Plant Breeding Allard

Quantitative Genetics in Maize BreedingGenomic Selection for Crop ImprovementEvolutionary Dynamics of Plant□Pathogen InteractionsBreeding Field CropsPrinciples of Plant Genetics and BreedingManaging Global Genetic ResourcesPrinciples of Plant BreedingDrought Resistance in Crops with Emphasis on RiceHorticultural Plant BreedingEmerging Technologies for Integrated Pest ManagementPlant BreedingPollination Mechanisms, Reproduction and Plant BreedingPlant BiotechnologyAdaptation in Plant BreedingAdvances in Plant Breeding Strategies: Breeding, Biotechnology and Molecular ToolsPlant Biotechnology and GeneticsPrinciples and Procedures of Plant BreedingPlant Breeding in the Omics EraManaging Plant Genetic DiversityThe ChromosomesGenetic Resources of Phaseolus BeansQuantitative Genetics and Selection in Plant BreedingFaba Bean ImprovementBroadening the Genetic Base of Crop ProductionBreeding Crop PlantsPlant BreedingAdaptation in Plant BreedingKey Notes on Genetics and Plant BreedingPlant Genetics and Biotechnology in BiodiversityGenetic Engineering of PlantsPlant Breeding PerspectivesNiger, Guizotia Abyssinica (L. F.) CassRediscovery of Landraces as a Resource for the FutureQuantitative Genetics and Selection in Plant BreedingMale Sterility in Higher PlantsHost Specialization in the World Agromyzidae (Diptera)Principles of Cultivar Development: Theory and techniquePlant Breeding ReviewsPlant Breeding ReviewsFarmers, Scientists, and Plant Breeding

Quantitative Genetics in Maize Breeding

The revised edition of the bestselling textbook, covering both classical and molecular plant breeding Principles of Plant Genetics and Breeding integrates theory and practice to provide an insightful examination of the fundamental principles and advanced techniques of modern plant breeding. Combining both classical and molecular tools, this comprehensive textbook describes the multidisciplinary strategies used to produce new varieties of crops and plants, particularly in response to the increasing demands to of growing populations. Illustrated chapters cover a wide range of topics, including plant reproductive systems, germplasm for breeding, molecular breeding, the common objectives of plant breeders, marketing and societal issues, and more. Now in its third edition, this essential textbook contains extensively revised content that reflects recent advances and current practices. Substantial updates have been made to its molecular genetics and breeding sections, including discussions of new breeding techniques such as zinc finger nuclease, oligonucleotide directed mutagenesis, RNA-dependent DNA methylation, reverse breeding, genome editing, and others. A new table enables efficient comparison of an expanded list of molecular markers, including Allozyme, RFLPs, RAPD, SSR, ISSR, DAMD, AFLP, SNPs and ESTs. Also, new and updated “Industry Highlights” sections provide examples of the practical application of plant breeding methods to real-world problems. This new edition: Organizes topics to reflect the stages of an actual breeding project Incorporates the most recent technologies in the field, such as CRSPR genome edition and grafting on GM stock Includes numerous illustrations and end-of-chapter self-assessment questions, key references, suggested readings, and links to relevant websites Features a companion website containing additional artwork and

instructor resources Principles of Plant Genetics and Breeding offers researchers and professionals an invaluable resource and remains the ideal textbook for advanced undergraduates and graduates in plant science, particularly those studying plant breeding, biotechnology, and genetics.

Genomic Selection for Crop Improvement

Evolutionary Dynamics of Plant□Pathogen Interactions

Plant Breeding Reviews is an ongoing series presenting state-of-the art review articles on research in plant genetics, especially the breeding of commercially important crops. Articles perform the valuable function of collecting, comparing, and contrasting the primary journal literature in order to form an overview of the topic. This detailed analysis bridges the gap between the specialized researcher and the broader community of plant scientists.

