Design and Evaluation of Irrigation Methods
By A. M. Michael, Shri Mohan, and K. R. Swaminathan. Water Technology Center, Indian Agricultural Research Institute, New Delhi. 207 pages.

The first 50-page chapter (which is too sketchy to be of much value) provides review and background on soil-water and plant-soil-water relationships and on selected aspects of water application. All the various kinds of efficiencies associated with irrigation are listed and defined. Procedures for estimating or measuring water flow rate, land surface slope, infiltration rate, depth of flow of water during irrigation, and hydraulic resistance to flow on the surface are presented, including complete plans for much of the equipment used. The remaining chapters describe evaluation and design procedures for border, basin, furrow, sprinkler, and drip irrigation systems, although the design of drip systems is omitted.

Appendices include (in metric units) orifice and weir tables, tables of friction head losses in pipes, sprinkler equipment specifications, English-literature publications, and computer programs for calculating water-front advance in border irrigation.

The style is instructional rather than readable, with numerous step-wise solutions given to example problems. Indeed, the book is preoccupied with procedure, with usually inadequate indication of rationale, and little discussion of possible limitations or errors. For example, the double-ring infiltrometer is advocated for determining the crucial infiltration-time relationship for flood irrigation with no warning that infiltration rates during actual irrigation often differ substantially from ring infiltration rates. Also, there is inadequate discussion of variability inherent in all infiltration rate measurements.

From the standpoint of evaluation of existing water application systems, the book is very valuable, since it provides relatively complete, systematic formats for analyzing performance. Variability and errors inherent in the procedures or assumptions may lead to some misinterpretations, but they will have no serious impact. Such evaluations provide a better understanding of the systems and their operation and should result in better irrigation practice.

On the other hand, I believe the value of the design procedures for the surface irrigation systems is very limited. The design of border systems is based on simplified assumptions and possibly incorrect infiltrometer data. The authors recognize the even greater complexity of furrow systems, and base the design on information from test furrows. This minimizes many of the problems, but certainly not all design can be based on prototype testing. An actual system operates with different hydraulic roughness, required depth of water application, and infiltration rate within its period of use, but all designs involve only single values.

Hopefully, this book will be a first step in the transformation of the design of these complex surface irrigation systems from an art to a science by passing work to improve available procedures.—D. W. Henderson, Water Science and Engineering Section, Land, Air and Water Resources Department, University of California, Davis.

Microbial Ecology

This volume contains four extensive review papers concerning various aspects of microbial ecology. Two of the articles deal with microbe-pesticide interactions, one with general aspects of bacterial growth, while the remaining one is specifically concerned with the activities of soil microorganisms. The papers previously appeared in issues of CRC Critical Reviews in Microbiology, a quarterly journal published by CRC Press during the period 1972–1973. The quality of the papers is generally high, and the volume offers the reader easy access to the recent literature of microbial ecology. The relatively limited depth of the book’s index will be a handicap, however.

The article by G. Stotsky, entitled “Activity, Ecology, and Population Dynamics of Microorganisms in Soil,” will likely be the one of greatest interest to soil microbiologists. Included in this very comprehensive review is a bibliography containing nearly 400 citations. The main strength of this article is its discussion of the action of physical factors, especially clay mineral surfaces, on microbial activities in soil.

F. K. Pfister reviews the recent literature concerning interactions of microorganisms with halogenated hydrocarbon pesticides. Although his literature coverage is extensive, the author makes little attempt to integrate the information he presents, resulting in a paper which is essentially a collection of abstracts.

J. M. Bollag provides an excellent review of the role of soil fungi in transforming various pesticides. Unfortunately, the list of cited articles which the author gives at the end of this paper has been cut short, leaving the reader without bibliographic details on 12 papers included in the review.

The paper by J. L. Meers treats various aspects of bacterial growth in mixed cultures. Although the author provides very little information concerning relationships in the soil environment, the general principles he presents will be of interest to those studying microbial growth in soil.