The Physiology Of Crop Yield

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The Pea Crop

Crop Physiology: Case Histories of Major Crops updates the physiology of broad-acre crops with a focus on the genetic, environmental and management drivers of development, capture and efficiency in the use of radiation, water and nutrients, the formation of yield and aspects of quality. These physiological process are presented in a double context of challenges and solutions. The challenges to increase plant-based food, fodder, fiber and energy against the backdrop of population increase, climate change, dietary choices and declining public funding for research and development in agriculture are unprecedented and urgent. The proximal technological solutions to these challenges are genetic improvement and agronomy. Hence, the premise of the book is that crop physiology is most valuable when it engages meaningfully with breeding and agronomy. With contributions from 92 leading scientists from around the world, each chapter deals with a crop: maize, rice, wheat, barley, sorghum and oat; quinoa; soybean, field pea, chickpea, peanut, common bean, lentil, lupin and faba bean; sunflower and canola; potato, cassava, sugar beet and sugarcane; and cotton. A crop-based approach to crop physiology in a G x E x M context Captures the perspectives of global experts on 22 crops

Redesigning Rice Photosynthesis to Increase Yield

The book is a compilation of articles on various issues, presented at the workshop on the Influence of Environment on Growth, Production, Physiology and Disease of Crops that was held at the University of Helsinki, Finland, December 2000. The main focus of the book is a review of the environmental factors influencing the

growth, development and production of food crops grown under various conditions. The book will be useful to scientists, researchers, students or experts dealing with agronomy, plant physiology, plant nutrition, plant pathology and crop cultivation.

Phenotyping Crop Plants for Physiological and Biochemical Traits

Key features: Describes the effects and responses of the macro and micro levels of crops under the different components of climate change Reports on the adaptation and resilience of food production systems within the changing climate Covers how plants cope with the changing climate including physiological, biochemical, phenotype, and ecosystem responses Provides an in-depth discussion on the importance of agricultural education connected to climate change Presenting an overview of agroecology within the framework of climate change, this book looks at the impact of our changing climate on crop production and agroecosystems, reporting on how plants will cope with these changes, and how we can mitigate these negative impacts to ensure food production for the growing population. It explores the ways that farmers can confront the challenges of climate change, with contributed chapters from around the world demonstrating the different challenges associated with differing climates. Examples are provided of the approaches being taken right now to expand the ecological, physiological, morphological, and productive potential of a range of crop types. Giving readers a greater understanding of the mechanisms of plant resilience to climate change, this book provides new insights into improving the productivity of an individual crop species as well as bringing resistance and resiliency to the entire agroecosystem. It offers a strong foundation for changing research and education programs so that they build the resistance and resilience that will be needed for the uncertain climate future ahead.

Cotton Physiology

The latest findings in seed physiology—discussed as they relate to agricultural problems! Presenting the latest findings in the area of seed physiology as well as the practical applications of that knowledge in the field, the Handbook of Seed Physiology: Applications to Agriculture provides a comprehensive view of seed biology and its role in crop performance. Key topics include seed germination, crop emergence, crop establishment, dormancy, preharvest sprouting, plant hormones, abscisic and giberellic acids, weeds, grain quality, oil crops, and malting quality. Abundant case studies provide information of value to researchers, students, and professionals in the fields of seed science, field crop research, crop science, agronomy, and seed technology. The Handbook of Seed Physiology discusses vital topics which serve as the basis for the development of techniques and processes to improve seed performance and crop yield. In this text, you will explore: the effect of the soil physical environment on seed germination the roles of physiology, genetics, and environment in the inception, maintenance, and termination of dormancy the relationship between the termination of dormancy and the synthesis and signaling of gibberellins and abscisic acid mechanisms of orthodox seed deterioration and approaches for repair of seed damage characteristics, behavior, and mechanisms of desiccation tolerance in recalcitrant seeds the role of seed

