

*R K Gaur S L Gupta Engineering Physics  
Dhanpath Rai Publications*

Chickpea: Crop Wild Relatives for Enhancing Genetic Gains explores aspects related to critical analysis on factors responsible for narrow genetic base of chickpea productions including domestication bottleneck, the level of diversity present in different cultivated and wild species, the uniqueness and usefulness of potential gene sources available and maintained in production systems across the globe, the level of genetic erosion both at landrace and species level over time and space etc. Despite considerable international investment in conventional breeding, production of chickpea has not yet been significantly improved beyond that achieved through its normal single domestication event and high self-pollination rate. Total annual pulse production of 42 million tons (FAO 2016) is far below actual potential. Susceptibility to both biotic and abiotic stresses have created a production level bottleneck whose solution possibly lies in the use of crop wild relatives and other genetic traits cultivated by tailoring novel germplasm. Presenting options for widening the genetic base of chickpea cultivars by introgression of diverse genes available in distantly related wild Cicer taxa, thus expanding the genetic base and maximize genetic gains from the selection, it is necessary to accumulate other complimentary alleles from CWRs. This review will focus on present status of gene pool and species distribution, germplasm conservation, characterization and evaluation, problems associated with crop production, sources of target traits available in wild species, status of trait introgression in synthesizing new gene pool of chickpea along with progress made in chickpea genomics. An edited book with contributions from leading scientists, this information will guide and inform chickpea breeders, PGR researchers and crop biologists across the world. Presents both conventional and emerging techniques Provides insights into gene pyramiding as cytogenic manipulations Includes case studies highlighting the impact of improving chickpea production

This book sheds new light on the chickpea genome sequencing and resequencing of chickpea germplasm lines and provides insights into classical genetics, cytogenetics, and trait mapping. It also offers an overview of the latest advances in genome sequencing and analysis. The growing human population, rapid climate changes and limited amounts of arable land are creating substantial challenges in connection with the availability and affordability of nutritious food for smallholder farmers in developing countries. In this context, climate smart crops are essential to alleviating the hunger of the millions of poor and undernourished people living in developing countries. In addition to cereals, grain legumes are an integral part of the human diet and provide sustainable income for smallholder farmers in the arid and semi-arid regions of the world. Among grain legumes, the chickpea (*Cicer arietinum*) is the second most important in terms of production and productivity. Besides being a rich source of proteins, it can fix atmospheric nitrogen through symbiosis with rhizobia and increase the input of combined nitrogen. Several abiotic stresses like drought, heat, salinity, together with biotic stresses like *Fusarium* wilt, *Ascochyta* blight, and *Botrytis* grey mould have led to production losses, as the chickpeas is typically grown in the harsh climates of our planet 's semi-arid regions.

Physics For Engineers Is A Text Book For Students Studying A Course In Engineering. The Book Has Been Written According To The Syllabi Prescribed In The Various Universities Of Karnataka. But It Can Be Profitably Used By The Students Of Other Indian Universities As Well. Engineering Is Generally Regarded As Applied Physics. It Is The Purpose Of The Book To Present The Principles And Concepts Of Physics As Relevant To An Engineer. The Topics Covered In The Book Are Drawn From Acoustics, Optics, Solid State Physics, Materials Science, Heat, Thermodynamics, Electricity And Magnetism. Some Of The Salient Features Of

The Book Are: \* Lucid Style \* Clarity In The Presentation Of Concepts \* Contains Numerous Problems And Solved Examples \* Has More Than 300 Figures.

Geminivirus: Detection, Diagnosis and Management

Overcoming the World Food Crisis

Accelerating Genetic Gains in Pulses

The Chickpea Genome

Advances in Legumes for Sustainable Intensification

Volume 37: Manganese and Its Role in Biological Processes

"Highlights the availability of magnesium to organisms, its uptake and transport in microorganisms and plants as well as its role in health and disease of animals and humans including its toxicology."

