The Physiological Ecology Of Plant Succession

This introduction to the features of the atmospheric environment is of particular relevance to plants and describes the physical and physiological principles required for understanding their interaction with the environment.

This textbook is remarkable for emphasising that the mechanisms underlying plant physiological ecology can be found at the levels of biochemistry, biophysics, molecular biology and whole-plant physiology. The authors begin with the primary processes of carbon metabolism and transport, plant-water relations, and energy balance. After considering individual leaves and whole plants, these physiological processes are then scaled up to the level of the canopy. Subsequent chapters discuss mineral nutrition and the ways in which plants cope with nutrient-deficient or toxic soils. The book then looks at patterns of growth and allocation, life-history traits, and interactions between plants and other organisms. Later chapters deal with traits that affect decomposition of plant material and with plant physiological ecology at the level of ecosystems and global environmental processes.

Plant Resource Allocation is an exploration of the latest insights into the theory and functioning of plant resource allocation. An international team of physiological ecologists has prepared chapters devoted to the fundamental topics of resource allocation. Comprehensive coverage of all aspects of resource allocation in plants All

contributors are leaders in their respective fields

Physiological plant ecology is primarily concerned with the function and performance of plants in their environment. Within this broad focus, attempts are made on one hand to understand the underlying physiological, biochemical and molecular attributes of plants with respect to performance under the constraints imposed by the environment. On the other hand physiological ecology is also concerned with a more synthetic view which attempts to under stand the distribution and success of plants measured in terms of the factors that promote long-term survival and reproduction in the environment. These concerns are not mutually exclusive but rather represent a continuum of research approaches. Osmond et al. (1980) have elegantly pointed this out in a space-time scale showing that the concerns of physiological ecology range from biochemical and organelle-scale events with time constants of a second or minutes to succession and evolutionary-scale events involving communities and ecosystems and thousands, if not millions, of years. The focus of physiological ecology is typically at the single leaf or root system level extending up to the whole plant. The time scale is on the order of minutes to a year. The activities of individual physiological ecologists extend in one direction or the other, but few if any are directly concerned with the whole space-time scale. In their work, however, they must be cognizant both of the underlying mechanisms as well as the consequences to ecological and evolutionary processes.

Published ecological information on Latin American coasts is scarce, despite the

growing need for a comprehensive examination of coastal processes on a global scale. This book brings together details on benthic marine algae, seagrasses, salt marsh, mangrove, and dune plant communities throughout Latin America. Researchers and graduate students in plant ecology, marine biology, and environmental management will benefit from the valuable information in this book. Distribution and community ecology Modern research approaches Coastal management possibilities

Describes the effects of disturbance, species competition and coexistence, and the processes of plant succession.

With more than 500 species distributed all around the Northern Hemisphere, the genus Quercus L. is a dominant element of a wide variety of habitats including temperate, tropical, subtropical and mediterranean forests and woodlands. As the fossil record reflects, oaks were usual from the Oligocene onwards, showing the high ability of the genus to colonize new and different habitats. Such diversity and ecological amplitude makes genus Quercus an excellent framework for comparative ecophysiological studies, allowing the analysis of many mechanisms that are found in different oaks at different level (leaf or stem). The combination of several morphological and physiological attributes defines the existence of different functional types within the genus, which are characteristic of specific phytoclimates. From a landscape perspective, oak forests and woodlands are threatened by many factors that can compromise their future: a limited regeneration, massive decline processes, mostly

triggered by adverse climatic events or the competence with other broad-leaved trees and conifer species. The knowledge of all these facts can allow for a better management of the oak forests in the future.