moisture in free radical assaults on seeds and the protective function of raffinose oligosaccharides the production of free radicals and their effect on lipids and lipid peroxidation components of grain quality in oil crops and factors influencing them structural components and genotypic and environmental factors affecting barley malting quality In addition to the latest scientific information in the area of seed physiology, this text provides insights into practical applications of that knowledge through the description of: screening protocols for germination tolerance to temperature and water stress methods for improving seed performance in the field techniques for controlling preharvest sprouting of cereals breeding and production strategies for improving grain quality population-based threshold models in the prediction of germination and emergence patterns modeling changes in dormancy to predict weed emergence Extensive reference sections accompanying each chapter include both foundation texts and current research. Principles and concepts discussed in the text are elaborated upon through equations, figures, and tables covering such topics as water and soil thermal regimes; seed water potential; temperature and water effects on germination; free radical attack; and molecular structures. Exploring concepts, techniques, and processes related to seed germination and crop establishment, this comprehensive, one-of-a-kind reference is an indispensable tool for seed scientists and agricultural professionals. Add it to your library today and put seed physiology research to work in establishing high-quality “next crops”!

Climate Change and Crop Production

In the present scenario, with the increasing pressure posed by a rapidly growing population and diminishing per capita arable land and sources of irrigation, the role of plant physiologists in increasing agricultural and horticultural production by economically viable means, is significant. The present book incorporates articles covering latest information on the varied aspects of plant physiology, like diagnosis and management of physiological disorders in fruit production, physiology of vegetable crops, breeding crops for dryland conditions, effect of sulphur dioxide on growth, photosynthesis, antioxidant enzyme activities and so on. Topics such as abiotic stress, macronutrient stress and stress caused by pollutants also form part of the book. Articles on the effect of herbicides, growth hormones, photoquality on germination and physiology of rice and groundnut provide useful information for improving crop yield. This book would serve as a useful reference for teachers, scientists and planners in the fields of Botany, Plant Physiology, Agriculture, Forestry and related fields

Chlorophyll Fluorescence

Rich in bibliographic references, this book presents the current status of knowledge on the physiology of the pea crop. It draws on contributions from plant physiologists and researchers in various other disciplines who have been working together for many years on the production of plants rich in proteins. The text first discusses vegetative and reproductive development, growth under non-limiting conditions, and the nitrogen nutrition of the pea crop. It then explores the effects of the abiotic and biotic stresses on the development as well as the growth and nitrogen uptake by the plant. The book concludes with a global model of the functioning of the pea crop, which is proposed as a tool for the diagnosis of the

yield-limiting factors.

Crop Physiology Case Histories for Major Crops

An Introduction to the Physiology of Crop Yield

Global demand for wheat, rice, corn, and other essential grains is expected to steadily rise over the next twenty years. Meeting this demand by increasing production through increased land use is not very likely; and while better crop management may make a marginal difference, most agriculture experts agree that this anticipated deficit must be made up through increased crop yields. The first resource of its kind, Physiology and Biotechnology Integration for Plant Breeding assembles current research in crop plant physiology, plant biotechnology, and plant breeding that is aimed toward improving crop plants genetically while supporting a productive agriculture ecosystem. Highly comprehensive, this reference provides access to the most innovative perspectives in crop physiology – with a special emphasis on molecular approaches – aimed at the formulation of those crop cultivars that offer the greatest potential to increase crop yields in stress environments. Surveys the current state of the field, as well as modern options and avenues for plant breeders and biotechnologists interested in augmenting crop yield and stability With the contributions of plant scientists from all corners of the globe who are actively involved in meeting this important challenge, Physiology and Biotechnology Integration for Plant Breeding provides readers with the background information needed to understand this cutting-edge work, as well as detailed information on present and potential applications. While the first half of the book establishes and fully explains the link between crop physiology and molecular biology, the second part explores the application of biotechnology in the effective delivery of the high yield and environmentally stable crop plants needed to avert the very real possibility of worldwide hunger.

Physiology and Biotechnology Integration for Plant Breeding

Phenotyping Crop Plants for Physiological and Biochemical Traits presents a proven range of methodologies and practices for effective, efficient, and appropriate typing of crop plants. By addressing the basic principles and precautions needed when conducting crop-based experiments, this book guides the reader in selecting the appropriate method based on the growing environment, whether greenhouse, pot, field, or liquid (hydroponic). By addressing the quantification of seed traits related to growth experiments, including their viability and vigor, this book presents methodology options for optimum yield based on potential abiotic stresses. Discusses various methods that can contribute to phenotyping of crop plants for various physiological and biochemical traits Presents reliable techniques for phenotyping or quantifying plant characters during varied climatic conditions Provides insights for selecting appropriate methodologies for specific crop growing situations Identifies the most appropriate protocols and methods for analyzing crop traits

Crop Physiology

The book provides in-depth knowledge on the physiology of soybean. It is written lucidly, systematically, and in depth. The book provides recent information and findings, explained with illustrations to express the ideas and concepts vividly to university students and researchers, and provides a better understanding of the improvement of the productivity of soybean to cope with the future demand. It describes the physiology of growth, development, flowering, pod development and seed yield as well as C, O, N and Oil metabolisms – their hormonal regulations under normal and stress environmental conditions. Molecular approaches are also described.