Breeding Field Crops

Principles of Plant Genetics and Breeding

Managing Global Genetic Resources

This book is a printed edition of the Special Issue "Plant Genetics and Biotechnology in Biodiversity" that was published in Diversity

Principles of Plant Breeding

Genomic Selection for Crop Improvement serves as handbook for users by providing basic as well as advanced understandings of genomic selection. This useful review explains germplasm use, phenotyping evaluation, marker genotyping methods, and statistical models involved in genomic selection. It also includes examples of ongoing activities of genomic selection for crop improvement and efforts initiated to deploy the genomic selection in some important crops. In order to understand the potential of GS breeding, it is high time to bring complete information in the form of a book that can serve as a ready reference for geneticist and plant breeders.

Drought Resistance in Crops with Emphasis on Rice

Plant adaptation is a fundamental process in plant breeding. It was the first criterion in the initial domestication of plants thousands of years ago. Adaptedness is generally a quantitative complex feature of the plant, involving many traits, many of which are quantitative. Adaptation to stresses like cold, drought or diseases are among the most central problems in a world grappling with global food security. Modern plant breeding, based on mendelian genetics, has made plant improvement more effective and more precise and selective. Molecular

genetics and genetic engineering has considerably increased this selectivity down to single genes affecting single traits. The time has come when plant breeding efficiency may cause loss of genetic resources and adaptation. In these proceedings an effort is made to merge modern plant breeding efficiency with ecological aspects of plant breeding, reflected in adaptation. It is hoped that this merger results in more sustainable use of genetic resources and physical environments. The book is based on 10 keynotes addressing a wide spectrum of themes related to adaptation. In addition each subject is further elaborated in up to three case studies on particular plant species or groups of plants. The keynotes do in fact overlap to some degree and there are articles in this volume that seemingly contradict each other, a common aspect in advanced fields of research. The keen reader may conclude that, in a world where climates and environments are under continuous change and where human society is more and more polarized into a developed and a developing part, adaptation of our cultivated plants has different constraints on yields depending on ecology, and indeed economy.

Horticultural Plant Breeding

The basic concept of this book is to examine the use of innovative methods augmenting traditional plant breeding towards the development of new crop varieties under different environmental conditions to achieve sustainable food production. This book consists of two volumes: Volume 1 subtitled Breeding, Biotechnology and Molecular Tools and Volume 2 subtitled Agronomic, Abiotic and Biotic Stress Traits. This is Volume 1 which consists of 21 chapters covering domestication and germplasm utilization, conventional breeding techniques and the role of biotechnology. In addition to various biotechnological applications in plant breeding, it includes functional genomics, mutations and methods of detection, and molecular markers. In vitro techniques and their applications in plant breeding are discussed with an emphasis on embryo rescue, somatic cell hybridization and somaclonal variation. Other chapters cover haploid breeding, transgenics, cryogenics and bioinformatics.

Emerging Technologies for Integrated Pest Management

Genetics is the study of genes, heredity, and genetic variation in living organisms while plant breeding is the art and science of changing the traits of plants in order to produce desired characteristics. The fundamental discoveries of Darwin and Mendel established the scientific basis for plant breeding and genetics at the turn of the 20th century. Trait inheritance and molecular inheritance mechanisms of genes are still a primary principle of genetics in the 21st century, but modern genetics has expanded beyond inheritance to studying the function and behavior of genes. The recent integration of advances in biotechnology, genomic research, and molecular marker applications with conventional plant breeding practices has created the foundation for molecular plant breeding. The present book entitled "Key notes on Genetics and Plant Breeding" has been designed to provide a simple umbrella for the multidisciplinary field of modern plant breeding that combines molecular tools and methodologies with conventional approaches for crop improvement. The topics mainly covered includes general genetics, genome organization of crop plants, cytogenetics of crop plants, reproduction and

pollination methods, plant breeding methods, population and quantitative genetics principles, biometrical genetics, plant breeding for stress resistance and nutrional quality, genetic engineering and biotechnological tools in plant breeding, plant genetic resources and their regulatory system, seed- classes and certification, economic botany and medicinal plants and Statistical methods and field plot techniques. Hope this volume would be useful for graduate and post graduate students of Agriculture and Biology in all Indian Universities. This will also be useful for those appearing in Competitive examinations such as Agricultural Research Services of the Indian Council of Agricultural Research, National Eligibility Test, Civil Services Examination and other allied examinations.