Vascular Transport in Plants provides an up-to-date synthesis of new research on the biology of long distance transport processes in plants. It is a valuable resource and reference for researchers and graduate level students in physiology, molecular biology, physiology, ecology, ecological physiology, development, and all applied disciplines related to agriculture, horticulture, forestry and biotechnology. The book considers long-distance transport from the perspective of molecular level processes to whole plant function, allowing readers to integrate information relating to vascular transport across multiple scales. The book is unique in presenting xylem and phloem transport processes in plants together in a comparative style that emphasizes the important interactions between these two parallel transport systems. Includes 105 exceptional figures Discusses xylem and phloem transport in a single volume, highlighting their interactions Syntheses of structure, function and biology of vascular transport by leading authorities Poses unsolved questions and stimulates future research Provides a new conceptual framework for vascular function in plants

Carnivorous plants have fascinated botanists, evolutionary biologists, ecologists, physiologists, developmental biologists, anatomists, horticulturalists, and the general public for centuries. Charles Darwin was the first scientist to demonstrate

experimentally that some plants could actuallyattract, kill, digest, and absorb nutrients from insect prey; his book Insectivorous Plants (1875) remains a widely-cited classic. Since then, many movies and plays, short stories, novels, coffee-table picture books, and popular books on the cultivation of carnivorous plants have been produced.However, all of these widely read products depend on accurate scientific information, and most of them have repeated and recycled data from just three comprehensive, but now long out of date, scientific monographs. The field has evolved and changed dramatically in the nearly 30 years since the lastof these books was published, and thousands of scientific papers on carnivorous plants have appeared in the academic journal literature. In response, Ellison and Adamec have assembled the world's leading experts to provide a truly modern synthesis. They examine every aspect of physiology,biochemistry, genomics, ecology, and evolution of these remarkable plants, culminating in a description of the serious threats they now face from over-collection, poaching, habitat loss, and climatic change which directly threaten their habitats and continued persistence in them.a href="http://harvardforest.fas.harvard.edu/aaron-ellison"Aaron Ellison/a

This richly illustrated text covers the ecophysiology of plants of all major tropical ecosystems, from tropical rain forests, epiphytic habitats, mangroves and

savannas to salinas, inselbergs and paramos and their ecophysiological adaptation to these different tropical environments. The physiognomy of biotopes and characteristic life forms of plants are depicted with photographs.

This textbook covers Plant Ecology from the molecular to the global level. It covers the following areas in unprecedented breadth and depth: - Molecular ecophysiology (stress physiology: light, temperature, oxygen deficiency, drought, salt, heavy metals, xenobiotica and biotic stress factors) - Autecology (whole plant ecology: thermal balance, water, nutrient, carbon relations) - Ecosystem ecology (plants as part of ecosystems, element cycles, biodiversity) - Synecology (development of vegetation in time and space, interactions between vegetation and the abiotic and biotic environment) - Global aspects of plant ecology (global change, global biogeochemical cycles, land use, international conventions, socio-economic interactions) The book is carefully structured and well written: complex issues are elegantly presented and easily understandable. It contains more than 500 photographs and drawings, mostly in colour, illustrating the fascinating subject. The book is primarily aimed at graduate students of biology but will also be of interest to post-graduate students and researchers in botany, geosciences and landscape ecology. Further, it provides a sound basis for those dealing with agriculture, forestry, land use, and landscape management.

This book critically reviews advances in our understanding of the biology of vascular epiphytes since Andreas Schimper's 1888 seminal work. It addresses all aspects of their biology, from anatomy and physiology to ecology and evolution, in the context of general biological principles. By comparing epiphytes with non-epiphytes throughout, it offers a valuable resource for researchers in plant sciences and related disciplines. A particular strength is the identification of research areas that have not received the attention they deserve, with conservation being a case in point. Scientists have tended to study pristine systems, but global developments call for information on epiphytes in human-disturbed systems and the response of epiphytes to global climate change.
Any explanation of the physiological ecology of plant growth--why plants survive in particular environments--requires the measurement of the effects of environmental factors. This book reviews the history, development, and current status of instruments and measurement techniques that have been particularly useful in field studies of plant physiological ecology. It will be of interest to researchers and students in plant physiology and biochemistry, crop scientists, horticulturalists, and foresters. Miniaturized, portable gas exchange measurement systems Permanent field installation for transportationo measurements Automated plant-water sensing system Use of chlorophyll

fluorescence for screening of tolerant genotypes

Following a description of the physical and biological characterization of the four North American deserts together with the primary adaptations of plants to environmental stress, the authors go on to present case studies of key species. They provide an up-to-date and comprehensive review of the major patterns of adaptation in desert plants, with one chapter devoted to several important exotic plants that have invaded these deserts. The whole is rounded off with a synthesis of the resource requirements of desert plants and how they may respond to global climate change.