Effect of High Temperature on Crop Productivity and Metabolism of Macro Molecules

This book offers a comprehensive and state-of-the-art source reference for understanding the functions and mechanisms responsible for yield and quality determination under a range of conditions. By uncovering relationships and challenges of successful and scalable crop management and breeding, this volume addresses the challenges of environmentally sound production of bulk and quality food, fodder, fiber, and energy which are of ongoing international concern. Contemporary agriculture and crop management confronts the challenge of increasing demand in terms of quantitative and qualitative production targets. These targets have to be achieved against a background of climate change, including soil and water scarcity and higher temperatures, and the environmental and social aspects of agricultural sustainability. This book views crop production as an active source of methods, theories, ideas, and tools for application in genetic improvement and agronomy.

Fundamentals of Rice Crop Science

Water stress and heat stress are considered to be two primary factors that limit crop production in many parts of the world. Global warming appears to be increasing the water requirements of plants. Understanding the impact of water deficit on plant physiological processes and efficient water management are of great concern in maintaining food production to meet ever increasing world food demand. The book addresses various climatic soil and plant factors that contribute to the water use efficiency in plants subjected to water stress. It covers all issues related to soil, plant and climatic factors that contribute to the crop responses to water stress. The books advances the knowledge in improving and sustaining crop yields in ever increasing unpredictable climatic fluctuations This book uses crop simulation models for response of crops to limited water under various management and climatic conditions.

Physiology of Crop Plants

Emerging Trends of Plant Physiology for Sustainable Crop Production

Herbicides make a spectacular contribution to modern crop production. Yet, for the

development of more effective and safer agrochemicals, it is essential to understand how these compounds work in plants and their surroundings. This expanded and fully revised second edition of Herbicides and Plant Physiology provides a comprehensive and up-to-date account of how modern herbicides interact with target plants, and how they are used to manage crop production. In addition, the text: Provides a current account of the importance of weeds to crop yield and quality; Describes how new herbicides are discovered and developed; Examines precise sites of herbicide action and mechanisms of herbicide selectivity and resistance; Reviews commercial and biotechnological applications, including genetically engineered herbicide resistance in crops; Suggests new areas for future herbicide development; Includes many specially prepared illustrations. As a summary of diverse research information, this second edition of Herbicides and Plant Physiology is a valuable reference for students and researchers in plant physiology, crop production/protection, plant biochemistry, biotechnology and agriculture. All libraries in universities, agricultural colleges and research establishments where these subjects are studied and taught will need copies of this excellent book on their shelves.

Physiological Aspects of Crop Yield

Offers a complete description of all growth processes of plants

Modeling Physiology of Crop Development, Growth and Yield

From climate change to farming systems to genetic modification of organisms, Crop Physiology, Second Edition provides a practical tool for understanding the relationships and challenges of successful cropping. With a focus on genetic improvement and agronomy, this book addresses the challenges of environmentally sound production of bulk and quality food, fodder, fiber, and energy which are of ongoing international concern. The second edition of Crop Physiology continues to provide a unique analysis of these topics while reflecting important changes and advances in the relevant science and implementation systems. Contemporary agriculture confronts the challenge of increasing demand in terms of quantitative and qualitative production targets. These targets have to be achieved against the background of soil and water scarcity, worldwide and regional shifts in the patterns of land use driven by both climate change and the need to develop crop-based sources of energy, and the environmental and social aspects of agricultural sustainability. Provides a view of crop physiology as an active source of methods, theories, ideas, and tools for application in genetic improvement and agronomy Written by leading scientists from around the world Combines environment-specific cropping systems and general principles of crop science to appeal to advanced students, and scientists in agriculture-related disciplines, from molecular sciences to natural resources management

