Crop Ecology Productivity And Management In Agricultural Systems

We dedicate this book to professor C. T. de Wit (1924 - 1993) who initiated Production Ecology as a school of thought at the Wageningen Agricultural Univer sity (see Rabbinge et at. , 1990). To acknowledge the leading role of C. T. de Wit, a recently formed graduate school at this university in Production Ecology was named after him. Production Ecology is the study of ecological processes, with special attention to flows of energy and matter as factors that determine the productivity of ecological systems. Agro-ecosystems are a special case of ecosystems which are much better suited for the productivity approach than natural ecosystems are. This is the reason for the strong role of agricultural research in production ecology. On the other hand, it must be recognized that the spatial heterogeneity of natural ecosys tems and their species richness may alter some ecophysiological relationships. However, the basic physical, chemical and physiological processes will be the same. De Wit introduced the state variable approach as the basis for simulation mod elling. In this approach the floating character of nature is schematized into a series of snapshots over time in which the states are frozen at each separate moment. The current state determines how the rates of change will lead to the next snapshot. This way of thinking enables a clear and workable representation of interacting simul taneous processes, without compromising on the mathematics.

Soil is a complex body that exists as many types, each with diverse properties that may vary widely across time and space as a function of many factors. This complexity makes the evaluation of soil quality much more challenging than that of water or air quality. Evaluation of soil quality now considers environmental implications as well as economic productivity, seeking to be more holistic in its approach. Thus, soil quality research draws from a wide range of disciplines, blending the approaches of biologists, physicists, chemists, ecologists, economists and agronomists, among others. This book presents a broad perspective of soil quality that includes these various perspectives and gives a strong theoretical basis for the assessment of soil quality. A short glossary provides definitions for terms used throughout the book.

This text discusses a wide range of print and electronic media to locate hard-to-find documents, navigate poorly indexed subjects and investigate specific research topics and subcategories. It includes a chapter on grey and extension literature covering technical reports and international issues.

The objective of this book is to give a general view of the different areas of crop science and its applications in the development of modern methods that help in improving crop productivity and management. Crop science is the study of crops and the diverse aspects related to crops such as breeding, physiology, genetics, ecology, etc. Crops are primarily harvested for food. Some popular techniques of crop science include intercropping, crop rotation, sharecropping and multiple cropping. Fundamental theories and concepts of crop science play a central role in the sustenance of a population. This book also brings forth some of the most innovative concepts and elucidates the unexplored aspects of this field. The various advancements in crop science are glanced at and their applications as well as ramifications are looked at in detail. Those in search of information to further their knowledge will be greatly assisted by this book.

A detailed introduction to agricultural ecology with emphasis on productivity and systems concepts.

Presents the work that has been done and the understanding and database that have been developed by work on climate change done at the Long-Term Ecological Research (LTER) sites. This book pulls together information from all 20 research sites.

Each issue of Transactions B is devoted to a specific area of the biological sciences, including clinical science. All papers are peer reviewed and edited to the highest standards. Published on the 29th of each month, Transactions B is essential reading for all biologists.

The concept of sustainable development appeared almost twenty years ago, adapting traditional policies to new circumstances, and promoting progress capable of satisfying the necessities of both present and future generations. It is widely believed that the need for a proper and sustainable management of water will be a problem which will confront society in the 21st century. In this publication, the main political aspects are successively developed, including the EU Water Framework Directive, the globalization and privatization of fresh water and the case of the new Australian structure for water regulation. The second part of the book is devoted to more practical aspects: from the real effects of climate change, to the various implications of water sustainability on agriculture and cities, devoting particular attention to the experience of the Environment Agency in UK. Finally, the last chapter delves into the economic aspects of the different approaches, and the points to take into account when they are to be translated to the final water tariff.

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Food security and environmental conservation are two of the greatest challenges facing the world today. It is predicted that food production must increase by at least 70% before 2050 to support continued population growth, though the size of the world's agricultural area will remain essentially unchanged. This updated and thoroughly revised second edition provides in-depth coverage of the impact of environmental conditions and management on crops, resource requirements for productivity and effects on soil resources. The approach is explanatory and integrative, with a firm basis in environmental physics, soils, physiology and morphology. System concepts are explored in detail throughout the book, giving emphasis to quantitative approaches, management strategies and tactics employed by farmers, and associated environmental issues. Drawing on key examples and highlighting the role of science, technology and economic conditions in determining management strategies, this book is suitable for agriculturalists, ecologists and environmental scientists.