Plant Breeding

The Indian Society of Genetics and Plant Breeding was established in 1941 in recognition of the growing contribution of improved crop varieties to the country's agriculture. Scientific plant breeding had started inIndia soon after the rediscovery of Mendel's laws of heredity. The Indian Agricultural Research Institute set up in 1905 and a number of Agricultural Colleges in different parts of the country carried out some of the earliest work mostly inthe form of pure-line selections. In subsequent years, hybridization programmes in crops like wheat, rice, oilseeds, grain legumes, sugarcane and cotton yielded a large number of improved cultivars with significantly higher yields. A turning point came in the 1960s with the development of hybrids in several crops including inter-specific hybrids in cotton. And when new germplasm with dwarfing genes became available in wheat and rice from CIMMYT and IRRI, respectively,Indian plant breeders quickly incorporated these genes into the genetic background of the country's widely grown varieties with excellent grain quality and other desirable traits. This was to mark the beginning of modem agriculture in India as more and more varieties were developed, characterized by a high harvest index and response to modem farm inputs like the inorganic fertilizers . India's green revolution which has led to major surpluses offood grains and othercommodities like sugar and cotton has been made possible by the work of one of the largest groups of plant breeders working in a coordinated network.

Pollination Mechanisms, Reproduction and Plant Breeding

Plant Biotechnology

In recent years, all over the world, the attention paid to local and traditional productions is growing, especially in the agro-food sector. Maybe, it is not only due to the impact of globalization and the social and economic changes but also due to the increased consideration to health and nutritional aspects of food. Hence, for economic, social, historical, and nutritional reasons, this trend has led to the rediscovery and reuse of landraces of many different crops, responding to requests for more and more demanding market. This volume collects examples of local crops and old landraces of different areas of the planet that testify the extreme importance of the relation existing among a land, the local productions, the historical traditions, the conservation of biodiversity, the health benefits, the

environmental impact and the local economies, also including the significance to dedicate resources to scientific researches in local crops.

Adaptation in Plant Breeding

Our requirement for plant breeders to be successful has never been greater. However one views the forecasted numbers for future population growth we will need, in the immediate future, to be feeding, clothing and housing many more people than we do, inadequately, at present. Plant breeding represents the most valuable strategy in increasing our productivity in a way that is sustainable and environmentally sensitive. Plant breeding can rightly be considered as one of the oldest multidisciplinary subjects that is known to humans. It was practised by people who first started to carry out a settled form of agriculture. The art, as it must have been at that stage, was applied without any formal underlying framework, but achieved dramatic results, as witnessed by the forms of cultivated plants we have today. We are now learning how to apply successfully the results of yet imperfect scientific knowledge. This knowledge is, however, rapidly developing, particularly in areas of tissue culture, biotechnology and molecular biology. Plant breeding's inherent multifaceted nature means that alongside obvious subject areas like genetics we also need to consider areas such as: statistics, physiology, plant pathology, entomology, biochemistry, weed science, quality, seed characteristics, repro ductive biology, trial design, selection and computing. It therefore seems apparent that modern plant breeders need to have a grasp of wide range of scientific knowledge and expertise if they are successfully to a exploit the techniques, protocols and strategies which are open to them.

Advances in Plant Breeding Strategies: Breeding, Biotechnology and Molecular Tools

Genetic basis of adaptation; Climatic and edaphic adaptation; Mechanisms of adaptation; Host-parasite coevolution; Plant mixtures; Stress conditions; Breeding for wide adaptation; Breeding for low/high input; Breeding in case of global warming; Genetic resources for adaptation.