Plant Virus-Host Interaction contains cutting-edge research in plant molecular virology, including pathogenic viroids and transport by insect vectors, interference with transmission to control viruses, and synergism, with pivotal coverage of RNA silencing and the counter-defensive strategies used by viruses to overcome the silencing response in plants. With a clear focus on plant virus evolution, including quantitative and population genetics, Plant Virus-Host Interaction provides insights on the major factors favoring disease emergence, such as genetic change in pathogen and host populations and changes in host ecology and environment. The book also examines socioeconomic implications of widespread plant viral agents. Contributions from leading experts around the globe provide varied perspectives, while comprehensive coverage ensures a complete look at this exciting field. Covers the emergence of new viral diseases Provides molecular approaches for virus-host interaction Highlights RNA silencing and counter-defensive strategies Discusses socioeconomic implications of viral spread and mitigation techniques

This book collates various aspects of stress tolerance in crop plants. It primarily focuses on the heat and temperature related stress, starting from the severity of the problem on quantity and quality of yield under the threat of global climate change. The content also explores other mechanistic dimensions such as physiochemical and molecular mechanism underlying thermotolerance, signaling mechanism under heat stress, role of heat shock proteins in modulating thermotolerance, omics approach for development of climate smart-crop. Chapters discuss different approaches used in the past to develop heat stress tolerant crop plants, list of developed thermotolerant agriculturally

important crop plants, redox homeostasis under heat stress, nutrient uptake and use efficiency in plants under heat stress and much more. The book is a useful compilation for researchers working in the area of abiotic stress tolerance in crop plants, as well as for students of plant physiology and agricultural sciences.

Regulation of Gene Expression by Small RNAs

Advances in Seed Production and Management

Metal Ions in Biological Systems

Plant Virus-Host Interaction

Genomic Approaches

Biotic Stress

**During the past 15 years, cellular and molecular approaches have emerged as valuable adjuncts to supplement and complement conventional breeding methods for a wide variety of crop plants. Biotechnology increasingly plays a role in the creation, conservation, characterization and utilization of genetic variability for germplasm enhancement. For instance, anther/microspore culture, somaclonal variation, embryo culture and somatic hybridization are being exploited for obtaining incremental improvement in the existing cultivars. In addition, genes that confer insect- and disease-resistance, abiotic stress tolerance, herbicide tolerance and quality traits have been isolated and re-introduced into otherwise sensitive or susceptible species by a variety of transgenic techniques. Together these transformative methodologies grant access to a greater repertoire of genetic diversity as the gene(s) may come from viruses, bacteria, fungi, insects, animals, human beings, unrelated plants or even be artificially derived. Remarkable achievements have been made in the production, characterization, field evaluation and commercialization of transgenic crop varieties worldwide. Likewise, significant advances have been made towards increasing crop yields, improving nutritional quality, enabling crops to be raised under adverse conditions and developing resistance to pests and diseases for sustaining global food and nutritional security. The overarching purpose of this 3-volume work is to summarize the history of crop improvement from a technological perspective but to do so with a forward outlook on further advancement and adaptability to a changing world. Our carefully chosen “case studies of important plant crops” intend to serve a diverse spectrum of audience looking for the right tools to tackle complicated local and global issues.**

**Bioinformatics in Agriculture: Next Generation Sequencing Era** is a comprehensive volume presenting an integrated research and development approach to the practical application of genomics to improve agricultural crops. Exploring both the theoretical and applied aspects of computational biology, and focusing on the innovation processes, the book highlights the increased productivity of a translational approach. Presented in four sections and including insights from experts from around the world, the book includes: Section I: Bioinformatics and Next Generation Sequencing Technologies; Section II: Omics Application; Section III: Data mining and Markers Discovery; Section IV: Artificial Intelligence and Agribots.

**Bioinformatics in Agriculture: Next Generation Sequencing Era** explores deep sequencing, NGS, genomic, transcriptome analysis and multiplexing, highlighting practices for reducing time, cost, and effort for the analysis of gene as they are pooled, and sequenced. Readers will gain real-world information on computational biology, genomics, applied data mining, machine learning, and artificial intelligence. This book serves as a complete package for advanced undergraduate students, researchers, and scientists with an interest in bioinformatics. Discusses integral aspects of molecular biology and pivotal tool for molecular breeding Enables breeders to design cost-effective and efficient breeding strategies Provides examples of innovative genome-wide marker (SSR, SNP) discovery Explores both the theoretical and practical aspects of computational biology with focus on innovation processes Covers recent trends of bioinformatics and different tools and techniques

High-quality seed is essential for healthy crops and greater agricultural productivity. At the same time, advances in breeding technology require equivalent advances in seed technology. In order to ensure food security, it is crucial to develop seeds that are high yielding, and resistant to drought, heat, cold, and insects. Gathering the latest research in seed sciences, the book includes contributions on seed production in crops such as legumes, sugar, rice, wheat and other cereals. It discusses a range of topics, like the effect of climate change on seed quality, production and storage; seed rouging; seed certification for different crop species; seed biology; and seed pathologies and their effective management. Integrating basic and applied research, this compendium provides valuable insights for researchers and students in agricultural and life

