to salt drought herbicides viruses Alternaria Fusarium Glomerella Verticillium Phytophthora fall armyworm etc in a number of plants of economic importance It is divided into two sections Section I Somaclonal Variation in Agricultural Crops wheat rice maize sorghum potato tomato Lotus Stylosanthes banana strawberry citrus colt cherry Section II Somaclonal Variation in Medicinal and Aromatic Plants Atropa Carthamus Hypericum Lavatera Nicotiana Primula Rauwolfia Scilla and Zinnia This book will be of great assistance to research workers teachers and advanced students of plant pathology tissue culture pharmacy horticulture and especially plant breeding **Advances in Haploid Production in Higher Plants** Alisher Touraev, Brian P. Forster, Shri Mohan Jain, 2008-12-18 The importance of

haploids is well known to geneticists and plant breeders. The discovery of anther derived haploid *Datura* plants in 1964 initiated great excitement in the plant breeding and genetics communities as it offered shortcuts in producing highly desirable homozygous plants. Unfortunately the expected revolution was slow to materialise due to problems in extending methods to other species including genotypic dependence, recalcitrance, slow development of tissue culture technologies and a lack of knowledge of the underlying processes. Recent years have witnessed great strides in the research and application of haploids in higher plants. After a lull in activities, drivers for the resurgence have been 1 development of effective tissue culture protocols, 2 identification of genes controlling embryogenesis and 3 large scale and wide spread commercial uptake in plant breeding and plant biotechnology arenas. The first major international symposium on Haploids in Higher Plants took place in Guelph, Canada in 1974. At that time there was much excitement about the potential benefits but in his opening address Sir Ralph Riley offered the following words of caution: I believe that it is quite likely that haploid research will contribute cultivars to agriculture in several crops in the future. However the more extreme claims of the enthusiasts for haploid breeding must be treated with proper caution. Plant breeding is subject from time to time to sweeping claims from enthusiastic proponents of new procedures.

Tobacco BY-2 Cells Toshiyuki Nagata, Seiichiro Hasezawa, Dirk Inzé, 2013-03-09. The first compilation of a wealth of knowledge on tobacco BY-2 cells, often cited as the HeLa cell line of higher plants. Basic issues of cell cycle progression, cytokinesis, cell organization and factors that are involved in these processes are covered in detail. Since the tobacco cell line is used as a tool for research in molecular and cellular biology, several chapters on such studies are also included. Further changes of primary and secondary metabolites during culture and factors that affect these processes are treated. Last but not least, the so far unpublished historical background of the BY-2 cell line is described. This volume is a must for any scientist working in the field of plant biology.

Brassica Eng Chong Pua, Carl J. Douglas, 2013-04-17. Recent advances in plant cell and molecular biology have opened new avenues for the improvement of crop plants in the genus *Brassica*, oilseeds and vegetables of worldwide economic importance. This volume reviews advances in various areas of *Brassica* biotechnology. It covers the use of rapid cycle brassicas, tissue culture and gene transfer, molecular genetics, biotic and abiotic stress resistance and molecular farming. Contributors are world leading international *Brassica* researchers. The volume is an invaluable reference for plant breeders, researchers and graduate students in the fields of plant biotechnology, agronomy, horticulture, genetics and cell and molecular biology.

Brassicas and Legumes From Genome Structure to Breeding Toshiyuki Nagata, Satoshi Tabata, 2013-03-09. Genome sequence studies have become more and more important for plant breeding. *Brassicas and Legumes From Genome Structure to Breeding* comprises 16 chapters and presents both an overview and the latest results of this rapidly expanding field. Topics covered include genome analysis of a flowering plant, *Arabidopsis thaliana*, the sequence of the *Arabidopsis* genome as a tool for comparative structural genomics in *Brassicaceae*, application of molecular markers in *Brassica* coenospecies, the molecular genetic basis of flowering

time variation in Brassica species quantitative trait loci for clubroot resistance in Brassica oleracea structural differences of S locus between Brassica oleracea and Brassica rapa Brassica and legume chromosomes sequence analysis of the Lotus japonicus genome introduction of an early flowering accession Miyakojima MG 20 to molecular genetics in Lotus japonicus genetic linkage map of the model legume Lotus japonicus construction of a high quality genome library of Lotus japonicus genome analysis of Mesorhizobium loti a symbiotic partner to Lotus japonicus molecular linkage map of the model legume Medicago truncatula genetic mapping of seed and nodule protein markers in diploid alfalfa Medicago sativa mapping the chickpea Cicer arietinum genome localization of fungal resistance genes in interspecific crosses **Somatic**

Embryogenesis Abdul Mujib, Jozef Šamaj, 2006-02-22 Somatic embryogenesis the initiation of embryos from previously differentiated somatic cells is a unique process in plants This volume expands our view of a subject that is important for plant biotechnology genetics cell biology development and agricultural applications All chapters present the latest research progress including functional genomic genetic and proteomic approaches A special focus is placed on the effects of stress environment and plant growth regulators on embryogenesis The role of genes such as Leafy Cotyledons and Baby Boom in defining and maintaining cell competence is discussed **Crop Improvement - II (Rabi crops)** Mr. Rohit