Plant Biotechnology and Genetics

Principles and Procedures of Plant Breeding

The period following the second world war has witnessed an expanding commitment to incr~ased food production in tropical countries. Public and private initiatives at the national and international levels have led to the creation of programs geared specifically towards the improvement of food crops in tropical conditions. Examples of this increased commitment are the network of international agricultural research centers and numerous bilateral aid projects. As a consequence, crop improvement has become a truly worldwide endeavor, relying on an international network of institutions and collaborators. This holds also for Phaseolus beans. Following the discovery of the Americas, Phaseolus beans became distributed on all six continents. Yet, until not so long ago, most of the

research on Phaseolus improvement took place in developed countries. In recognition of the nutritional importance of Phaseolus beans in developing countries, this has changed considerably in the last years, principally perhaps through the activities of the Centro Internacional de Agricultura Tropical (CIAT) and the International Board for Plant Genetic Resources (IBPGR). Consequently, the scope of the research on Phaseolus has broadened considerably and the number of Phaseolus researchers is larger than ever before.

Plant Breeding in the Omics Era

" . . . . . Nature has something more in view than that its own proper males should fecundate each blossom. " Andrew Knight Philosophical Transactions, 1799 Sterility implicating the male sex solely presents a paradoxical situation in which universality and uniqueness are harmoniously blended. It maintains a built-in outbreeding system but is not an isolating mechanism, as male steriles, the "self-emasculated" plants, outcross with their male fertile sibs normally. Both genes (nuclear and cytoplasmic) and environment, individually as well as conjointly, induce male sterility, the former being genetic and the latter nongenetic. Genetic male sterility is controlled either exclusively by nuclear genes (ms) or by the complementary action of nuclear (lr) and cytoplasmic (c) genes. The former is termed genic and the latter gene-cytoplasmic male sterility. Whereas genic male sterility exhibits Mendelian inheritance, gene-cytoplasmic male sterility is non-Mendelian, with specific transmissibility of the maternal cytoplasm type. Genetic male sterility is documented in 617 species and species crosses com prising 320 species, 162 genera and 43 families. Of these, genic male sterility occurs in 216 species and 17 species crosses and gene-cytoplasmic male sterility in 16 species and 271 species crosses. The Predominance of species exhibiting genic male sterility and of species crosses exhibiting gene-cytoplasmic male sterility is due to the fact that for the male sterility expression in the former, mutation of nuclear genes is required, but in the latter, mutations of both nuclear and cytoplasmic genes are necessary.

Managing Plant Genetic Diversity

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The Chromosomes

This new book examines key scientific and technological advances within the last decade that have the potential to dramatically improve the practice of integrated pest management (IPM). Entomologists, pest management consultants, plant pathologists, weed scientists, agriculture chemical industry professionals, agricultural regulatory personnel, commodity association professionals, educators and students will find Emerging Technologies for Integrated Pest Management: Concepts, Research and Implementation a useful resource.

Genetic Resources of Phaseolus Beans

This book focuses on the previously neglected interface between the conservation of plant genetic resources and their utilization. Only through utilization can the potential value of conserved genetic resources be realized. However, as this book shows, much conserved germplan has to be subjected to long term pre-breeding and genetic enhancement before it can be used in plant breeding programs. The authors explore the rationale and approaches for such pre-breeding efforts as the basis for broadening the genetic bases of crop production. Examples from a range of major food crops are presented and issues are analyzed by leading authorities from around the world.