**sciences; professionals involved in seed certification and those working in quarantine laboratories; as well as plant pathologists.**

**Accelerated Plant Breeding, Volume 4  
Molecular Approaches and Viral Evolution  
Bioinformatics in Agriculture  
Organophosphorus Chemistry  
Legumes for Global Food Security  
Principles and Applications**

Advances in molecular biology and genome research in the form of molecular breeding and genetic engineering put forward innovative prospects for improving productivity of many pulses crops. Pathways have been discovered, which include regulatory elements that modulate stress responses (e.g., transcription factors and protein kinases) and functional genes, which guard the cells (e.g., enzymes for generating protective metabolites and proteins). In addition, numerous quantitative trait loci (QTLs) associated with elevated stress tolerance have been cloned, resulting in the detection of critical genes for stress tolerance. Together these networks can be used to enhance stress tolerance in pulses. This book summarizes recent advances in pulse research for increasing productivity, improving biotic and abiotic stress tolerance, and enhancing nutritional quality.

**New Findings Revolutionize Concepts of Gene Function** Endogenous small RNAs have been found in various organisms, including humans, mice, flies, worms, fungi, and bacteria. Furthermore, it's been shown that microRNAs acting as cellular rheostats have the ability to modulate gene expression. In higher eukaryotes, microRNAs may regulate as much as 50 p

Plant stresses are serious threats to the sustainability of crop yields accounting for more crop productivity losses than any other factor in rainfed agriculture. Post-harvest losses mean surplus crops do not reach market, affecting the livelihoods of farming families, and too often these families are left with no other option than to eat contaminated stored food. These constraints impact the food security of these farming families as well as the communities and countries in which they live. This book is the demonstration of a clear synergistic effect of stresses, an effect that was unexpectedly as important as either stress applied alone. This book will add to our current knowledge of abiotic stress response in plants and will provide the groundwork necessary to build future strategies for crop enhancement. The fundamental principles that underpin all biotechnology are explained and a full range of examples discussed to show how these principles are applied; from starting substrate to final product. It will be beneficial to both plant breeders and

molecular biologists, because it combines the topics of physiology, tolerance genes, and breeding methods. When these topics are presented together, it is easy to compare all aspects of tolerance mechanisms and breeding methods for abiotic stresses. These comparisons are useful to understand which pathways or which genes are important for rendering more tolerance to a certain abiotic stress, and to bring forward new ideas for improving the tolerance. Features

- Cover both plant biotic and abiotic stresses
- Important factors in managing crops for water stress conditions
- Substantially increase the sustainable productivity of smallholder farmers in developing countries
- Genetic and biochemical approaches – if those approaches constitute a substantial improvement on current practices.

Next Generation Sequencing Era

Natural Remedies for Pest, Disease and Weed Control

Biotechnologies of Crop Improvement, Volume 3

Science Abstracts

Oil Crops

Accelerated Plant Breeding, Volume 3

Natural Remedies for Pest, Disease and Weed Control presents alternative solutions in the form of eco-friendly, natural remedies. Written by senior researchers and professionals with many years of experience from diverse fields in biopesticides, the book presents scientific information on novel plant families with pesticidal properties and their formulations. It also covers chapters on microbial pest control and control of weeds by allelopathic compounds. This book will be invaluable to plant pathologists, agrochemists, plant biochemists, botanists, environmental chemists and farmers, as well as undergraduate and postgraduate students. Details microbial biopesticides and other bio-botanical derived pesticides and their formulation Contains case studies for major crops and plants Discusses phytochemicals of plant-derived essential oils

Emerging Technologies for Promoting Food Security: Overcoming the World Food Crisis discusses rising energy prices, increased biofuel use, water scarcity, and the rising world population, all factors that directly affect worldwide food security. The book examines the range of approaches to promoting global food security, including novel and existing agricultural and husbandry techniques for safe and sustainable food production. It is divided into three parts beginning with an overview of food security, an analysis of key drivers of food insecurity, and nutrition and food security. Part Two examines emerging technologies for plant and animal food security, with subsequent chapters discussing topics from genetic and aquaculture technologies, pest and disease control, environmental and policy issues affecting food security, and an in-depth analysis of water management and methods to reduce post-harvest losses. Provides a comprehensive overview of food security Thoroughly discusses rising energy prices, increased biofuel use, water scarcity, and the rising

