Managing Soil Quality: Challenges in Modern Agriculture


The editors of this book attempt to shed new light on soil quality, with an emphasis on management instead of indicator thresholds that do not relate to management. In the book, leading soil scientists discuss the history and concept of soil quality, and chemical (acidity, P, N, K), biological (organic matter dynamics, microbial activity, and soil biodiversity), and physical (subsoil compaction, erosion) aspects of soil quality. The final chapters are devoted to soil contaminants, a systems approach to soil quality management, and implementation of soil quality management in developed and developing countries.

The editors have to be commended for bringing unity to contributions from Europe, North America, Australia, and New Zealand. The cross-continental character gives this book a unique flavor. The European authors emphasize fertilizer and pesticide reductions (or elimination as in organic agriculture), but largely ignore the contrast between no-tillage and conventional tillage. For example, on the one hand, European authors discuss liming, nitrogen fertilization strategies, and compaction management, but fail to contrast management strategies in each of these areas for no-tillage versus tillage systems. North American authors, on the other hand, pay less attention to differences in tillage timing and depth as affecting, for instance, organic matter dynamics. The chapter on system approaches specifically contrasts conservation tillage and organic agriculture. The editors themselves note in the final chapter that the contrast is really artificial, as components of both systems could be combined to result in even better soil quality management. The chapter on land use planning reveals that soil quality hardly influences policy decisions in Europe. The “missing link” in this chapter seems to be the importance of the land owner and user in land use decision making. The discussion of soil quality in developing countries emphasizes the greater importance of productivity than environmental considerations there. Although regional differences are alluded to, the impression is created that high population inputs are at the root of soil quality degradation in developing countries. Recent policy research shows within Sub-Saharan Africa, differences in population density, market access, and agroecological conditions differ widely, suggesting that soil management challenges and solutions vary. Therefore, the topic of soil quality management in developing countries deserves more attention than it receives in this book. In the synthesis chapter, the editors note the inability to define critical management thresholds for most properties, but they still suggest 1000 kg/ha/yr of CaCO3 to maintain pH of neutral soils at 7, an Olsen-P level of 60 mg P/kg as a critical level not to be exceeded to avoid acidification, and a maximum wheel load of 30 kN to avoid subsoil compaction. In practice, however, acidification depends on the amount of N-fertilizer and manure applied, P leaching is no environmental threat on most soils, and subsoil compaction depends on soil water content as well as surface and subsoil properties. To give global guidelines, therefore, misleading an international audience to believe they can be applied anywhere. Instead, this book reveals the need for local-specific management guidelines developed interactively between land users (and owners), researchers, public and private personnel, and policy makers.

This book gives food for thought for those interested in soil management to improve soil quality. The hidden tension between European and United States soil management schools just reveals how much our values impact scientific research. As the editors justly indicate, we need greater recognition of these values as well as the openness to discuss them.

SJOERD W. DUIKER
Department of Crop and Soil Sciences
The Pennsylvania State University
University Park, PA 16802
swd10@psu.edu
doi:10.2134/jeq2005.0024br