Stems, of various sizes and shapes, are involved in most of the organic processes and interactions of plants, ranging from support, transport, and storage to development and protection. The stem itself is a crucially important intermediary: it links above- and below ground organs-connecting roots to leaves. An international team of leading researchers vividly illustrate that stems are more than pipes, more than simple connecting and supporting structures; rather stems are critical, anatomically distinct structures of enormous variability. It is, to an unappreciated extent, this variability that underpins both the diversity and the success of plants in myriad ecosystems. Plant Stems will be a valuable resource on form/function relationships for researchers and graduate-level students in

ecology, evolutionary biology, physiology, development, genetics, agricultural sciences, and horticulture as they unravel the mechanisms and processes that allow organisms and ecosystems to function. Syntheses of structural, physiological, and ecological functions of stems Multiple viewpoints on how stem structure relates to performance Highlights of major areas of plant biology long neglected

The processes and mechanisms that control the growth of woody plants are of crucial importance for both economic and biological reasons. The comprehensive coverage of Growth Control in Woody Plants includes discussion of the growth controlling factors in both reproductive structures (flowers, fruit, seeds, pollen, etc.) and vegetative organs (stems, branches, leaves, and roots). Other major topics covered include seed germination, seedling growth, physiological and environmental regulation of growth, cultural practices, and biotechnology. This comprehensive treatment of the many factors that control the growth of woody plants can serve both as a valuable text and as a frequently used reference. * Includes comprehensive representation of a broad subject * Provides thorough bibliographic coverage * Well illustrated * Serves as a vital companion to Physiology of Woody Plants, Second Edition

Due to many issues related to long-term carbon dynamics, an improved

understanding of the biology of C4 photosynthesis is required by more than the traditional audience of crop scientists, plant physiologists, and plant ecologists. This work synthesizes the latest developments in C4 biochemistry, physiology, systematics, and ecology. The book concludes with chapters discussing the role of C4 plants in the future development of the biosphere, particularly their interactive effects on soil, hydrological, and atmospheric processes.

Coniferous forests are among the most important of ecosystems. These forests are widespread and influence both the financial and biological health of our globe. This book focuses attention on conifers and how these trees acquire, allocate, and utilize the resources that sustain this crucial productivity. An international team of experts has surveyed and synthesized information from an expanding area of inquiry. The first half of the book describes how resources are acquired both by means of photosynthesis and through root systems. The latter half of the volume focuses upon how resources are stored and used. As conifers continue as a resource and ever increasingly important contributor to the regional and global environmental sustainability, this book will help establish how much sustainability can be expected and maintained.

This book provides a critical and selective review of lichen physiological ecology.

This book presents a whole-plant perspective on plant integrated responses to

multiple stresses, including an analysis of how plants have evolved growth forms and phenological responses to cope with changing stress patterns in natural environments. Explores stress responses at both the structural and process levels Outlines structural, phenological, and physiological responses that optimize production under multiple stresses Combines physiological and evolutionary perspectives

Box 9E. 1 Continued FIGURE 2. The C–S–R triangle model (Grime 1979). The strategies at the three corners are C, competiti- winning species; S, stress-tolerating s- cies; R,ruderalspecies. Particular species can engage in any mixture of these three primary strategies, and the m- ture is described by their position within the triangle. comment briefly on some other dimensions that Grime's (1977) triangle (Fig. 2) (see also Sects. 6. 1 are not yet so well understood. and 6. 3 of Chapter 7 on growth and allocation) is a two-dimensional scheme. A C—S axis (Com- tition-winning species to Stress-tolerating spe- Leaf Economics Spectrum cies) reflects adaptation to favorable vs. unfavorable sites for plant growth, and an R- Five traits that are coordinated across species are axis (Ruderal species) reflects adaptation to leaf mass per area (LMA), leaf life-span, leaf N disturbance. concentration, and potential photosynthesis and dark respiration on a mass basis. In the five-trait Trait-Dimensions