world population, all factors that directly affect worldwide food security Covers the emerging technologies for plant and animal food security Analyzes the policy issues affecting food security Advancement in Crop Improvement Techniques presents updates on biotechnology and molecular biological approaches which have contributed significantly to crop improvement. The book discusses the emerging importance of bioinformatics in analyzing the vast resources of information regarding crop improvement and its practical application and utilization. Throughout this comprehensive resource, emphasis is placed on various techniques used to improve agricultural crops, providing a common platform for the utility of these techniques and their combinations. Written by an international team of contributors, this book provides an in-depth analysis of existing tools and a framework for new research. Reviews techniques used for crop improvement, from selection and crossing over, to microorganismal approaches Explores the role of conventional biotechnology in crop improvement Summarizes the combined approaches of cytogenetics and biotechnology for crop improvement, including the importance of molecular techniques in this process Focuses on the emerging role of bioinformatics for crop improvement Thermotolerance in Crop Plants

Chickpea: Crop Wild Relatives for Enhancing Genetic Gains  
RNAi Technology

A Textbook of Engineering Physics

IVth National Conference on Thermophysical Properties - NCTP'07

*Geminivirus: Detection, Diagnosis and Management focuses on the latest techniques for managing diseases caused by these circular, single-stranded (ss) DNA genomes. The most significant impact of plant diseases in host populations is often caused by emerging diseases, whose incidence in a plant host is increasing as a result of long-term changes in their underlying epidemiology. Genetic changes in pathogen and host populations, as well as changes in host ecology and environment, are major factors contributing to disease emergence. Understanding plant virus evolution is crucial for modeling the within-host and between-host dynamics and genetics of virus populations. The book presents a comprehensive review of how these viruses develop, including contributing factors such as population bottlenecks during cell-to-cell movement, systemic colonization, or between-host transmission by different procedures. Presented in five sections—Detection and Diagnosis, Emergence and Diversity, Vector and Transmission, Virus–Host Interaction, and Disease Management, the book includes host range determinant and virulence factors involved in pathogenesis, virus–vector interactions during acquisition, retention, and transmission and evaluating management strategies to control Geminivirus. The book is an essential reference for students and researchers interested in plant virology, particularly begomoviruses, geminiviruses, and vector transmission biology. Introduces identification and characterization of geminiviruses that infect agricultural crops, their wild relatives, and weed hosts Discusses recombination and reassortment mechanisms influencing viral genetic diversity, virulence, and vector transmission Explores the origin, evolution, and bottlenecks of Geminiviruses Introduces*

*identification and characterization of geminiviruses that infect agricultural crops, their wild relatives, and weed hosts Discusses recombination and reassortment mechanisms influencing viral genetic diversity, virulence, and vector transmission Explores the origin, evolution, and bottlenecks of Geminiviruses*

*Physics for Engineers New Age International*

*NCTP'07 was the fourth in a series of biannual conferences on thermophysical properties being organized by the prestigious Thermophysical Society of India. The first Asian Thermophysical conference was held in Guwahati University in 1994, the second in the Rajasthan University; Jaipur and the third in the University of Goa. All papers have been peer-reviewed. These Conferences are designed to be unique forums for the exchange of ideas and the newest technical information on thermophysical properties, as well as materials characterization for both the novice and the expert, and for the experts to share experiences with their peers.*

*Approaches for Enhancing Abiotic Stress Tolerance in Plants*

*Engineering Physics for BSc and BE Students*

*Pulse Improvement*

*Engineering Physics*

*Annual Report*

*Physiological, Molecular and Genetic Perspectives*

**Genomic Applications for Crop Breeding: Biotic Stress is the first of two volumes looking at the latest advances in genomic applications to crop breeding. This volume focuses on genomic-assisted advances for improving economically important crops against biotic stressors, such as viruses, fungi, nematodes, and bacteria. Looking at key advances in crops such as rice, barley, wheat, and potato amongst others, Genomic Applications for Crop Breeding: Biotic Stress will be an essential reference for crop scientists, geneticists, breeders, industry personnel and advanced students in the field.**

**RNAi technology is used for large-scale screens that systematically shut down each gene in the cell, which can help identify the components necessary for a particular cellular process or an event such as cell division. Exploitation of the pathway is also a promising tool in biotechnology and medicine. Introducing new technology in the study of RNA**