Physiology of the Pea Crop

Respiration is a large and important component of the carbon economy of crops. There are already several good books dealing with the biochemistry and physiol ogy of plant respiration, but there are none I know of that are devoted to the rela

tionship between respiration and crop productivity, although this relationship is more and more frequently being studied with both experiment and simulation. Crop physiology books do cover respiration, of course, but the treatment is limited. The purpose of the present book is to fill this void in the literature. The approach taken here is to use the popular two-component functional model whereby respiration is divided between growth and maintenance components. Mter thoroughly reviewing the literature, I came to the conclusion that at present this is the most useful means of considering respiration as a quantitative compo nent of a crop's carbon economy. This functional distinction is used as the frame work for describing respiration and assessing its role in crop productivity. Discussions and critiques of the biochemistry and physiology of respiration serve primarily as a means of more fully understanding and describing the functional approach to studying crop respiration. It is assumed that the reader of this book is familiar with the fundamentals of plant physiology and biochemistry. The research worker in crop physiology should find this an up-to-date summary of crop respiration and the functional model of respiration. This book is not, however, a simple review of existing data.

Physiological Processes Limiting Plant Productivity

Plant physiology is now considered as an essential ingredient for improving crop productivity, a continuing necessity with today’s ever-increasing world population. This new volume provides an understanding of the physiological basis of the various plant processes and their underlying mechanisms under fluctuating environments, which is of great importance for sustainable crop production. Further advances in cellular and molecular biology hold promise to modify physiological processes, thereby improving the quality and quantity of major food crops and ensuring stability in yield of the produce even under severe abiotic stress. This book covers the latest information on the physiological basis of plant productivity, including abiotic stress adaptation and management, plant nutrition, climate change and plant productivity, transgenic and functional genomics, and plant growth regulators and their applications. The chapters in this volume tackle some of these key issues of sustainable plant production and evolve future strategies in overcoming challenges faced by the agricultural sector as a whole. The topics covered in this book presents important from research reputed scientists. This volume is a rich source of information in one place. It will be a useful resource for researchers and extension workers involved in plant physiology and related disciplines. Key features: Provide the latest information on developments in plant physiology Covers abiotic and biotic stress on economically important crop species Presents a detailed collection of biotechnological approaches in plant physiology Covers plant growth regulators, secondary metabolites, germination, crop growth and development of different crop species Provides research from experts at internationally renowned institutes

Response of Crops to Limited Water

This book has been prepared for those seeking a better understanding of the functioning of crop plants, particularly the processes that lead to the genera tion of products valued by human beings. The contributors, who are among the world's foremost experts on the important crops upon which humanity depends for food or

fibre, address the relevant processes for their specific crop. Currently, the world population is continuing to increase. It is projected to plateau around the middle of the next century, and while there is considerable controversy regarding the population level when this plateau is achieved, most estimates are in the area of 10 000 000 000. At present, there are about 800000000 people in the world who do not have secure access to food. Over the last 50 years various aspects of agricultural research have been combined to increase the output of world crops approximately 2.5-fold. Given the need to feed the increasing population, and to provide better access, it is predicted that during the next 50 years the agricultural research community must repeat this achievement.

The Physiology of Crop Yield

When humankind began to save seed to plant for the next season, they did so hoping to secure a food supply for the future. With that came the inevitable question: Will it be enough? Scientists today are still asking that question. Our dependence on domesticated cultivated varieties has never been greater, even as increasing populations strain our resource base. This book provides a fascinating snapshot-in-time account of the productivity status of all major U.S. field crops. Each crop has a different story to tell. Plant breeding, biotechnology, and agronomy have shaped these stories. It is imperative that we learn from them to ensure continued productivity. The solution is long-term stewardship and the most effective use of our critical resources—water, soil, genetic resources, and human intellect.

Respiration and Crop Productivity

Completely updated and revised, this bestselling book continues to explain the growth and developmental processes involved in the formation of vegetables. Since the publication of the successful first edition significant discoveries, particularly in the area of molecular biology, have deepened and broadened our knowledge and understanding of these processes. This new edition brings the topic up-to-date and is presented over two sections: the first provides general knowledge on germination, transplanting, flowering, the effects of stress and modelling, whilst the second section details the physiology of specific crops or crop groups.