space,79%ofallvariation worldwideliesalonga single main axis (Fig. 33 of Chapter 2A on photo- A recent trend in plant strategy thinking has synthesis; Wright et al. 2004). Species with low been trait-dimensions, that is, spectra of varia- LMA tend to have short leaf life-spans, high leaf tion with respect to measurable traits. Compared nutrient concentrations, and high potential rates of mass-based photosynthesis. These species with category schemes, such as Raunkiaer's, trait occur at the ''quick-return'' end of the leaf e- dimensions have the merit of capturing cont- nomics spectrum.

Process-based models open the way to useful predictions of the future growth rate of forests and provide a means of assessing the probable effects of variations in climate and management on forest productivity. As such they have the potential to overcome the limitations of conventional forest growth and yield models, which are based on mensuration data and assume that climate and atmospheric CO2 concentrations will be the same in the future as they are now. This book discusses the basic physiological processes that determine the growth of plants, the way they are affected by environmental factors and how we can improve processes that are well-understood such as growth from leaf to stand level and productivity. A theme that runs through the book is integration to show a clear relationship between photosynthesis, respiration, plant nutrient

requirements, transpiration, water relations and other factors affecting plant growth that are often looked at separately. This integrated approach will provide the most comprehensive source for process-based modelling, which is valuable to ecologists, plant physiologists, forest planners and environmental scientists. Includes explanations of inherently mathematical models, aided by the use of graphs and diagrams illustrating causal interactions and by examples implemented as Excel spreadsheets Uses a process-based model as a framework for explaining the mechanisms underlying plant growth Integrated approach provides a clear and relatively simple treatment

As the global climate changes, there are concomitant changes in global biological productivity. This book is devoted to the assessment of terrestrial Net Primary Productivity ("the total amount of energy acquired by green plants during photosynthesis, minus the energy lost through respiration"--APDS&T, pp. 1457). The book is comprised of three major sections. The first section is a review of the processes that operate globally to influence productivity--these are the initial conditions of any model of primary productivity. The second section is comprised of chapters that assess the contribution of particular ecosystems to global productivity. The final major section contains chapters of a synthetic nature that describe attempts to model global productivity. This book should appeal to both

ecologists and environmental scientists.

The Physiological Ecology of Tunas documents the proceedings of the Tuna Physiology Workshop held at the National Marine Fisheries Service Southwest Fisheries Center at La JoDa, California, January 10-15, 1977. The contributions made by researchers at the workshop are organized into seven chapters. The first chapter includes studies on the morphological diversity and muscle-tissue-specific enzymatic attributes of scombrids. Papers in the second chapter deal with the integrated aspects of tuna behavior and capabilities that result from their complex cardiovascular system. The third chapter contains studies on skipjack tuna white muscle and the locomotor muscles of Scomber and Katsuwonus. The fourth chapter focuses on the thermal biology of tunas while the fifth chapter examines the hydromechanics of tuna propulsion. The sixth chapter provides information on energetic costs of tunas, and observations on physiological demands and correlates. It culminates with a conceptual model for the complex life cycle of the extant "ultimate tuna," the Atlantic bluefin tuna. The seventh chapter discusses applications of tuna physiology studies.

