



# Physicochemical and Environmental Plant Physiology

*By Park S. Nobel*

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## **Physicochemical and Environmental Plant Physiology** By Park S. Nobel

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

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## **Editorial Review**

### Review

"Nobel's book has been a cornerstone of plant physiology for over three decades?a must read for any self-respecting plant physiologist. Where else can one find such an analytically precise presentation that couples the engineering equations of ecophysiology to the basic principles of physical chemistry? This edition represents the penultimate integration of the quantitative sciences within the field of plant physiology" - William K. Smith, Wake Forest University

"Park Nobel presents, in an unusually lucid and quantitative manner, the fundamentals of plant physiology in relation to basic physical and chemical processes. This book is an important starting point for anyone concerned with the response of plants to their physical environment." - Harold Mooney, Stanford University

"A generation of biologists has turned to Park Nobel's **Physicochemical and Environmental Plant Physiology** for answers to all fundamental questions about how plants function in the environment...The references are thoroughly updated, and the theory behind newer techniques is explained with Nobel's customary precision and elegance. The many small changes have improved the book without altering its essential rigor and scholarly appeal." - Gretchen North, Occidental College

"Basic textbooks on plant physiology lately have become rare...This thoroughly updated third edition can help both undergraduate and graduate students gain a solid foundation in fundamental concepts of plant physiology. The integrative power of physical and chemical background helps the understanding of basic physiological process of photosynthesis and respiration, plant water relations, and the response of plants to the environment. It will also be useful as a supplemental text for courses in agronomy, forestry, functional ecology, and horticulture, and for researches working on the mechanisms underlying plant physiological ecology in natural and cultivated systems." - Eulogio Pimienta-Barrios, Universidad de Guadalajara, Mèxico

"I have used and recommended this text since it beginnings because it is unique in its emphasis on a quantitative approach to problems in plant physiology, biophysics and biochemistry...It is important to foster the more quantitative aspects of biology now that the data collecting phase of genomics is maturing. Nobel has consistently provided a text that promotes this goal." - Roger M. Spanswick, Cornell University

"Nobel's text, in its various incarnations, has long provided a relatively painless introduction to topics such as diffusion, chemical potentials, active transport, carbon and water fluxes, and energy budgets. It has been accessible to students with little prior training in thermodynamics, physics, or chemistry; its success is attested to by the fact that there really is little in the way of direct competition for the topics it covers. The recent revision maintains the focus of the previous ones, being concerned more with basic concepts than with detailed experimental data, though there is excellent guidance given on the values and ranges of many important physiological parameters... If anyone is capable of helping readers develop this understanding, it is Park Nobel." -*ECOLOGY*, praise for the 1st edition

### From the Publisher

Praise for the First Edition "The best available source for the student or researcher to learn or to review the physical aspects of the majority of plant-physiological processes." (*Quarterly Review of Biology*)

"...The book contains an enormous amount of information, carefully presented and well discussed...Should

be available in every library." (*Annals of Botany*)

"...The book deserves to be widely read and will be of great use for a substantial time." (*Plant, Cell and Environment*)

"A 'must' for any advanced course on plant physiological ecology and environmental physiology." (J. Rozema, Vrije Universiteit Amsterdam, The Netherlands)

"...The style and content make this book unique among textbooks in plant physiology..." (*Plant Science Bulletin*)

"...its success is attested to by the fact that there really is little in the way of direct competition for the topics it covers..." (*Ecology*)

From the Back Cover

In fundamental ways, the functioning of all living systems obeys the laws of physics and chemistry. This is true for all physiological processes that occur inside cells, tissues, organs, and organisms. This new edition of a classic text has been thoroughly revised while maintaining its unparalleled commitment to the clear presentation and student user-friendliness. Certain to maintain its leading role in the teaching of general and comparative physiological principles, **Physicochemical and Environmental Plant Physiology, 2nd Edition** establishes a new standard of excellence in the teaching of quantitative plant physiology.

- \* Over four hundred fifty updated references
- \* Thorough text revisions intended to improve clarity of presentation
- \* Enhanced coverage of bioenergetics, and gas and water fluxes
- \* Thoroughly revised figures
- \* Revised calculations in all chapters
- \* Reformatted problems with solutions
- \* New information on root properties and especially global climate change
- \* Established and classic equations presented in an easy-to-refer-to list
- \* Appendices with conversion factors and constants

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**Traci Daniels:**

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