Quantitative Genetics and Selection in Plant Breeding

Maize is used in an endless list of products that are directly or indirectly related to human nutrition and food security. Maize is grown in producer farms, farmers depend on genetically improved cultivars, and maize breeders develop improved maize cultivars for farmers. Nikolai I. Vavilov defined plant breeding as plant evolution directed by man. Among crops, maize is one of the most successful examples for breeder-directed evolution. Maize is a cross-pollinated species with unique and separate male and female organs allowing techniques from both self and cross-pollinated crops to be utilized. As a consequence, a diverse set of breeding methods can be utilized for the development of various maize cultivar types for all economic conditions (e.g., improved populations, inbred lines, and their hybrids for different types of markets). Maize breeding is the science of maize cultivar development. Public investment in maize breeding from 1865 to 1996 was $3 billion (Crosbie et al., 2004) and the return on investment was $260 billion as a consequence of applied maize breeding, even without full understanding of the genetic basis of heterosis. The principles of quantitative genetics have been successfully applied by maize breeders worldwide to adapt and improve germplasm sources of cultivars for very simple traits (e.g. maize flowering) and very complex ones (e.g., grain yield). For instance, genomic efforts have isolated early-maturing genes and QTL for potential MAS but very simple and low cost phenotypic efforts have caused significant and fast genetic progress across genotypes moving elite tropical and late temperate maize northward with minimal investment. Quantitative genetics has allowed the integration of pre-breeding with cultivar development by characterizing populations genetically, adapting them to places never thought of (e.g., tropical to short-seasons), improving them by all sorts of intra- and inter-population recurrent selection methods, extracting lines

with more probability of success, and exploiting inbreeding and heterosis. Quantitative genetics in maize breeding has improved the odds of developing outstanding maize cultivars from genetically broad based improved populations such as B73. The inbred-hybrid concept in maize was a public sector invention 100 years ago and it is still considered one of the greatest achievements in plant breeding. Maize hybrids grown by farmers today are still produced following this methodology and there is still no limit to genetic improvement when most genes are targeted in the breeding process. Heterotic effects are unique for each hybrid and exotic genetic materials (e.g., tropical, early maturing) carry useful alleles for complex traits not present in the B73 genome just sequenced while increasing the genetic diversity of U.S. hybrids. Breeding programs based on classical quantitative genetics and selection methods will be the basis for proving theoretical approaches on breeding plans based on molecular markers. Mating designs still offer large sample sizes when compared to QTL approaches and there is still a need to successful integration of these methods. There is a need to increase the genetic diversity of maize hybrids available in the market (e.g., there is a need to increase the number of early maturing testers in the northern U.S.). Public programs can still develop new and genetically diverse products not available in industry. However, public U.S. maize breeding programs have either been discontinued or are eroding because of decreasing state and federal funding toward basic science. Future significant genetic gains in maize are dependent on the incorporation of useful and unique genetic diversity not available in industry (e.g., NDSU EarlyGEM lines). The integration of pre-breeding methods with cultivar development should enhance future breeding efforts to maintain active public breeding programs not only adapting and improving genetically broad-based germplasm but also developing unique products and training the next generation of maize breeders producing research dissertations directly linked to breeding programs. This is especially important in areas where commercial hybrids are not locally bred. More than ever public and private institutions are encouraged to cooperate in order to share breeding rights, research goals, winter nurseries, managed stress environments, and latest technology for the benefit of producing the best possible hybrids for farmers with the least cost. We have the opportunity to link both classical and modern technology for the benefit of breeding in close cooperation with industry without the need for investing in academic labs and time (e.g., industry labs take a week vs months/years in academic labs for the same work). This volume, as part of the Handbook of Plant Breeding series, aims to increase awareness of the relative value and impact of maize breeding for food, feed, and fuel security. Without breeding programs continuously developing improved germplasm, no technology can develop improved cultivars. Quantitative Genetics in Maize Breeding presents principles and data that can be applied to maximize genetic improvement of germplasm and develop superior genotypes in different crops. The topics included should be of interest of graduate students and breeders conducting research not only on breeding and selection methods but also developing pure lines and hybrid cultivars in crop species. This volume is a unique and permanent contribution to breeders, geneticists, students, policy makers, and land-grant institutions still promoting quality research in applied plant breeding as opposed to promoting grant monies and indirect costs at any short-term cost. The book is dedicated to those who envision the development of the next generation of cultivars with less need of water and inputs, with better nutrition; and with higher percentages of exotic germplasm as well as those that pursue independent