Environmental Plant Physiology focuses on the physiology of plant-environment interactions, revealing plants as the key terrestrial intersection of the biosphere, atmosphere, hydrosphere and geosphere. It provides a contemporary understanding of the topic by focusing on some of

humankind's fundamental biological, agricultural and environmental challenges. Its chapters identify thirteen key environmental variables, grouping them into resources, stressors and pollutants, and leading the reader through how they challenge plants and how plants respond at molecular, physiological, whole plant and ecological levels. The importance of taking account of spatial and temporal dimensions of environmental change in order to understand plant function is emphasised. The book uses a mixture of ecological, environmental and agricultural examples throughout in order to provide a holistic view of the topic suitable for a contemporary student audience. Each chapter uses a novel stress response hierarchy to integrate plant responses across spatial and temporal scales in an easily digestible framework. Much effort has been devoted to developing theories to explain the wide variation we observe in reproductive allocation among environments. Reproductive Allocation in Plants describes why plants differ in the proportion of their resources that they allocate to reproduction and looks into the various theories. This book examines the ecological and evolutionary explanations for variation in plant reproductive allocation from the perspective of the underlying physiological mechanisms controlling reproduction and growth. An international team of leading experts have prepared chapters summarizing the current state of the field and offering their views on the factors determining reproductive allocation in plants. This will be a valuable resource for senior undergraduate students, graduate students and researchers in ecology, plant ecophysiology, and population biology. 8 outstanding chapters dedicated to the evolution and ecology of variation in plant reproductive allocation Written by an international team of leading experts in the field Provides enough background information to make it accessible to senior undergraduate students Includes over 60 figures and 29 tables

The efficient management of trees and other woody plants can be improved given an understanding of the physiological processes that control growth, the complex environmental factors that influence those processes, and our ability to regulate and maintain environmental conditions that facilitate growth. Emphasizes genetic and environmental interactions that influence woody plant growth Outlines responses of individual trees and tree communities to environmental stress Explores cultural practices useful for efficient management of shade, forest, and fruit trees, woody vines, and shrubs

Growth, reproduction, and geographical distribution of plants are profoundly influenced by their physiological ecology: the interaction with the surrounding physical, chemical, and biological environments. This textbook highlights mechanisms that underlie plant physiological ecology at the levels of physiology, biochemistry, biophysics, and molecular biology. At the same time, the integrative power of physiological ecology is well suited to assess the costs, benefits, and consequences of modifying plants for human needs and to evaluate the role of plants in natural and managed ecosystems. Plant Physiological Ecology, Third Edition is significantly updated, with many full color illustrations, and begins with the primary processes of carbon metabolism and transport, plant water relations, and energy balance. After considering individual leaves and whole plants, these physiological processes are then scaled up to the level of the canopy. Subsequent chapters discuss mineral nutrition and the ways in which plants cope with nutrient?deficient or toxic soils. The book then looks at patterns of growth and allocation, life?history traits, and interactions between plants and other organisms. Later chapters deal with traits that affect decomposition of plant material and with the consequences of plant physiological ecology at ecosystem and global levels. Plant Physiological Ecology, Third

Edition features several boxed entries that extend the discussions of selected issues, a glossary, and numerous references to the primary and review literature. This significant new text is suitable for use in plant ecology courses, as well as classes ranging from plant physiology to plant molecular biology.

In the spring of 1969 a small meeting was convened at the CSIRO Riverina Laboratory, Deniliquin, New South Wales, to discuss the biology of the genus Atriplex, a group of plants considered by those who attended to be of profound importance both in relation to range management in the region and as a tool in physiological research. The brief report of this meeting (Jones, 1970) now serves as a marker for the subsequent remarkable increase in research on this genus, and served then to interest the editors of the Ecological Studies Series in the present volume. This was an exciting time in plant physiology, particularly in the areas of ion absorption and photosynthesis, and unknowingly several laboratories were engaged in parallel studies of these processes using the genus Atriplex. It was also a time at which it seemed that numerical methods in plant ecology could be used to delineate significant processes in arid shrubland ecosystems. Nevertheless, to presume to illustrate and integrate plant physiology and ecology using examples from a single genus was to presume much. The deficiencies which became increasingly apparent during the preparation of the present book were responsible for much new research described in these pages.

