Review of *Properties and Management of Soils in the Tropics*


Garrison Sposito*

The second edition of *Properties and Management of Soils in the Tropics* is a remarkable book—not only because its world-famous author, Pedro Sánchez, is the only soil scientist ever to receive the World Food Prize, be awarded a MacArthur "genius" Fellowship, and be elected to the US National Academy of Sciences—not only because the book is up-to-date, coming at a crucial time, and absolutely encyclopedic, covering a vast number of topics, from the microscale of the rhizosphere to the global scale of the water and carbon cycles, in more than 650 double-columned, heavily referenced pages—but it is remarkable as well because it uses a literary device that is extremely rare in modern scientific works but well-known to generations of writers, from Brontë to Fitzgerald to Lemony Snicket, in which an author steps away from the text and addresses the reader personally. While reading along in Sánchez’s book, a reader may suddenly hear from the author himself with a personal anecdote, punctuated by the use of personal photographs in the figures, or even get his personal take on the current consensus regarding some topic. This remarkable book is thus authoritative, encyclopedic, and conversational.

The first section of the book contains two introductory chapters, one giving an overview of the natural environment of the tropics in a time of global change, followed by one about the people who live in the tropics and their quest for food security, both chapters featuring detailed discussions (as well as the author’s personal and sometimes acerbic comments). The second chapter might be characterized as posing the question, “Why should we care about the tropics?” whereas the first chapter conveys the fragile uniqueness of the tropical environment. The second chapter might well be read before the first one because it lends higher purpose to any search for knowledge about tropical agriculture and the soils that sustain it.

The next section, weighing in at 240 pages, virtually a book-within-a-book, provides a comprehensive discussion of tropical soil properties. Five of its eight chapters, all of which require a solid prior understanding of basic soil science and plant ecology, cover physical properties related to soil structure and soil water, mineralogy, acidity, biology, and organic carbon, this focused subject matter being prefaced by three overview chapters on the classification and management of tropical soils. The third of these chapters introduces the latest version of the Functional Capability Classification System, developed by Sánchez and Stanley W. Buol, which augments the US Soil Taxonomy with A horizon designations for attributes that figure importantly in the ability of soil to support plant productivity. These latter attributes, in turn, are organized according to three “core” soil properties considered to determine the ability of soils to provide ecosystem services: texture, mineralogy, and organic matter (Palm et al., 2007), a viewpoint to which the present reviewer also subscribes. The factual material on soil properties in this section is thoroughly integrated with discussions of the role they play in tropical soil management. For example, the chapter on soil structure and erosion contains discussions of exemplary soil and water conservation practices as well as conservation (minimum-tillage) agriculture.
The third section of the book, 120 pages addressing tropical soil fertility, is largely self-contained. It comprises an overview chapter on soil fertility principles and practice, replete with the author’s experiential insights concerning the role of laboratory diagnostic testing, plus chapters on three of the four macronutrients deemed by consensus to limit plant growth most often in tropical agriculture (nitrogen, phosphorus, and sulfur each receive chapter treatment but not potassium). These three macronutrient chapters give careful, up-to-date discussions of nutrient cycling issues that have major agricultural and environmental consequences, including exhaustive discussions of fertilization practices and the plant and soil response to them. Expressions of personal viewpoint are deeply blended into this section, including the author’s optimistic perspective on whether global phosphorus reserves are destined to run out in the near term.

The final section, some 220 pages long, comprises four specialized chapters addressing the most prevalent agricultural systems found in the tropics: slash-and-burn agriculture, wetland rice cultivation, livestock-based systems, and agroforestry. Each of these chapters, which build on material in previous sections of the book, is abundantly illustrated and heavily documented, as well as thoroughly infused with the author’s field experience. Nutrient cycling plays a central role in these chapters, along with detailed analyses of the impacts of the agricultural systems discussed on both soil properties and the tropical environment. Given the exhaustive and encyclopedic nature of these chapters, the reader may find it useful to consult the Summary and Conclusions sections as an introduction to the chapter material. It should be added that none of the chapters downplays the serious questions that have been raised over the years concerning the global environmental consequences of tropical agricultural systems; indeed, the possible alternatives to or improvements that could be made in each system are given careful attention.

In the Preface to the second edition of *Properties and Management of Soils in the Tropics*, which comes to us more than four decades after the first edition, the author states that “This edition encompasses both agronomy and ecology, addressing the ecosystem services that soils provide, not only food and nutrition security but also the regulation of climate, water, and nutrients, and the preservation of biodiversity. One could call this edition ‘soils plus.’” One could indeed do so, because this second edition is truly comprehensive and encyclopedic. But “soils plus” also reflects the fact that this book is conversational, engaging the reader unforgettably with one of the modern masters of soil science.

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