Climate Change Effect on Crop Productivity

Seed Biology and Yield of Grain Crops, 2nd Edition

Physiological Processes Limiting Plant Productivity presents the proceedings of the Thirtieth University of Nottingham Easter School in Agricultural Science held at Sutton Bonington in England on April 2-5, 1979. Contributors focus on physiological processes limiting plant growth and development in the context of agricultural productivity. Emphasis is placed on the fundamental mechanisms that underlie crop production and their control. This text is comprised of 20 chapters; the first of which discusses the genetics of crop physiology in relation to agricultural

production. The range of problems that plant physiologists must address is considered, followed by an assessment of what is happening in crop physiology. A number of chapters are devoted to the utilization of light by crop plants, plant nutrition, water relations, and the effects of an adaptation to unfavorable conditions including those imposed by air pollution. The reader is also introduced to the influence of photoperiodism on crop production; gas exchange in water-stressed plants; and the use of water, solar energy, and fossil fuels in crop production. This book will be of interest to agriculturists, plant breeders, and researchers working in relevant aspects of plant biochemistry, physiology, and genetics.

Crop Yields and Global Food Security

This new edition of an established title examines the determination of grain crop yield from a unique perspective, by concentrating on the influence of the seed itself. As the food supply for an expanding world population is based on grain crops harvested for their seeds, understanding the process of seed growth and its regulation is crucial to our efforts to increase production and meet the needs of that population. Yield of grain crops is determined by their assimilatory processes such as photosynthesis and the biosynthetic processes in the seed, which are partly regulated within the seed itself. Substantially updated with new research and further developments of the practical applications of the concepts explored, this book is essential reading for those concerned with seed science and crop yield, including agronomists, crop physiologists, plant breeders, and extension workers. It is also a valuable source of information for lecturers and graduate students of agronomy and plant physiology.

Application of Physiology in Wheat Breeding

First published in 1989, Physiology of Crop Yield was the first student textbook to digest and assimilate the many advances in crop physiology, within a framework of resource capture and use. Retaining the central core of the first edition, this long-awaited second edition draws on recent developments in areas such as phenology, canopy dynamics and crop modelling, and the concepts of sustainable crop production. A broad perspective is developed, from the gene through the plant and crop to the ecosystem, covering: Advances in molecular biology relating to crop science Limitation of crop yield by the supply of water or nitrogen Global climate change and its impact on crop modelling Physiological aspects of crop quality A wider range of species, with emphasis on wheat, maize and soybean This book will be a valuable tool for advanced undergraduate and postgraduate students of agricultural science, plant science, applied ecology and environmental science. It will be an essential addition to all libraries in universities and relevant research establishments.

Handbook of Seed Physiology

The Pea Crop: A Basis for Improvement documents the proceedings of the University of Nottingham 40th Easter School in Agricultural Science, held at the School of Agriculture, Sutton Bonington, 2-6 April 1984. The aim of the conference

was to formulate a basis for improving the pea crop by bringing together international scientists to present research findings and review published work on a wide range of subject areas encompassing pea genetics, plant breeding, agronomy, crop and plant physiology, utilization, and marketing. This volume contains 42 papers organized into 10 parts. Part I discusses the production, research and development, and future prospects of the pea crop. The papers in Part II focus on the need to improve the pea crop. Part III examines the genetic aspects of improved pea crop production. Part IV deals with crop improvement techniques. The studies in Part V are devoted to the impact of the environment on crop growth. Part VI covers diseases, pests, and weed control while Part VII presents plant physiological studies. Part VIII takes up pea fruit and seed development. Part IX focuses on Rhizobium while Part X discusses the processing, marketing, and consumption of peas.

Physiology of Crop Production

Chlorophyll a fluorescence is a tool for evaluating plant responses to stress conditions. Fluorescence can be used in plant phenotyping and breeding programs to monitor biotic and abiotic stresses including mineral deficiencies, soil salinity, and pathogenic diseases. Chlorophyll Fluorescence: Understanding Crop Performance — Basics and Applications reviews a diversity of instruments available for recording and analyzing different types of light signals from plants and addresses the use of chlorophyll a fluorescence in research on plants and other photosynthesizing organisms, such as algae and cyanobacteria. This book characterizes the phenomenon of chlorophyll a fluorescence, describes the methods for its measurement, and demonstrates — using selected examples — the applicability of these methods to research the response of the photosynthetic apparatus and plant tolerance to unfavorable environmental conditions. In addition, chapters cover a general background on photosynthesis, analysis of delayed fluorescence, and the pulse amplitude modulated (PAM) technique. The book is addressed to a wide range of professionals in photosynthesis research and scientists from other areas of plant sciences.