This book is centered on the "production processes" of crops and pastures, photosynthesis, and use of water and nutrients in fields. It is unique in its combination of great breadth and depth in its treatment of production processes and systems problems. The approach is explanatory and integrative, with a firm basis in environmental physics, soils, physiology, and morphology, in contrast to descriptive or

reductionist approaches. Systems concepts are introduced early and expanded as the book proceeds, giving emphasis to quantitative approaches, to management strategies and tactics employed by farmers, and to environmental issues. The systems approach is brought together in the final chapters where production and nutrient cycling are analyzed, for example farms and problems in an uncertain future are considered. The book is designed for use as a text for an introductory course in crop ecology (advanced undergraduates and beginning post-graduate level). In addition, given the wide range of subjects, the integrated references, and the background material included, it can also be considered a "stand-alone" reference work useful to agriculturalists and botanists.

Tropical Forage Plants: Development and Use covers the research and resulting pasture development in the tropics and subtropics, which has undergone dramatic changes in the past few decades. Providing a broad, global perspective, it serves as a comprehensive resource covering a wide range of subjects pertaining to forage and animal production in th

Crop EcologyProductivity and Management in Agricultural SystemsCambridge University Press

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.

Worldwide, soybean seed proteins represent a major source of amino acids for human and animal nutrition. Soybean seeds are an important and economical source of protein in the diet of many developed and developing countries. Soy is a complete protein and soyfoods are rich in vitamins and minerals.Soybean protein provides all the essential amino acids in the amounts needed for human health. Recent research suggests that soy may also lower risk of prostate, colon and breast cancers as well as osteoporosis and other bone health problems and alleviate hot flashes associated with menopause. This volume is expected to be useful for student, researchers and public who are interested in soybean.

As human populations grow and resources are depleted, agriculture will need to use land, water, and other resources more efficiently and without sacrificing long-term sustainability. Darwinian Agriculture presents an entirely new approach to these challenges, one that draws on the principles of evolution and natural selection. R. Ford Denison shows how both biotechnology and traditional plant breeding can use Darwinian insights to identify promising routes for crop genetic improvement and avoid costly dead ends. Denison explains why plant traits that have been genetically optimized by individual selection--such as photosynthesis and drought tolerance--are bad candidates for genetic improvement. Traits like plant height and leaf angle, which determine the collective performance of plant communities, offer more room for improvement. Agriculturalists can also benefit from more sophisticated comparisons among natural communities and from the study of wild species in the landscapes where they evolved. Darwinian Agriculture reveals why it is sometimes better to slow or even reverse evolutionary trends when they are inconsistent with our present goals, and how we can glean new ideas from natural selection's marvelous innovations in wild species.

Agroecology is the science of applying ecological concepts and principles to the design, development, and management of sustainable agricultural systems. The Ecology of Agroecosystems highlights a collection of alternative agricultural methodologies and philosophies and provides an interdisciplinary approach that bridges the sociopolitical and historical context of agriculture. It includes the technical issues in a serious and ecological fashion and captures the complex merging of ecology, agriculture, politics and economics in both a historical and contemporary context. Readers will learn not only about the ethical and moral elements related to producing food of questionable quality while possibly impairing the environment, but also about the soil chemistry involved.

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.

PRINT/ONLINE PRICING OPTIONS AVAILABLE UPON REQUEST AT a href="http://www.tandfonline.com/action/bookPricing?doi=10.1081%2FE-EPM " target="_blank"Taylor & Francis Online

A field experiment was conducted at farmer’s field of Anandapur, Mangalpur VDC-3, Chitwan, Nepal during winter season from September 2006 to February 2007 to study the effects of nitrogen and plant population on maize. Fifteen treatment combinations consisting of five levels of nitrogen: 0, 50, 100, 150 and 200 kg N/ha and three levels of plant population; 55555