research goals before searching for funding. Scientists are encouraged to use all possible breeding methodologies available (e.g., transgenics, classical breeding, MAS, and all possible combinations could be used with specific sound long and short-term goals on mind) once germplasm is chosen making wise decisions with proven and scientifically sound technologies for assisting current breeding efforts depending on the particular trait under selection. Arnel R. Hallauer is C. F. Curtiss Distinguished Professor in Agriculture (Emeritus) at Iowa State University (ISU). Dr. Hallauer has led maize-breeding research for mid-season maturity at ISU since 1958. His work has had a worldwide impact on plant-breeding programs, industry, and students and was named a member of the National Academy of Sciences. Hallauer is a native of Kansas, USA. José B. Miranda Filho is full-professor in the Department of Genetics, Escola Superior de Agricultura Luiz de Queiroz - University of São Paulo located at Piracicaba, Brazil. His research interests have emphasized development of quantitative genetic theory and its application to maize breeding. Miranda Filho is native of Pirassununga, São Paulo, Brazil. M.J. Carena is professor of plant sciences at North Dakota State University (NDSU). Dr. Carena has led maize-breeding research for short-season maturity at NDSU since 1999. This program is currently one the of the few public U.S. programs left integrating pre-breeding with cultivar development and training in applied maize breeding. He teaches Quantitative Genetics and Crop Breeding Techniques at NDSU. Carena is a native of Buenos Aires, Argentina.
http://www.ag.ndsu.nodak.edu/plantsci/faculty/Carena.htm

Faba Bean Improvement

Alternate approaches for the exploitation of heterosis and population improvement have been elaborated with the help of schematic diagrams.

Broadening the Genetic Base of Crop Production

William C. Taylor Department of Genetics University of California Berkeley, California 94720 It is evident by now that there is a great deal of interest in exploiting the new technologies to genetically engineer new forms of plants. A purpose of this meeting is to assess the possibilities. The papers that follow are concerned with the analysis of single genes or small gene families. We will read about genes found within the nucleus, plastids, and bacteria which are responsible for agri culturally important traits. Given that these genes can be isolated by recombinant DNA techniques, there are two possible strategies for plant engineering. One involves isolating a gene from a cultivated plant, changing it in a specific way and then inserting it back into the same plant where it produces an altered gene product. An example might be changing the amino acid composition of a seed pro tein so as to make the seed a more efficient food source. A second strategy is to isolate a gene from one species and transfer it to another species where it produces a desirable feature. An example might be the transfer of a gene which encodes a more efficient pho tosynthetic enzyme from a wild relative into a cultivated species. There are three technical hurdles which must be overcome for either strategy to work. The gene of interest must be physically isolated.

Breeding Crop Plants

Plant Breeding

As ancient as agriculture itself, plant breeding is one of civilization\'s oldest activities. Today, world food production is more dependent than ever on the successful cultivation of only a handful of major crops, while continuing advances in agriculture rely on successfully breeding new varieties that are well-adapted to their human-influenced ecological circumstances. Plant breeding involves elements of both natural and cultural selection-a process which operates on individual plants and on plant populations. This book offers the most recent detailed knowledge of plant reproduction and their environmental interaction, which can help guide new breeding programs and help insure continuing progress in providing more food for growing populations produced with better care of the environment.

Adaptation in Plant Breeding

While preparing the first edition of this textbook I attended an extension short course on writing agricultural publications. The message I remember was "select your audience and write to it. " There has never been any doubt about the audience for which this textbook was written, the introductory course in crop breeding. In addition, it has become a widely used reference for the graduate plant-breeding student and the practicing plant breeder. In its prepa ration, particular attention has been given to advances in plant-breeding theo ry and their utility in plant-breeding practice. The blend of the theoretical with the practical has set this book apart from other plant-breeding textbooks. The basic structure and the objectives of the earlier editions remain un changed. These objectives are (1) to review essential features of plant re production, Mendelian genetic principles, and related genetic developments applicable in plant-breeding practice; (2) to describe and evaluate established and new plant-breeding procedures and techniques, and (3) to discuss plant breeding objectives with emphasis on the importance of proper choice of objec tive for achieving success in variety development. Because plant-breeding activities are normally organized around specific crops, there are chapters describing breeding procedures and objectives for the major crop plants; the crops were chosen for their economic importance or diversity in breeding sys tems. These chapters provide a broad overview of the kinds of problems with which the breeder must cope.

