Acta Agronomica Hungarica, 48(2), pp. 217–220 (2000)

Book reviews

G. FILEP: Soil Chemistry – Processes and Constituents (1999)
Akadémiai Kiadó (Academy Publishing House), Budapest
ISBN 963 05 7455 1

The control of soil processes (mass and energy regimes; abiotic and biotic transport and transformation) is the primary task of up-to-date soil science. For efficient control, exact quantitative information is necessary on the existing processes, their determining/influencing/modifying factors and their mechanisms. The book represents a considerable contribution to our present knowledge on soil chemistry, soil processes and soil constituents.

The topic of the book is the quantitative characterization of chemical reactions taking place in the soil, as well as the properties of the main soil components.

Outlines are given on the physico-chemical and colloid-chemical regularities necessary for the evaluation of soil chemical processes, after which the individual reaction types and the mechanism of mass transport are discussed in detail.

Attention is focused on the properties and roles of soil colloids, the mechanism of adsorption and ion exchange, the chemical and colloid-chemical interpretation of soil acidity, the evaluation of the acid-base buffer capacity of the soils, as well as on the principles of the modelling of salt and ion transport in soils.

The 330-page book includes 9 chapters, as follows (the 4 numbers in brackets following the title of each chapter express the number of pages, tables, figures and references, respectively):

1. Introduction (5; 21; 1; 2): the subject of soil chemistry.

2. Chemical principles (58; 9; 16; 27). The basic rules of thermodynamics; the structure and physico-chemical properties of aqueous solutions and the elements of reaction kinetics are briefly explained and comprehensively defined.

3. The solid phase of the soil (49; 16; 31; 69). This richly illustrated chapter summarizes the main mineral components and organic materials of the soil, characterizing their roles in various soil reactions and processes.

4. Liquid and gaseous phases of the soil (24; 9; 8; 53). Information is given on the composition and movement of soil air and special attention is paid to the chemical characteristics of the soil solution and to the solute transport in soils (diffusion, convection and their combination).

5. Solubility and redox equilibria (36; 4; 13; 27). In addition to well-explained general information, the solubility equilibrium of carbonate systems, aluminium silicates, aluminium and iron hydroxides is discussed in detail, as are redox potential and electron activity, electrochemical equilibrium diagrams and oxidation/reduction in soils.

6. Soil colloids (25; 5; 13; 20). In this chapter theories on the description of ion distribution on colloid surfaces and the main characteristics of mineral, organic and organo-mineral complex soil colloids are summarized, including their electrochemical behaviour (charge characteristics).

7. Adsorption and ion exchange (55; 6; 25; 70). The most valuable chapter of the book reflects the fact that the author is an internationally recognized specialist in this particular part of soil chemistry. In the first part of the chapter adsorption-desorption phenomena are precisely defined and various adsorption-desorption isotherms are evaluated; in the second part the cation and anion exchange processes are described, evaluating the influencing factors and their mechanisms.

8. Soil acidity and alkalinity (33; 6; 18; 65). One "added value" of the book is that in addition to theoretical considerations some examples are also presented for practical application. In this chapter the acidity/alkalinity behaviour of soil is described, its main sources are analysed and its quantitative characteristics are summarized. The acid and base neutralizing capacity of soils is discussed, evaluating its components, interactions and mechanisms. This knowledge represents an exact scientific basis for the efficient control (prevention, reduction) of soil acidity or alkalinity.

9. Modelling of solute transport in soil (30; 1; 9; 69). In this chapter the author gives a clear, precise and comprehensive critical review of the theories describing chromatographic processes and of the miscible displacement theory, including convective-

dispersive solute transport equations and other transport models (combined models, stochastic models).

The rational, logical structure of the book, the well-selected, expressive illustrations (figures, tables), the precise list of symbols and their definitions, and the subject index make the high-standard scientific content clearly understandable and relatively easily applicable, which is particularly important in the case of a comprehensive source book.

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P. STEFANOVITS, G. FILEP, G. FÜLEKI: Talajtan (Soil Science)
Mezőgazda Kiadó, Budapest, 1999.
ISBN 963 9239 13 5

Soils are the most important conditionally renewable natural resources in Hungary. Consequently, their rational utilization and conservation, and the maintenance of their multi-functionality are priority tasks for the national economy and environment protection.

A scientifically-based plan of action for efficient soil management requires comprehensive information on the physical, chemical, biological and agronomic properties of the soils and on their complex ecological and environmental functions, as well as on soil processes (mass and energy regimes; transport, abiotic and biotic transformation, biogeochemical cycles of various elements), the factors which determine, influence and modify them, and their mechanisms. This knowledge provides alternative possibilities for any soil-related activity and for the efficient control of soil processes, which is the primary task of up-to-date soil science.

In spite of the fact that in Hungary numerous soil science textbooks and university lecture notes (by Z. Fekete, L. Hargitai, F. Zsoldos, P. Stefanovits, I. Szabó; and by J. Dömsödi, J. Fekete, G. Filep, G. Pántos, I. Szabó, respectively); general soil monographs (P. Stefanovits) and handbooks on particular disciplines of soil science (S. Arany, D. Fehér, G. Filep, J. di Gléria, A. Klimes-Szmik, P. Stefanovits, I. Szabolcs) have been published during recent decades, a comprehensive textbook covering all aspects of soil science was not available. The present book on **"Soil Science"** intends to satisfy these needs and to present a well-structured, clearly-written, easily readable and understandable book for a large number of people: scientists, teachers and decision-makers at various levels, agronomists, extensionists, land use planners, environmentalists, practical farmers, land users, and any soil-loving member of society.

The 470-page book includes 21 chapters. The text is supplemented by 49 tables and illustrated by 131 figures and 32 colour photographs on 8 plates (soil profiles, landscapes and soil management/amelioration practices). The list of references (as Chapter 22) recommends 22 books and selected publications for further study.

The 21 chapters are as follows (after the title of the chapter the author's name is given, followed by the number of pages, tables and figures, respectively):

1. Soil and soil science (Stefanovits; 3; 0; 1): short and precise definitions, disciplinary subdivision, connections with other soil-related sciences and practical applications.

2. Mineral soil components (Stefanovits; 11; 1; 4): primary and secondary minerals with particular attention to clay minerals, their characteristics and role in soil processes.

3. Soil-forming factors (Stefanovits; 21; 1; 3): brief description of the 5 main factors of soil formation (geological conditions and relief, climate, biological factors, time, human activities); introduction of the main rocks, sediments and other parent materials according to their geological chronology, as well as the role of hydrological conditions in soil formation processes.

4. Weathering processes (Stefanovits; 9; 5; 0): brief summary of physical, chemical and biological weathering.

5. Living organisms in the soil (Füleky; 12; 3; 1). Annotated list of soil macro- and micro-organisms, with their favourable and unfavourable effects on soil development and biological soil processes.

6. Soil organic matter (Füleky–Filep; 15; 1; 9). Short but concise summary of the decomposition of biomass (especially plant) residues and on the formation and characteristics of humus substances.

7. Chemical properties of soils (Filep–Füleky; 45; 7; 23). Well-structured description of the soluble salt content, soil colloids,