**Advances in Legume-based Agroecosystem for Sustainable Intensification explores current research and future strategies for ensuring capacity growth and socioeconomic improvement through the utilization of legume crop cultivation and production in the achievement of sustainability development goals (SDGs). Sections cover the role of legumes in addressing issues of food security, improving nitrogen in the environment, environmental sustainability, economic-environmentally optimized systems, the importance and impact of nitrogen, organic production, and biomass potential, legume production, biology,**



*breeding improvement, cropping systems, and the use of legumes for eco-friendly weed management. This book is an important resource for scientists, researchers and advanced students interested in championing the effective utilization of legumes for agronomic and ecological benefit. Focuses on opportunities for agricultural impact and sustainability Presents insights into both agricultural sustainability and eco-intensification Includes the impact of legume production on societal impacts such as health and wealth management*

*Indian Journal of Pure & Applied Physics*

*Essays in Memory of Shri A. Ghosh*

*Advancement in Crop Improvement Techniques*

*Approaches to Plant Stress and their Management*

*Magnetic Sensors*

*Optics and Spectroscopy*

Plant improvement has shifted its focus from yield, quality and disease resistance to factors that will enhance commercial export, such as early maturity, shelf life and better processing quality. Conventional plant breeding methods aiming at the improvement of a self-pollinating crop, such as wheat, usually take 10-12 years to develop and release of the new variety. During the past 10 years, significant advances have been made and accelerated methods have been developed for precision breeding and early release of crop varieties. This work summarizes concepts dealing with germplasm enhancement and development of improved varieties based on innovative methodologies that include doubled haploidy, marker assisted selection, marker assisted background selection, genetic mapping, genomic selection, high-throughput genotyping, high-throughput phenotyping, mutation breeding, reverse breeding, transgenic breeding, shuttle breeding, speed breeding, low cost high-throughput field phenotyping, etc. It is an important reference with special focus on accelerated development of improved crop varieties.

This book provides an introductory overview of the research done in recent years in the area of magnetic sensors. The topics presented in this book range from fundamental theories and properties of magnets and their sensing applications in areas such as biomedicine, microelectromechanical systems, nano-satellites and pedestrian tracking.

Written for the readers who wished to obtain a basic understanding of the research area as well as to explore other potential areas of applications for magnetic sensors, this book presents exciting developments in the field in a highly readable manner.

Organophosphorus Chemistry provides a comprehensive annual review of the literature. Coverage includes phosphines and their chalcogenides, phosphonium salts, low coordination number phosphorus compounds, penta- and hexa-coordinated compounds, tervalent phosphorus acids, nucleotides and nucleic acids, ylides and related compounds, and phosphazenes. The series will be of value to research workers in universities, government and industrial research organisations, whose work involves the use of organophosphorus compounds. It provides a concise but comprehensive survey of a vast field of study with a wide variety of applications, enabling the reader to rapidly keep abreast of the latest developments in their specialist areas. Specialist Periodical Reports

provide systematic and detailed review coverage of progress in the major areas of chemical research. Written by experts in their specialist fields the series creates a unique service for the active research chemist, supplying regular critical in-depth accounts of progress in particular areas of chemistry. For over 80 years the Royal Society of Chemistry and its predecessor, the Chemical Society, have been publishing reports charting developments in chemistry, which originally took the form of Annual Reports. However, by 1967 the whole spectrum of chemistry could no longer be contained within one volume and the series Specialist Periodical Reports was born. The Annual Reports themselves still existed but were divided into two, and subsequently three, volumes covering Inorganic, Organic and Physical Chemistry. For more general coverage of the highlights in chemistry they remain a 'must'. Since that time the SPR series has altered according to the fluctuating degree of activity in various fields of chemistry. Some titles have remained unchanged, while others have altered their emphasis along with their titles; some have been combined under a new name whereas others have had to be discontinued. The current list of Specialist Periodical Reports can be seen on the inside flap of this volume.