Manglik, 2024-07-29 Breeding approaches and yield improvement of winter season rabi crops **Chromosome Biology** Rudi Appels, R. Morris, Bikram S. Gill, C. E. May, 2012-12-06 Chromosome biology has been brought to a golden age by phenomenal advanced in molecular genetics and techniques This is true in the plant arena and it is becoming increasingly true in animal studies where chromosomes are more difficult to work with With advanced knowledge of transformation scientists can tell exactly where a new element enters a chromosome Conversely molecular biologists can make large mistakes if they do not understand the behavior of chromosomes Written by internationally recognized experts in the field this book is the most authoritative work on the subject to date Students of genetics crop science and plant breeding entomology animal science and related fields will benefit from this comprehensive and practical textbook **Gene**

Manipulation in Plant Improvement II J. Perry Gustafson, 2012-12-06 There are clearly many directions in which the further development of the GUS gene fusion system can progress Some of these have been outlined above but others can be imagined There are no reasons to limit our conceptions of the use of GUS gene fusions to analysis and manipulation of single genes We can envision numerous marked genes perhaps with several new fusion systems giving valuable information about gene interaction or population structure The study of plant pathogen and plant symbiont interactions can progress rapidly with simple quantitative markers for genes and individuals We can imagine ways of using gene fusions to report on crop physiology or other complex phenotypes thereby enhancing the accuracy and speed of screening Introduction of the biosynthetic pathway for glucuronide detoxification by expressing genes for the UDP glucuronyl transferases in plants may result in novel mechanisms for plants to deal with xenobiotics such as insecticides or herbicides Synthesis of substrates

which until now has been performed chemically resulting in expensive compounds can be done biosynthetically. This should make the system not only the most powerful gene fusion system for agriculture but also the most accessible. In Vitro Haploid Production in Higher Plants S. Mohan Jain, S.K. Sopory, R.E. Veilleux, 2013-03-09. Since the beginning of agricultural production there has been a continuous effort to grow more and better quality food to feed ever increasing populations. Both improved cultural practices and improved crop plants have allowed us to divert more human resources to non agricultural activities while still increasing agricultural production. Malthusian population predictions continue to alarm agricultural researchers especially plant breeders to seek new technologies that will continue to allow us to produce more and better food by fewer people on less land. Both improvement of existing cultivars and development of new high yielding cultivars are common goals for breeders of all crops. In vitro haploid production is among the new technologies that show great promise toward the goal of increasing crop yields by making similar germplasm available for many crops that was used to implement one of the greatest plant breeding success stories of this century i.e. the development of hybrid maize by crosses of inbred lines. One of the main applications of anther culture has been to produce diploid homozygous pure lines in a single generation thus saving many generations of backcrossing to reach homozygosity by traditional means or in crops where self pollination is not possible. Because doubled haploids are equivalent to inbred lines their value has been appreciated by plant breeders for decades. The search for natural haploids and methods to induce them has been ongoing since the beginning of the 20th century. 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.

Indonesian Journal of Agriculture ,2009 *The Indian Journal of Agricultural Sciences* ,2018 **Proceedings of the Vth International Symposium on In Vitro Culture and Horticultural Breeding** ,2006 *Transgenic Crops I* Y.P.S. Bajaj, 1999-11-02. Recently there has been tremendous progress in the genetic transformation of agricultural crops and plants resistant to insects herbicides and diseases have been produced field tested and patented. *Transgenic Crops I* compiles this information on cereals grasses legumes and oilseed crops. This book is of special interest to advanced students teachers and research workers in the field of plant breeding genetics molecular biology plant tissue culture and plant biotechnology in general. **BOOK JACKET Title Summary** field provided by Blackwell North America Inc. All Rights Reserved. *Acta Physiologiae Plantarum* ,1978 Somatic Embryogenesis and Synthetic Seed II Y. P. S. Bajaj, 1995-03-16. While working in the laboratory of Professor Dr Jacob Reinert at the Freie Universitat Berlin 1974-1976 I had the opportunity to become

deeply involved in studying the intricacies of the fascinating phenomenon of somatic embryogenesis in plant cells and protoplasts. In numerous stimulating discussions with Professor Reinert on this subject I was fully convinced that somatic embryogenesis would become one of the most important areas of study not only regarding basic and fundamental aspects but also for its application in crop improvement. During the last decade we have witnessed tremendous interest and achievements in the use of somatic embryos for the production of synthetic seeds for micropropagation, genetic transformation, cryopreservation and conservation of germplasm. The en masse production of somatic embryos in the bioreactors has facilitated some of these studies. Somatic embryos have now been induced in more than 300 plant species belonging to a wide range of families. It was therefore felt that a compilation of literature state of the art on this subject was necessary. Thus two volumes on Somatic Embryo genesis and Synthetic Seed have been compiled which contain 65 chapters contributed by International experts. Somatic Embryogenesis and Synthetic Seed I comprises 31 chapters arranged in 3 sections. Section I Commitment of the cell to somatic embryogenesis, early events, anatomy, molecular basis, gene expression, role of polyamines, machine vision analysis of somatic embryos. Section II Applications of somatic embryos, technology of synthetic seed, fluid drilling, micropropagation, genetic transformation through somatic embryos, cryopreservation.

Haploids In Crop Improvement Ii Book Review: Unveiling the Power of Words

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