The Physiology of Vegetable Crops, 2nd Edition

Model studies focus experimental investigations to improve our understanding and performance of systems. Concentrating on crop modelling, this book provides an introduction to the concepts of crop development, growth, and yield, with step-by-step outlines to each topic, suggested exercises and simple equations. A valuable text for students and researchers of crop development alike, this book is written in five parts that allow the reader to develop a solid foundation and coverage of production models including water- and nitrogen-limited systems.

Physiology of Soybean Plant

Examine important global environmental changes that will affect the future of agriculture! Here is a complete introduction to the influence of global environmental changes on the structure, function, and harvestable yield of major field crops. It gives you an in-depth look at the effects of climate change, air

pollution, and soil salinization. The book provides an introduction to the ramifications, both positive and negative, of these ongoing environmental changes for present and future crop production and food supply. Crops and Environmental Change: An Introduction to Effects of Global Warming, Increasing Atmospheric CO2 and O3 Concentrations, and Soil Salinization on Crop Physiology and Yield integrates a discussion of the physiological effects of environmental change with background information on basic topics in plant physiology. Numerous charts, tables, and figures are included to assist in understanding the empirical effects of the environment on crops. Topics addressed in Crops and Environmental Change include: the effects of increasing global atmospheric carbon dioxide concentration climatic changes associated with increasing atmospheric concentrations of carbon dioxide and other greenhouse gases the effects of increasing ozone concentrations in the lower atmosphere across large crop-growing regions soil salinization in areas of irrigated crops the causes and trajectories of ongoing environmental changes the implications of environmental changes on the future of crop production and much more! The information in this book is appropriate for newcomers to the field as well as for seasoned professionals. It is written in language accessible to those new to the area and serves as a good jumping off point for more in-depth study. And since it is organized like a traditional plant physiology textbook, it is appropriate for students in the field. For experienced professionals, it acts as a handy refresher/reference tool on the basics of plant physiology. Crops and Environmental Change is a valuable resource for anyone concerned with the future of agriculture. Make it part of your professional/teaching collection today!

Herbicides and Plant Physiology

Explore the Relationship between Crop and Climate Agricultural sustainability has been gaining prominence in recent years and is now becoming the focal point of modern agriculture. Recognizing that crop production is very sensitive to climate change, Climate Change Effect on Crop Productivity explores this timely topic in-depth. Incorporating contributions by expert scientists, professors, and researchers from around the world, it emphasizes concerns about the current state of agriculture and of our environment. This text analyzes the global consequences to crop yields, production, and risk of hunger linking climate and socioeconomic scenarios. Addresses Biotechnology, Climate Change, and Plant Productivity The book contains 19 chapters covering issues such as CO2, ozone on plants, productivity fertilization effect, UV (ultraviolet) radiation, temperature, and stress on crop growth. The text discusses the impact of changing climate on agriculture, environment stress physiology, adaptation mechanism, climate change data of recent years, impact of global warming, and climate change on different crops. It explores the overall global picture in terms of the effect of crops to climate change during abiotic stress and considers strategies for offsetting and adapting to ongoing climate change. Details how and why climate change occurs and how it effects crop productivity and agriculture Considers what measures should be taken to mitigate the effect of climate change on agriculture Highlights the effect of climate change on crop productivity, the invention of new technology, and strategies for agriculture practice to adapt to climate change Provides an analysis of the global warming effect on crop productivity due to climate change and long-term agriculture technique development Confirms the asymmetry between potentially severe agricultural damages such as the effect on crop yield due to

variation in temperature Reports on the results of experiments to assess the effects of global climate change on crop productivity An asset to agriculturists, environmentalists, climate change specialists, policy makers, and research scholars, Climate Change Effect on Crop Productivity provides relevant information and opportunities for productive engagement and discussion among government negotiators, experts, stakeholders, and others concerned about climate change and agriculture.