plants/ha (60 cm × 30 cm spacing), 66666 plants/ha (60 cm × 25 cm spacing) and 83333 plants/ha (60 cm × 20 cm spacing) were tested in factorial randomized complete block design (RCBD) with 3 replications. “Rampur Composite” variety of maize was planted on sandy silt loam and strongly acidic soil having medium in total nitrogen (0.123%), high in soil available phosphorous (77.56 kg/ha) and low in soil available potassium (23.25 kg/ha). The research findings revealed that each level of nitrogen significantly increased grain yield upto 200 kg N/ha. The grain yield (6514.48 kg/ha) obtained under 200 kg N/ha was significantly higher than that of 0, 50, 100 and 150 kg N/ha. The percent increment in yield due to application of 50, 100, 150 and 200 kg N/ha was to the extent of 62.11, 104.74, 135.68 and 154.74%, respectively over control. Significant effect on grain yield due to different levels of plant population was observed. The grain yield (5113.46 kg/ha) obtained under 66666 plants/ha was statistically at par with that under 83333 plants/ha, but significantly superior over that under 55555 plants/ha. The interaction between different nitrogen levels and plant densities on grain yield showed that the highest grain yield (6925.79 kg/ha) was obtained under treatment of 200 kg N/ha + 66666 plants/ha. The yield attributes namely number of cobs/plant, cob length, cob diameter, number of grain rows/cob and 1000 seed weight significantly increased with increasing N levels and decreasing plant population levels. The number of barren plants/ha decreased with increasing levels of N but increased with increasing levels of plant population. The net return (Rs. 42188.74/ha) and benefit:cost ratio (1.67) obtained under 200 kg N/ha were significantly highest than that obtained under other levels of nitrogen (150, 100, 50 and 0 kg N/ha). The plant population of 66666 plants/ha gave the highest net returns (Rs. 25812.28) which was 10.19 and 49.64% higher than that of 83333 plants/ha and 55555 plants/ha, respectively. The benefit: cost ratio (1.44) obtained under 66666 plants/ha was significantly higher than that of 55555 and 83333 plants/ha. The interaction between different nitrogen levels and plant densities on economics of maize production showed that significantly highest net return (Rs.48606.98) and B:C ratio (1.78) were under treatment of 200 kg N/ha + 66666 plants/ha. The highest grain yield and maximum profit were obtained when maize variety “Rampur Composite” was planted with 200 kg N/ha and plant population level of 66666 plants/ha (60 cm × 25 cm spacing).

This book is a review of the recent literature on the key scientific and technical subjects of fertilization management in vegetable crops. In the last decades, research on fertilization management in vegetables was aimed at producing economical yields with reduced fertilizer inputs by the development and implementation of cropping systems, nutrient management approaches and crop varieties. Examples of the interventions in cropping systems included adequate crop rotations, inter-cropping, double cropping, and other strategies for a better soil organic matter management; nutrient management approaches included modelling, Decision Support Systems, crop nutritional status testing and precision agriculture technologies; amelioration of crop varieties has been directed toward higher nutrient/fertilizer use efficiency.

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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.

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Meeting the world’s food security challenge will require a multi-national, collaborative effort to integrate the best research from science, engineering and socioeconomics so that technological advances can bring benefits where they are most needed. The present book covers the effect of major environmental problems on crop production and how to cope with these issues for sustainable agriculture and improvements of crops. The world’s population is predicted to hit 9.6 Billion by 2050, up from today’s total of nearly 7.3 Billion, and with it food demand is predicted to increase substantially. The post-war ‘second agricultural revolution’ in developed countries, and the ‘green revolution’ in developing nations in the mid- 1960s converted agricultural practices and elevated crop yields spectacularly, but the outcome is levelling off and will not meet projected demand. Simultaneously, crop production is affected by many other factors, including industrial pollution, overuse of fertilizers and insecticides, heavy metal and radiation stresses etc. It has been noted that many pests are becoming resistant to insecticides. Estimates vary, but around 25% of crops can be lost to pests and diseases. Climate change associated with agriculture is also a global issue. Agriculture is a significant contributor to greenhouse gases and is estimated to account for 10-12% of total greenhouse gas (GHG) emissions. Many of the issues highlighted are global problems and are addressed thoroug hly in this work.