Key Notes on Genetics and Plant Breeding

The purpose of this book is to examine the nature of and relationship between the knowledge of farmers and of scientists, and how these can be best integrated in plant breeding.

Plant Genetics and Biotechnology in Biodiversity

The field of plant breeding has grown rapidly in the last decade with breakthrough research in genetics and genomics, inbred development, population improvement, hybrids, clones, self-pollinated crops, polyploidy, transgenic breeding and more. This book discusses the latest developments in all these areas but explores the

next generation of needs and discoveries including omics beyond genomics, cultivar seeds and intellectual and property rights. This book is a leading-edge publication of the latest results and forecasts important areas of future needs and applications.

Genetic Engineering of Plants

Designed to inform and inspire the next generation of plant biotechnologists Plant Biotechnology and Genetics explores contemporary techniques and applications of plant biotechnology, illustrating the tremendous potential this technology has to change our world by improving the food supply. As an introductory text, its focus is on basic science and processes. It guides students from plant biology and genetics to breeding to principles and applications of plant biotechnology. Next, the text examines the critical issues of patents and intellectual property and then tackles the many controversies and consumer concerns over transgenic plants. The final chapter of the book provides an expert forecast of the future of plant biotechnology. Each chapter has been written by one or more leading practitioners in the field and then carefully edited to ensure thoroughness and consistency. The chapters are organized so that each one progressively builds upon the previous chapters. Questions set forth in each chapter help students deepen their understanding and facilitate classroom discussions. Inspirational autobiographical essays, written by pioneers and eminent scientists in the field today, are interspersed throughout the text. Authors explain how they became involved in the field and offer a personal perspective on their contributions and the future of the field. The text's accompanying CD-ROM offers full-color figures that can be used in classroom presentations with other teaching aids available online. This text is recommended for junior- and senior-level courses in plant biotechnology or plant genetics and for courses devoted to special topics at both the undergraduate and graduate levels. It is also an ideal reference for practitioners.

Plant Breeding Perspectives

Faba beans, formerly known as broad beans, are among the oldest crops in the world. It has in fact been claimed with some justification that the Pyramids were built on faba beans! They are today a major crop in many countries such as China, Egypt and the Sudan; and are widely grown for human food throughout the Me~iterranean region, in Ethiopia and in parts of Latin America. In recent years there has been a growing interest in faba bean production as a protein source for stock feed in parts of Europe, North America and Aus· tralia. The publication served by this preface arose from the first International Faba Bean Con ference, held in Cairo, Egypt, on March 7-11, 1981 which provided a suitable forum for the review of many scientifically important aspects of the improvement of the crop. Leading faba bean specialists from four continents who participated were able not only to contri· bute from their personal expertise in relevant subjects, but in return to gain from their ex perience of Nile Valley conditions and from close contact with so many of the world's faba bean scientists. The conference was supported in the main by the ICARDAjIFAD Nile Valley Faba Bean Project. Additional support was received from a number of other organisations and institutions whose help is gladly acknowledged. These included the Agricultural Research Council (ARC) of the Egyptian Ministry of Agriculture; G.T.Z. of Germany; IDRC of Canada; the National

Research Center of Egypt; and Cairo University.

Niger, Guizotia Abyssinica (L. F.) Cass

Rediscovery of Landraces as a Resource for the Future

Plant Biotechnology presents a balanced, objective exploration of the technology behind genetic manipulation, and its application to the growth and cultivation of plants. The book describes the techniques underpinning genetic manipulation and makes extensive use of case studies to illustrate how this influential tool is used in practice.