Archaeology and History

Volume 21

Indian Science Abstracts

Cumulated Index Medicus

Plant Breeding Reviews

Physics abstracts. Series A

Legumes in the Omic Era provides a timely review of recent advances in legume genomics research and application. In this post-genomic era enormous amount of biological information is available which could be of huge potential use for crop improvement applications. This aspect of genomics assisted plant breeding is focused throughout the book for all the important grain legume crops. Role of functional genomics and importance of bioinformatics tools in present day genomics and molecular breeding research is also discussed in detail. Use of molecular tools for nutritional fortification of grain legume is briefly presented. A chapter also been contributed on fungal disease resistance to elucidate potential application of genomic tools in molecular breeding of grain legume species. The book contains fifteen chapters contributed by 50 scientists from different countries who are actively involved in analyzing and improving particular legume genome. This book will serve as reference resource to legumes researchers for use of genome information in improvement of major legume crops. Dr Sanjeev Gupta is Principal Scientist/Project Coordinator-All India Coordinated Research Project on Vigna Crops at Indian Institute of Pulses Research (IIPR), Kanpur. He has more than two decades of research experience in grain legume breeding and developed a number of high yielding cultivars in grain legumes. He is authored numerous research papers published in peer-reviewed journals and edited several books in plant breeding aspects. He was the Organizing Secretary of the International Grain Legume Conference, 2009 held in the Indian Institute of Pulses Research, Kanpur, India. He has travelled across the continents to present his research several times. He is recipient of several awards for his research and literary contributions Dr. Nagasamy Nadarajan is the Director of the Indian Institute of Pulses Research (IIPR), Kanpur. He has more than three decades of teaching and research experience and developed more than fifteen legume and cereal cultivars. He has to his credits more than 200 peer-reviewed research publications. He has guided several graduate students for Masters and Doctoral degrees in food legume breeding and genetics research. He has authored a book in biometrics which is one of the most popular books among the agriculture graduate students in India. He is the recipient of three international and six

national awards and honours for his outstanding contributions Mr. Debjyoti Sen Gupta is the ICAR International Fellow and Ph.D. candidate at North Dakota State University (NDSU), Fargo, USA. Recently, he visited Department of Crop and Soil Sciences, Washington State University, Pullman, USA for high throughput genotyping work. Before joining at NDSU he was serving as the Scientist in the Indian Institute of Pulses Research (IIPR). He has authored several research articles, review articles and book chapters in the peer-reviewed journals and books from reputed publishers like Springer, CABI etc. He is recipient of several fellowships like CSIR-JRF, New Delhi; ICAR-JRF, New Delhi throughout his graduate study programs.

A Textbook of Engineering Physics is written with two distinct objectives: to provide a single source of information for engineering undergraduates of different specializations and provide them a solid base in physics. Successive editions of the book incorporated topics as required by students pursuing their studies in various universities. In this new edition the contents are fine-tuned, modernized and updated at various stages.

Plants are frequently exposed to unfavorable and adverse environmental conditions known as abiotic stressors. These factors can include salinity, drought, heat, cold, flooding, heavy metals, and UV radiation which pose serious threats to the sustainability of crop yields. Since abiotic stresses are major constraints for crop production, finding the approaches to enhance stress tolerance is crucial to increase crop production and increase food security. This book discusses approaches to enhance abiotic stress tolerance in crop plants on a global scale. Plant scientists and breeders will learn how to further mitigate plant responses and develop new crop varieties for the changing climate.

Legumes in the Omic Era

Thermophysical Properties of Materials and Devices

IECON.

Emerging Technologies for Promoting Food Security

Food Legumes

Translational Genomics for Crop Breeding

Plant improvement has shifted its focus from yield, quality and disease resistance to factors that will enhance commercial export, such as early maturity, shelf life and better processing quality. Conventional plant breeding methods aiming at the improvement of a self-pollinating crop usually take 10-12 years to develop and release of the new variety. During the past 10 years, significant advances have been made and accelerated methods have been developed for precision breeding and early release of crop varieties. This book focuses on the accelerated breeding technologies that have been adopted for major oil crops. It summarizes concepts dealing with germplasm enhancement and development of improved varieties based on innovative methodologies that include doubled haploidy, marker assisted selection, marker assisted background selection, genetic mapping, genomic selection, high-throughput genotyping, high-throughput phenotyping, mutation breeding, reverse breeding, transgenic breeding, shuttle breeding, speed breeding, low cost high-throughput field phenotyping, etc. This edited volume is therefore an excellent reference on accelerated development of improved crop varieties.

Plant Breeding Reviews presents state-of-the-art reviews on plant genetics and the breeding of all types of crops by both traditional means and molecular methods. Many of the crops widely grown today stem from a very narrow genetic base; understanding and preserving crop genetic resources is vital to the security of food systems worldwide. The emphasis of the series is on methodology, a fundamental understanding of crop genetics, and applications to major crops.

Physics for Engineers