Although, as W.D. Billings notes in his chapter in this book. the development of physiological ecology can be traced back to the very beginnings of the study of ecology it is clear that the modern development of this field in North America is due in the large part to the efforts of Billings alone. The foundation that Billings laid in the late 1950s came from his own studies on

deserts and subsequently arctic and alpine plants, and also from his enormous success in instilling enthusiasm for the field in the numerous students attracted to the plant ecology program at Duke University. Billings' own studies provided the model for subsequent work in this field. Physiological techniques. normally confined to the laboratory. were brought into the field to examine processes under natural environmental conditions. These field studies were accompanied by experiments under controlled conditions where the relative impact of various factors could be assessed and further where genetic as opposed to environmental influences could be separated. This blending of field and laboratory approaches promoted the design of experiments which were of direct relevance to understanding the distribution and abundance of plants in nature. Physiological mechanisms were studied and assessed in the context of the functioning of plants under natural conditions rather than as an end in itself.

The last decade has seen rapid and major advances in our understanding of the physiological ecology of plants. This volume reviews some of these advances and new challenges. The chapters cover five broad themes: resource acquisition and utilization; interactions between organisms; responses to global environmental changes; ecosystems; and integration and scaling. This book brings together an unrivalled collection of leading practitioners in the discipline from North America, Europe and Australia and adopts a broad approach, ranging from the molecular to the ecosystem level. It has proven a valuable tool for researchers and advanced students in the discipline.

Mammals are the so-called "pinnacle" group of vertebrates, successfully colonising virtually all terrestrial environments as well as the air (bats) and sea (especially pinnipeds and cetaceans). How mammals function and survive in these diverse environments has long fascinated

mammologists, comparative physiologists and ecologists. Ecological and Environmental Physiology of Mammals explores the physiological mechanisms and evolutionary necessities that have made the spectacular adaptation of mammals possible. It summarises our current knowledge of the complex and sophisticated physiological approaches that mammals have for survival in a wide variety of ecological and environmental contexts: terrestrial, aerial, and aquatic. The authors have a strong comparative and quantitative focus in their broad approach to exploring mammal ecophysiology. As with other books in the Ecological and Environmental Physiology Series, the emphasis is on the unique physiological characteristics of mammals, their adaptations to extreme environments, and current experimental techniques and future research directions are also considered. This accessible text is suitable for graduate level students and researchers in the fields of mammalian comparative physiology and physiological ecology, including specialist courses in mammal ecology. It will also be of value and use to the many professional mammologists requiring a concise overview of the topic.

Unlocking the puzzle of how animals behave and how they interact with their environments is impossible without understanding the physiological processes that determine their use of food resources. But long overdue is a user-friendly introduction to the subject that systematically bridges the gap between physiology and ecology. Ecologists--for whom such knowledge can help clarify the consequences of global climate change, the biodiversity crisis, and pollution--often find themselves wading through an unwieldy, technically top-heavy literature. Here, William Karasov and Carlos Martínez del Rio present the first accessible and authoritative one-volume overview of the physiological and biochemical principles that shape how animals procure energy and nutrients and free themselves of toxins--and how this relates

to broader ecological phenomena. After introducing primary concepts, the authors review the chemical ecology of food, and then discuss how animals digest and process food. Their broad view includes symbioses and extends even to ecosystem phenomena such as ecological stochiometry and toxicant biomagnification. They introduce key methods and illustrate principles with wide-ranging vertebrate and invertebrate examples. Uniquely, they also link the physiological mechanisms of resource use with ecological phenomena such as how and why animals choose what they eat and how they participate in the exchange of energy and materials in their biological communities. Thoroughly up-to-date and pointing the way to future research, Physiological Ecology is an essential new source for upper-level undergraduate and graduate students-and an ideal synthesis for professionals. The most accessible introduction to the physiological and biochemical principles that shape how animals use resources Unique in linking the physiological mechanisms of resource use with ecological phenomena An essential resource for upper-level undergraduate and graduate students An ideal overview for researchers

There is a new emerging interest in the effects of gaps and patches on succession and biodiversity. This innovative volume is a synthesis of studies of plant responses to temporal and spatial heterogeneity, the exploitation of resources from pulses and patches by plants, and their competition with neighbors in the face of this variability. Aboveground, the book focuses upon the nature of canopy patchiness, consequences of this heterogeneity for the light environment, and the mechanisms by which plants respond to and exploit this patchiness. Belowground, the text explores the heterogeneity of soil environments and how root systems obtain nutrients and water in the context of this temporal and spatial variability. As a new

reference in an evolving and growing field, this text is sure to be a valuable tool for researchers and advanced students in plant physiology, ecology, agronomy, and forestry alike.