Wheat

Effect of High Temperature on Crop Productivity and Metabolism of Macro Molecules presents a comprehensive overview on the direct effect of temperatures defined as "high", a definition which increasingly includes a great number of geographic regions. As temperature impacts the number of base growth days, it is necessary to adapt plant selection, strategize planting times, and understand the expected impact of adaptive steps to ensure maximum plant health and crop yield. Global warming, climate change and change in environmental conditions have become common phrases in nearly every scientific seminar, symposium and meeting, thus these changes in climatic patterns constrain normal growth and reproduction cycles. This book reviews the effect of high temperature on agricultural crop production and the effect of high temperature stress on the metabolic aspects of macro molecules, including carbohydrates, proteins, fats, secondary metabolites, and plant growth hormones. Focuses on the effects of high temperature on agriculture and the metabolism of important macro-molecules Discusses strategies for improving heat tolerance, thus educating plant and molecular breeders in their attempts to improve efficiencies and crop production Provides information that can be applied today and in future research

Water-Conservation Traits to Increase Crop Yields in Water-deficit Environments

This single volume explores the theoretical and the practical aspects of crop physiological processes around the world The marked decrease over the past century in the land available for crop production has brought about mounting pressure to increase crop yields, especially in developing nations. Physiology of Crop Production provides cutting-edge research and data for complete coverage of the physiology of crop production, all in one source, right at your fingertips. This valuable reference gives the extensive in-depth information soil and crop professionals need to maximize crop productivity anywhere the world. Leading soil and plant scientists and researchers clearly explain theory, practical applications, and the latest advances in the field. Crop physiology is a vital science needed to understand crop growth and development to facilitate increases of plant yield. Physiology of Crop Production presents a wide range of information and references from varying regions of the world to make the book as complete and broadly focused as possible. Discussion in each chapter is supported by experimental data to make this book a superb resource that will be used again and again. Chapter topics include plant and root architecture, growth and yield components, photosynthesis, source-sink relationship, water use efficiency, crop yield relative to water stress, and active and passive ion transport. Several figures and tables

accompany the extensive referencing to provide a detailed, in-depth look at every facet of crop production. Physiology of Crop Production explores management strategies for: ideal plant architecture maximizing root systems ideal yield components maximizing photosynthesis maximizing source-sink relationship sequestration of carbon dioxide reducing the effects of drought improving N, P, K, Ca, Mg, and S nutrition improving micronutrient uptake Physiology of Crop Production is an essential desktop resource for plant physiologists, soil and crop scientists, breeders, agronomists, agronomy administrators in agro-industry, educators, and upper-level undergraduate and graduate students.

Crops and Environmental Change

Discussing the latest processes involved in researching yield generation, Wheat: Ecology and Physiology of Yield Determination will help you design various types of crop production systems for maximum yield. Featuring information on developing high-yielding, low-input, and quality-oriented systems, this book offers you both physiological and ecological approaches that will help you understand the crop as well as increase its production. Discussing aspects of wheat growth for specific regions around the world, Wheat provides you with information that will improve the size and quality of your crops, including: how temperature, vernalization, and the photoperiod affect the development of wheat using the correct amount of nitrogen fertilizers for wheat crops an explanation of the reproduction and nitrogen cycles of wheat how elements and conditions such as lipids, proteins, nitrogen, and climate enhance grain quality estimating and determining optimal sowing dates examining factors that may affect wheat yield-density relationships, such as planting arrangement and date of sowing preventing seed decay and examining effects of mildews and leaf blights examining historical trends of the crop to see what further research needs to be done You'll also receive information on the genetic gains in wheat research that are improving the physiological traits and numerical components of this essential grain. Within Wheat, you'll find data and methods from international experts in the field that will improve the yield and growth of the world's most important crop.

Yield Gains in Major U.S. Field Crops

Systems analysis of natural resources and crop production. Engineering for higher yields. Productivity and the morphology of crop stands: patterns with leaves. Physiological significance of internal water relations to crop yield. Light interception and radiative exchange in crop stands. Gaseous exchange in crop stands. Mechanisms of translocation of plant metabolites. Metabolic sinks. Interrelationships among photosyntesis, respiration, and movement of carbon in developing crops. Mechanisms of carbon fixation and associated physiological responses. Physiological responses to nitrogen in plants. Plant morphology and stand geometry in relation to nitrogen. Development, differentiation, and yield. Cultural manipulation for higher yields. Environmental manipulation for higher yields. Germ plasm manipulation of the future.

The Biology of Crop Productivity

Growth and development of the rice plant. Climatic environments and its influence. Mineral nutrition of rice. Nutritional disorders. Photosynthesis and respiration. Rice plant characters in relation to yielding ability. Physiological analysis of rice yield.

