Also, bentonite applied alone decreased bacterial counts to half of their original numbers.

5. Humus materials are the main buffers for harmful chemicals in the soil. Studies of their synthesis and decomposition thus become more important research areas.

6. The main method for assessing the mass and energy circulation in soils continues to be the measurement of CO₂ production.

7. Little is known about the uniqueness of the interactions between the microbial biocenoses and specific soils or the impact of human activities on these interactions.

The proceedings of this symposium, like the eight before it, deal with soil biology and the closely related fields of agricultural ecology and soil fertility. The papers of the present two volumes will be useful to soil scientists, persons interested in plant nutrition or chemical protection of plants, and will also help in education at the university level.—WILEY D. NETTLETON, National Soil Survey Laboratory, Federal Building, Room 345, 100 Centennial Mall North, Lincoln, NE 68508-3866.

Microbiology in Action


This volume is dedicated to Dr. James Matthew Vincent on the occasion of his 75th birthday and is written by former students and colleagues. Dr. Vincent is a well-known Australian worker in Rhizobium and Bradyrhizobium ecology, whose methods and research findings have enhanced our understanding of the legume-rhizobial symbiosis. The book is divided into two parts. The first 15 chapters deal with various aspects of biological nitrogen fixation and the last seven chapters cover other topics in general microbiology.

The topics of rhizobial ecology in soil, strain selection, root colonization and rhizosphere interactions, inoculation of seed, and the root-infection process are well summarized for both the slow- and fast-growing rhizobia early in the book. The authors point out that our knowledge of the ecology of root-nodule bacteria in the field is still limited and that factors controlling the competitiveness of introduced strains to soil for the most part remain unknown. Similarly, even though the morphological events involved in infection of the host have been well documented, the signals between bacteria and plant in the infection process are not well elucidated.

The molecular basis of symbiotic nitrogen fixation, both of the plant and rhizobia, is well summarized. The authors suggest that this basic understanding is important at the mechanistic level to allow future manipulation of the symbiotic system and potentially to transfer nodulating ability to agriculturally important, nonleguminous crops.

Three chapters covering nitrogen-fixing symbioses with Australian native legumes, constraints to biological nitrogen fixation in ley-farming systems designed for West Asia, and Bradyrhizobium of the nonlegume, Parasponia, while interesting and well written, are likely of interest to a narrower audience.

Topics covered in the general microbiology section include rhizosphere ecology, bacterial adhesion, microbial structure and function, microbial tolerance to desiccation, bacterial spores, and the microbiology of milk and meat. These topics are well done but the overall effectiveness of the book suffers because of the dichotomy.

This book likely will be of interest to a broad array of readers, but especially to those working in the ecology and the genetics of biological nitrogen fixation. Individual chapters address the state-of-knowledge of topics and suggest the direction for future research. Illustrations, line drawings, tables, and figures are helpful to the reader in some chapters but limited or lacking in others. One of the major strengths of the book is that most chapters have extensive references cited.—T.E. LOYNACHAN, Department of Agronomy, Iowa State University, Ames, IA 50011.

Conservation Farming on Steep Lands


The material presented in this book was compiled and edited from the workshop on “Soil and Water Conservation on Steep Lands” in San Juan, Puerto Rico, 22–27 Mar. 1987. The workshop focused primarily on issues in developing countries, although other examples are cited. The overall objectives of the workshop as outlined by Moldenhauer were “(1) to compare experiences from successful soil and water conservation projects on steep lands as a means of determining the common principles involved that might be applied worldwide, (2) to publish the invited papers as a record of the magnitude of soil erosion worldwide and what accounts for the success or failure of efforts to deal with the erosion problem, and (3) to develop a manual that can be used by field technicians to integrate soil and water conservation measures with improved agricultural production systems.” The first two objectives are addressed in this text.

There are six main sections in the book: Introduction; Principles and Programs; Social and Economic Issues; Practices and Projects; Case Studies and Country Reports; and Summary. Although there is some overlap between sections, in general the book is well organized and the material clearly presented. The introduction emphasizes the necessity of an integrated approach when addressing the problems of farming on steep lands. Hudson suggests that conservation farming may be a more appropriate goal than soil conservation alone. He goes on further to state that soil degradation must not be thought of as a mismanagement problem, but socioeconomic factors need to be considered as well. A recurring theme stressed throughout the book is the necessity of full farmer participation beginning at the planning stage. The time invested in interviewing farmers before project initiation may turn out to be the key factor in determining the success or failure of the project.

The Principles and Programs section presents general guidelines for planning and implementing programs. As the majority of projects are sponsored and/or administered by developed countries, it is important to remember that the constraints differ for developed and developing countries. Some principles may apply universally, but actual programs need to be flexible and site-specific. The pros and cons of incentive programs were also addressed in this section, along with the need for coordination of efforts within the country.