Book review


In the ‘developed’ world, soil fertility in agricultural land has generally been maintained or improved by inexpensive fertilizers and manure, whereas in the tropics, it tends to be low, declining and often undervalued. Over the past decade or so, an impressive series of books and articles has been published on soil fertility in the tropics, its assumed decline, and the integrated ways in which soil fertility can be managed by using, for example, an appropriate combination of mineral fertilizers, rock phosphates, legumes, agroforestry and runoff and erosion control measures.

There is yet another book on the market now with the slightly presumptuous title Soil Fertility Decline in the Tropics. “Forget all the previous work, here is the final verdict”, is what the title may suggest. The subtitle of the book, With Case Studies on Plantations, however, shows that some novel elements may be included, given the limited attention to plantation crops in the arena of international agricultural research. Since the end of colonial times, there has been a stigma associated with plantation crops. This may be due to several reasons including their history (which is related to slavery), the large scale at which they are grown (and consequent displacement of small landowners) and because they have often replaced more biodiverse natural ecosystems. The author, however, shows that over the past four decades plantation crops have continued to gain importance, in terms of area and yield. Furthermore, they provide labour opportunities and substantial contributions to national economies and, to divulge one conclusion from the book, because they cause less nutrient depletion than most annual crops.

The book is strongly centered on the quest for the “evidence of soil fertility decline”. This can be based on stories told by farmers and other experts, comparing photographs of landscapes, or comparing a set of indicators at different spatial and temporal scales. One approach to do this could have been to focus on the fashionable but methodologically difficult semi-quantitative methods, where a set of nutrient inputs and outputs are measured or estimated to arrive at a nutrient budget. Instead, the author focusses on “changes in soil properties” as the major entry point into a discussion of soil fertility decline. He evaluates both annual and perennial cropping systems on the basis of data derived from chronosequences (based on long-term experiments) as well as biosequences (comparing land use systems and soil-crop interaction). The approach sounds difficult to do because outcome 1 is compared to outcome 2, with all processes determining rate and direction of change put into black boxes. The author overcomes this difficulty and allows insight into these black boxes by presenting a comprehensive review in each chapter of various soil-process studies including erosion, leaching and denitrification.

Chapter 4 is a key chapter in the book because it describes the theoretical considerations underlying the measurement and evaluation of soil fertility changes. The author carefully leads the reader through systems thinking, data types and needs, and the many sources of error and bias that can occur during sampling and analysis. For example, in the context of nitrogen (N) soil fertility, a decrease of 0.1 g N per kilogram soil could translate into a loss of 350 kg N per hectare, thereby having a substantial effect on subsequent recommendations for soil N replenishment. As well, minor
deviations from the 0.1 g/kg value or bulk density values used to translate the concentration of N to a mass of N will have a strong impact on the estimated large values. The author provides summary tables of many long-term experiments, which are invaluable because of the lack of new data on soil fertility indicators. Soil surveys are not conducted very often these days, but basing soil fertility evaluations on data obtained in the 1960s and 1970s, perhaps even those obtained from virgin land, is not meaningful for current soil fertility management strategies.

The author concludes from the data sets assembled in the book that increased monitoring and evaluation of soil fertility in the tropics is needed. This is based on the observation that on average soil fertility decline does occur, the decline is greater in annual cropping systems than perennial systems and greater in sugarcane than in sisal. But the decline in soil fertility it is not always obvious in terms of declining crop yields. In other words, whereas soil fertility decline takes place in many soils it is either still high enough to sustain yields, or other factors (e.g., improved husbandry, improved varieties, climatic conditions) have a positive effect on yields, and so cloud the issue. This is what makes soil fertility dynamics so difficult to study. In contrast, things like droughts, flooding, locusts and infestation of obnoxious weeds such as Striga hermonthica are very tangible and striking, as is their effect on crop performance. A decline in soil fertility is more like an illness with an incubation period; if you don’t feel sick, why worry?

I strongly recommend this book to soil scientists, agronomists, farming system specialists and, as far as the main lines of the book are concerned, to anyone interested in sustainable agriculture. It contains a wealth of information, based upon a thorough and up-to-date literature review. The book is comprehensive and convincing, and it adds much value to what is already in the literature. It is not a set of papers but one story, with a consistent storyline embedded in a relevant historical context, written in a witty and at times provocative style. And when the reading is finished, the picture on the book cover may lure the reader into falling in love with plantation crops.

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