



Book reviews

Encyclopedia of Soil Science

Edited by R. Lal. Marcel Dekker, 2002. Hardbound, 1476 pp. ISBN 082470634. US\$ 250

When I send out a book as book review editor of *Geoderma*, I include some suggestions that may be of help to the reviewer. The first suggestion is: “. . . you should read the whole book, which is the very least you owe the author(s) and/or editor(s).” After a review copy of the “*Encyclopedia of soil science*” was received, I realised it would be difficult to find a reviewer giving the size of the book: it is fat (73 mm thick), weighs 3.3 kg and has almost 1500 pages. Secondly, there are so many people involved in this encyclopaedia that it would be difficult to find someone who has not contributed. Therefore, as a non-contributor and someone who likes to read a bit, I decided to review the book myself.

Given the increasing availability of soil information and data on the world wide web and in hundreds of textbooks, it is good to see that this book starts with the rationale why it was written. The rationale, as the editor points out in the preface, is the important challenges that humankind faces at the start of the 21st century (growing population, food insecurity, soil degradation, increase in greenhouse gasses, decrease in the area of arable land, shortage of fresh water). The development of soil maintenance strategies are essential for the solutions to these challenges, and it is necessary that soil information is readily available to the scientific community, policy makers and the public at large in an easily accessible compendium: hence this book.

The encyclopaedia has about 360 entries that were written by over 400 authors. All branches of soil science are covered and an editorial board of 15 soil scientists in addition to 47 topical editors was involved steered by the competent editor Rattan Lal. Each entry covers three to six pages and consists of an introduction whereafter the main part is presented in several short sections including graphs, tables and sometimes pictures. All entries end with a list of references, which are numbered in the text. Each entry reviews in a few pages the most important aspects and developments of a particular subject. For example, the four-page entry ‘infiltration properties’ includes paragraphs on infiltration models, model parameters like porosity, initial water content, wetting front suction, effective hydraulic conductivity, and ends with conclusions and a list of 23 references. It includes two tables. The pages of the book are slightly smaller than A4 and the text is double-columned. There is an excellent 24-page index at the back.

It is impossible to list all entries in this review as it is also impossible to have all soil science entries in a single encyclopaedia. Some subjects have multiple entries and there are 12 entries (> 3%) starting with ‘degradation’, 29 entries (9%) start with ‘erosion’, 7 entries with ‘inorganic carbon’ and 9 start with ‘organic matter’. The 12 orders of Soil Taxonomy

(e.g. Alfisol, Gelisol) all have a separate entry but the 30 Reference Soil Groups (e.g. Alisols, Solonetz) of the World Reference Base (WRB) have no entry and are also not listed in the index. WRB is separately listed. Rendzina has an entry, but podzol is not there which is a bit surprising as podzols are amongst the most researched soils in the world. Sodium has no separate entry and is listed with silicon. The same applies to 'boron and molybdenum' and 'cobalt and iodine'. Therefore the index might be a better starting point than the individual entries. There are a few entries which one would not expect in a soil science encyclopaedia like for example 'health', 'value to humans', 'testing'; they are well written entries but these are not the words one looks for. Perhaps of interest to readers of this journal is that 'pedotransfer functions' as well as 'pedological modeling' are included, but 'pedometrics' is not.

It must have been a major operation and at first one wonders if a book of such size and so many people involved could have been written without electronics. The answer is probably yes but not in the same time (the encyclopaedia took about 3 years.) Recently we have also seen the appearance of the "Handbook of soil science" (Sumner, 2000) and I have understood similar types of books are in preparation. We should be very pleased that such large volumes appear as summarise the tremendous developments that have taken place in soil science in the past 150 years or so. In my opinion one of the best efforts that summarised decades of research is the "Fertilizer guide for the tropics and subtropics" from the early 1970s. This was a single-authored book with over 5000 references that has no match yet in quality and quantity. Another great book that brings together much soil science is "Russell's soil conditions and plant growth" (Wild, 1988) and the increase in pages and subjects covered by Russell has been analysed by Greenland (1997). This encyclopaedia is different in a number of ways: it has fewer entries compared to ordinary encyclopaedias (e.g. the Britannica) and the average entry is longer. However, as the articles are short I kept reading. I have not experienced that so much with the "Handbook of soil science" which has longer articles.

Some entries in this encyclopaedia are better than others which is unavoidable giving the large number of contributors. As far as I can judge most entries are up-to-date with the current developments. Now a critical point beyond control of the soil science community involved in this encyclopaedia: it is a pity that most of the pictures are not clear, perhaps as the quality of the printing (digital I assume) is rather poor. That is no exception as I have also noticed in other recently published books that the quality of pictures is declining compared to books from the 1970s de Geus, 1973. Graphs and tables are, however, clear.

In conclusion, this is a great book that should be on the library shelf in every soil science department and other departments of natural sciences. Individuals may want to consider to purchase the much cheaper on-line version which will be regularly updated. Overall this is a very commendable effort for which the editor and all involved need to be congratulated.

References

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Diversity and Integration in Mycorrhizas

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The book contains keynote lectures and symposium presentations of the Third International Conference on Mycorrhizas (ICOM-3) held in Adelaide, Australia, in 2001. Mycorrhizal research is a rapidly advancing multidisciplinary field, where both reductionist and holistic approaches are used in the study of the interface between soils, mutualistic fungi and plants. Reductionism is evident in the ever-finer studies of molecular biology when it comes to molecular communication between plants and fungi, or the fine tuning between gene expression by plants and fungi. At the other end, there is a need to upscale our study of mycorrhizal functioning to global scales. In terms of precision, the reductionist approach offers rapid rewards as can be evidenced by the seven papers in section B: Development—from genes to structure. As a consequence, the mycorrhizal community tends to lean to the molecular side, and issues of global relevance may not always find the (financial) support and representation at conferences that they merit. In that regard, the book is probably no exception. The word soil is in the title of only 1 of the 31 chapters—a chapter that treats soil microorganisms other than mycorrhizal fungi. In that chapter, J.I. Prosser sketches modern developments in microbial ecology and the impact that molecular methods have in leaving behind the inherent biases and limited views that the conventional, cultivation-based methods had exerted. While such methods have tremendously increased our understanding of species and functional diversity of soil bacteria, application of these methods in (mycorrhizal) fungal ecology has lagged behind. The chapter suggests way for further improvement, and it is pleasing to note that the number of papers in which such methods are applied to mycorrhizal communities are rapidly increasing.

Soil scientists will find more chapters that are relevant for their research. In the introductory chapter, B. Söderström sets the scene, pointing out that 20–30% of the C that is fixed by plants may be consumed by the fungus. A substantial part of that C is immediately oxidized, but a significant part could be sequestered in the external mycelium, ending up in soil carbon. A major challenge to mycorrhizal researchers is to better understand the factors that determine C flows in mycorrhizas and the ways in which