Crop Yield

Reviews and analyzes recent advances in in our knowledge of the functioning of crop plants in the field. Emphasis is on north-temperate cropping (although examples are included from other regions), material being drawn from both the laboratory and the field. Also covered are crop simulation and interactions between plant disease and plant physiology, with thoughtful discussion of the complexity of crop/environment/management relationships.

Advances in Plant Physiology

This volume explores specific approaches that have shown to result in crop yield increases. Research on the physiological understanding of these methods has led to the development of practical applications of plant breeding approaches to genetically improve crops to achieve higher yields. Authoritative entries from crop scientists shed new light on two water-conservation traits: one that is based on an initiation of the decrease in transpiration earlier in the soil drying cycle, and the second that is based on a sensitivity of transpiration rate under high atmospheric vapor pressure deficit that results in partial stomatal closure. Both these approaches involve partial stomatal closure under well-defined situations to decrease the rate of soil water loss. Readers will be able to analyze the circumstances under which a benefit is achieved as a result of the water-limitation trait; and key discussion points in the case studies presented will help answer questions such as what species, which environments, how often will yield be benefited for various crop species? Contributions also review the genetic variation for these two traits within each crop species and the physiological basis for the expression of these traits.

Crop Science

The Biology of Crop Productivity attempts to reassess and restate what is known about the biology underlying crop productivity. The prime question which this volume attempts to address is, "What is known about the biology of crop productivity from a range of diverse biological disciplines, and what needs to be known?" Is it possible to formulate the important biological questions, can we begin to discern the biological mechanisms and limitations which underline crop production? This volume is certainly not an all-inclusive survey. It attempts to supplement and explicate material presented in other volumes. The volume is organized into five broad areas: the first deals with various interactions of plants and their environments; the second deals with the interactions of plants with other organisms; the third treats some aspects of the internal organization of plants; the fourth examines genetic manipulations utilizing plant materials; and the fifth outlines a perspective for future research efforts. This volume is intended primarily for persons interested or actively engaged in research in the agricultural plant sciences.

Environment and Crop Production

Rice yields need to increase in order to keep pace with the growing population of Asia and to alleviate hunger and poverty. There appears, however, to be a biophysical limit associated with conventional photosynthetic pathways. The research presented in this book aims at understanding how the rice plant's photosynthetic pathway could be redesigned to overcome current yield limits. The factors controlling yield are discussed from the agronomic to the molecular level. Prospects for improving rice photosynthesis include using genetic engineering to convert rice into a C4 plant. The various chapters in this book deal with photosynthesis; a comparison of C3 and C4 pathways; genes physiology and function, and also discuss this in the broader context of economic consequences of yield improvements for poverty, the molecular genetics of photosynthesis, and ecophysiological and evolutionary perspectives of photosynthesis in wetlands. Researchers on rice, photosynthesis, agronomy, genetic engineering, and food policy will find much of interest in this book.

The Role of Plant Roots in Crop Production

The Role of Plant Roots in Crop Production presents the state of knowledge on environmental factors in root growth and development and their effect on the improvement of the yield of annual crops. This book addresses the role of roots in crop production and includes references to numerous annual crops. In addition, it brings together the issues and the state-of-the-art technologies that affect root growth, with comprehensive reviews to facilitate efficient, sustainable, economical, and environmentally responsible crop production. Written for plant scientists, crop scientists, horticulturalists, and soil scientists, plant physiologists, breeders, environmental scientists, agronomists, and undergraduate and graduate students in different disciplines of agricultural science, The Role of Plant Roots in Crop Production: Addresses root architecture and development dynamics to help users improve crop productivity Emphasizes crop production, plant nutrition, and soil chemistry relative to root growth and functions Covers root morphology, root functions, nutrient and water uptake by roots, root-soil interactions, root-environment interactions, root-microbe interactions, physiology of root crops, and management practices to improve root growth Supports content with experimental results, and additional data is presented with pictures Increasing food production worldwide has become a major issue in the 21st century. Stagnation in grain yield of important food crops in recent years in developed, as well as developing, countries has contributed to a sharp increase in food prices. Furthermore, higher grain yield will be needed in the future to feed a burgeoning world population with a rising standard of living that requires more grain per capita. Technologies that enhance productivity, ensure environmental safety, and conserve natural resources are required to meet this challenge.