This new edition provides an update on the considerable amount of evidence on tree-crop interactions which has accumulated during the last two decades, especially on the more complex multi-strata agroforestry systems, which are typical of the humid tropics. In addition three new chapters have been added to describe the new advances in the relationship between climate change adaptation, rural development and how trees and agroforestry will contribute to a likely reduction in vulnerability to climate change in developing countries

Crop ecology is an emerging field of study. It studies the methods of farming and assesses the use of technology in agriculture. This book elucidates new techniques and their applications in a multidisciplinary approach. The research done in this field focuses on the techniques and practices that can maximize the profits produced by cropping systems.This book is an essential guide for both academicians and those who wish to pursue this discipline further.

Never before has a holistic approach to sustainable agriculture and plant physiology been presented in one source. This book compiles a multi-authored and international perspective on the ways in which crop physiology could be integrated with other disciplines. 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. * 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 with publication records of demonstrable influence and impact * 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

This book features articles that analyze current agricultural issues and knowledge. It also proposes novel, environmentally friendly solutions that are based on integrated information from such fields as agronomy, soil science, molecular biology, chemistry, toxicology, ecology, economics and the social sciences.Coverage examines ways to produce food and energy in a sustainable way for humans and their children. Inside, readers will find articles that explore climate change, increasing food and fuel prices, poor-nation starvation, rich-nation obesity, water pollution, soil erosion, fertility loss, pest control and biodiversity depletion. Instead of solving problems using the classical painkiller approach, which seeks to limit negative impacts, sustainable agriculture treats challenges at their source. Because most societal issues are in fact intertwined, global, and fast-developing, sustainable agriculture will bring solutions that have the potential to build a more peaceful world. This book will help scientists, decision-makers, professors, farmers and politicians build safer agriculture, energy and food systems for future generations.

Get cutting-edge information to improve crop breeding and productivity! Crop improvement will become progressively important over the next few decades as the world’s population is expected to top 10 billion people, with more than eight billion in developing countries alone. Genetic and Production Innovations in Field Crop Technology: New Developments in Theory and Practice tackles this enormous challenge by detailing the latest available research and innovations for crop breeders and physiologists for the twenty-first century. Respected multidisciplinary scientists comprehensively discuss cutting-edge advances in field crop technology and genetic production as they keep an eye on the goal of providing nutrition to a hungry world. Genetic and Production Innovations in Field Crop Technology emphasizes an integrated approach to solve global crop production problems and increase crop productivity. Crop research experts review methods of globally improving crop yield, food product efficiency, and providing adequate nutrition in diet. The authors discuss various types of field crops, including corn, soybeans, winter wheat, cassavas, rubber, sunflowers, and barley, as well as review the exciting innovations on the food production horizon. The text is extensively referenced and includes useful graphs and tables to clearly present data. Genetic and Production Innovations in Field Crop Technology presents: visionary articles by authorities in agricultural sciences statistical design axioms and modern plot techniques discussions of integration of crop physiology and plant breeding information on systematic collection and preservation of germplasm explanations of genetic diversity in soybeans corn breeding and production research—including the economics—in the United States research on cassava breeding in less favorable environments to alleviate poverty strategies for improving yielding potential of rubber in sub-optimal environments information on fine-tuning wheat genotype-by-environment interaction methodology reviews of QTL identification, mega-environment classification, and effective strategies for marker-based selection via GGE biplot analyses research on statistical properties and practical usefulness of the Scheffe-Calinski and Shukla models relative to genotype-by-environment interaction Genetic and Production Innovations in Field Crop Technology: New Developments in Theory and Practice belongs in every agricultural university library. Crop breeders, geneticists, agronomists and horticulturists, educators, and students will find this an invaluable research source for now and for the future.

This is the first scholarly reference work to cover all the major scientific themes and facets of the subject of seeds. It outlines the latest fundamental biological knowledge about seeds, together with the principles of agricultural seed processing, storage and sowing, the food and industrial uses of seeds, and the roles of seeds in history, economies and cultures. With contributions from 110 expert authors worldwide, the editors have created 560 authoritative articles, illustrated with plentiful tables, figures, black-and-white and color photographs, suggested further reading matter and 670 supplementary definitions. The contents are alphabetically arranged and cross-referenced to connect related entries.

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Rev. ed. of: Principles of ecology in plant production / edited by T.R. Sinclair and F.P. Gardner.

Continuous discoveries in plant and crop physiology have resulted in an abundance of new information since the publication of the second edition of the Handbook of Plant and Crop Physiology, necessitating a new edition to cover the latest advances in the field. Like its predecessors, the Third Edition offers a unique, complete collection of topics

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