BOOK REVIEWS

New Books Received


Handbook of Processes and Modeling in the Soil–Plant System


Soil is a fundamental requirement of life on the earth. Most plants rely on soil for physical support and nutrition supply. Animal and other low forms of organisms, in turn, use organic matter produced by plants for food. Correct and efficient soil management methods rely always on the thorough understanding of physical, chemical, and biological processes occurring in soil that form a very sophisticated interrelated network system. To understand the complex network system, it is important to explore every component by all means. Presenting both the fundamental processes occurring in the system and a variety of related modeling approaches in one book makes it quite valuable. The book can be divided into five parts. Chapters 1 through 3 review the physical, chemical, and biological processes of soil properties in general. The three chapters cover energy and matter flow, dynamics of organic and inorganic matter, and chemical processes in the complex network system. From soil formation and degradation and other closely related substances and processes are critical for soil structure, water, nutrition, and productivity. Chapters 4 through 9 describe humic substances, radioactivity, and soil formation and degradation processes. Chapter 4 reviews recent research results on the conformational structure of humic substances. The formation processes of parent material, surface soil, and lower soil horizons and the corresponding modeling approaches are discussed in Chapter 5. The deposition, behavior, and transfer of radionuclides in the soil-plant system and the corresponding modeling approaches are given in Chapter 6. Chapters 7 through 9 focus on soil degradation processes (i.e., soil acidification, alkalization, and wind and water erosion) and corresponding modeling approaches.

Chapters 10 through 19 describe the dynamics and modeling approaches of all essential soil matter including water, solutes, carbon dioxide, organic matter, major nutrient elements (i.e., nitrogen, phosphorus, and potassium), secondary nutrient elements (i.e., sulfur, calcium, and magnesium), trace and toxic elements (e.g., copper, zinc, boron, lead, arsenic, etc.), and agrochemicals (e.g., herbicides, insecticides, fungicides, nematicides, and plant growth regulators). A variety of modeling approaches, concepts, and application examples are presented in these chapters. The modeling approaches integrate physical and chemical processes in the complex network system. From my point of view, they are quite useful to people working in the fields of dynamic modeling, especially for model development and application.

In the soil–plant–atmosphere network system, plant species...