Traditional plant physiological ecology is organism centered and provides a useful framework for understanding the interactions between plants and their environment and for identifying characteristics likely to result in plant success in a particular habitat. This book focuses on extending concepts from plant physiological ecology as a basis for understanding carbon, energy, and biogeochemical cycles at ecosystem, regional, and global levels. This will be a valuable resource for researchers and graduate students in ecology, plant ecophysiology, ecosystem research, biometerology, earth system science, and remote sensing. Key Features * The integration of metabolic activities across spatial scales, from leaf to ecosystem * Global constraints and regional processes * Functional units in ecological scaling * Models and technologies for scaling

O.L. LANGE, P.S. NOBEL, C.B. OSMOND, and H. ZIEGLER Growth, development and reproductive success of individual plants depend on the interaction, within tolerance limits, of the factors in the physical, chemical and biological environment. The first two volumes of this series addressed fea tures of the physical environment (Vol. 12A) and the special responses of land plants as they relate to water use and carbon dioxide assimilation (Vol. 12B). In this volume we consider specific aspects of the chemical and biological envi ronment, and whereas the previous volumes were primarily concerned with the atmospheric interactions, our emphasis here shifts very much to the soil. This complex medium for plant growth was briefly reviewed in Chapter 17, Volume 12A. Since it is difficult to determine the precise physical and chemical interactions in the soil, it is even more difficult to determine the important biological

interactions among organisms. Nevertheless there is growing aware ness of the significance of these interactions and their effects on physiological processes in the individual plant.
The growth, reproduction and geographical distribution of plants are profoundly influenced by their physiological ecology: the interaction with the surrounding physical, chemical and biological environments. This textbook is notable in emphasizing that the mechanisms underlying plant physiological ecology can be found at the levels of biochemistry, biophysics, molecular biology and whole-plant physiology. At the same time, the integrative power of physiological ecology is well-suited to assess the costs, benefits and consequences of modifying plants for human needs, and to evaluate the role of plants in ecosystems.Plant Physiological Ecology begins with the primary processes of carbon metabolism and transport, plant-water relations, and energy balance. After considering individual leaves and whole plants, these physiological processes are then scaled up to the level of the canopy. Subsequent chapters discuss mineral nutrition and the ways in which plants cope with nutrient-deficient or toxic soils. The book then looks at patterns of growth and allocation, life-history traits, and interactions between plants and other organisms. Later chapters deal with traits that affect decomposition of plant material and with plant physiological ecology at the level of ecosystems and global environmental processes.Plant Physiological Ecology features numerous boxed entries that provide extended discussions of selected issues, a glossary, and numerous references to the primary and review literature. The significant new text is suitable for use in plant ecology courses, as well as classes ranging from plant physiology to plant molecular biology.
This text is the successor volume to Biophysical Plant Physiology and Ecology (W.H. Freeman,

1983). The content has been extensively updated based on the growing quantity and quality of plant research, including cell growth and water relations, membrane channels, mechanisms of active transport, and the bioenergetics of chloroplasts and mitochondria. One-third of the figures are new or modified, over 190 new references are incorporated, the appendixes on constants and conversion factors have doubled the number of entries, and the solutions to problems are given for the first time. Many other changes have emanated from the best laboratory for any book, the classroom. · Covers water relations and ion transport for plant cells; diffusion, chemical potential gradients, solute movement in and out of plant cells · Covers interconnection of various energy forms; light, chlorophyll and accessory photosynthesis pigments, ATP and NADPH · Covers forms in which energy and matter enter and leave a plant; energy budget analysis, water vapor and carbon dioxide, water movement from soil to plant to atmosphere