Quantitative Genetics and Selection in Plant Breeding

view than its own proper males should fecundate each blossom." ANDREW KNIGHT Philosophical Transactions, 1799 Pollination mechanisms and reproduction have a decisive bearing upon rational procedures in plant breeding and crop production. This book intends to furnish' under one cover an integrated botanical, genetical and breeding-methodologi cal treatment of the reproductive biology of spermatophytes mainly angiosperms; it is based on an advanced topical course in plant breeding taught at the Hebrew University of Jerusa lem. We have tried to present a coverage which is concise, but as comprehensive as possible, of the pollination mechanism and modes of reproduction of higher plants, and to illustrate topics, whenever practicable, by examples from cultivated plants. Nevertheless, some relevant publications may have escaped our attention or may not be mentioned because of various limitations. The book is organized into three parts. The first part starts with an evaluation of the significance of the different pollination mechanisms for plant breeding and crop produc tion, describes modes of reproduction in higher plants and discusses ecology and dynamics of pollination. The second part is devoted to crops propagated by self pollination and describes specific breeding procedures for such crops. The third part details sexual reproduction in higher plants and handles three mechanisms involved in the prevention of self pollination and their utilization in plant breeding: sex expres sion, incompatibility, and male sterility.

Male Sterility in Higher Plants

A broad view of plant-pathogen interactions illustrating the fundamental reciprocal role pathogens and hosts play in shaping each other's ecology and evolution.

Host Specialization in the World Agromyzidae (Diptera)

Principles of Cultivar Development: Theory and technique

Horticultural Plant Breeding is a complete and comprehensive resource for the development of new cultivars or clones of horticultural crops. It covers the basic theories that underpin plant breeding and applies Mendelian, quantitative and

population inheritance practices in smaller populations where the individual plant has high value. Specific traditional breeding methods are also covered, with an emphasis on how these methods are adapted for horticultural species. In addition, the integration of biotechnologies with traditional breeding methodologies is explored, with an emphasis on specific applications for fruits, vegetables and ornamental crop species. Presented in focused sections, Horticultural Plant Breeding addresses historical perspectives and context, and genetics as a critical foundation of plant breeding. It highlights treatments of the various components of breeding programs, such as breeding objectives, germplasm, population engineering, mating systems, enhanced selection methods, established breeding methods applicable to inbreeding and outcrossing situations, and post-breeding activities. Provides a complete and comprehensive resource for those involved in the development of new cultivars or clones of horticultural crops Guides readers to the most appropriate breeding strategy including potential integration of traditional and biotechnology strategies that will best achieve a cost-effective outcome Will include access to 20 narrated slide sets to facilitate additional understanding

Plant Breeding Reviews

This book contains edited and revised papers from a conference on 'Science and Technology for Managing Plant Genetic Diversity in the 21st Century' held in Malaysia in June 2000, organised by the International Plant Genetic Resources Institute (IPGRI). It includes keynote papers and some 40 additional ones, covering ten themes.The major scientific challenges to developing a global vision for the next century are identified and key research objectives are also discussed.

Plant Breeding Reviews

Phytophagous insects represent a very particular not really belong to their host plant range. This may group of organisms. Firstly, their number amounts lead to mistaken conclusions especially in regions to more than one quarter of all recent species (ex where only few observations were possible, as well cluding fungi, algae and microbes) and together with as in the case of uncommon insect species. Fourthly, the green plants on which they feed they form al the great majority (99. 4%) of the agromyzid species most one half of all living species described so far. studied show a high degree of host specialization Secondly, their overwhelming majority shows very which makes these insects especially suitable for narrow host plant specialization, that is they feed taxonomic-phylogenetic considerations. only on one or a few, mostly closely related plant With such an enormous amount of data, it may species, a characteristic that led J. H. Fabre to elab have been tempting to draw far-reaching conclu orate the notion of the 'insects' botanical instinct' a sions. However, the author has been very careful in century ago. doing this.

Farmers, Scientists, and Plant Breeding

This anchor volume to the series Managing Global Genetic Resources examines the structure that underlies efforts to preserve genetic material, including the

worldwide network of genetic collections; the role of biotechnology; and a host of issues that surround management and use. Among the topics explored are in situ versus ex situ conservation, management of very large collections of genetic material, problems of quarantine, the controversy over ownership or copyright of genetic material, and more.