European Journal of Soil Science

Kutsch, W.L., Bahn, M. & Heinemeyer, A. (eds) *Soil Carbon Dynamics: an integrated methodology*. Cambridge University Press, Cambridge, UK (http://www.cambridge.com), 2010. xi + 286 pp. (£65; US$110), hardcover. ISBN 978-0-521-86561-6.

As concern over global warming grows with rising atmospheric carbon dioxide, it is useful to be reminded of the role soil

carbon (C) plays in the biome that we inhabit. Containing nearly twice the C in the atmosphere, soils may become sources or sinks of atmospheric C in the years to come. To understand anthropomorphic influences on terrestrial C balance it is necessary to appreciate the intricate relationships between soil chemistry, microbes, soil fauna and autotrophs, which have evolved over millions of years. That being said, intricacies of soil C cycling do not readily yield to scientific inquiry. Soil organic matter changes slowly on a timescale few have the luxury or the patience to see to completion. *Soil Carbon Dynamics: an integrated methodology* is a useful and up-to-date reference of current issues and methodological approaches. The body of literature associated with soil C dynamics is expansive in complexity, diversity and sheer volume. The editors and contributing authors have essentially created a tour of the methodological advances and defined the state of the art for subdisciplines within soil C dynamics.

The depth and breadth of the treatment of soil respiration and its constituent processes is noteworthy. Often soil scientists focus on the chemistry of soil C processes with an emphasis on long-term changes and the peculiarities of specific soil series or mineralogy, paying less attention to measuring C losses to the atmosphere. On the other hand, ecologists and biologists focus on monitoring respiratory losses without always understanding the role of soils. This text seems to bridge the gap between these sometimes divergent interests. Chapter 2 spans 80 years of measuring soil respiration under field conditions and offers an assessment of how each approach contends with sources of error. Anyone new to collecting or interpreting soil respiration data should read this chapter. The authors of Chapter 2 decided not to endorse one method over another, but took the approach of letting the readers decide which methods best fit their needs. This is followed by a nice overview (Chapter 3) of the considerations to be mindful of when designing experiments to quantify soil respiration (i.e. actually have a hypothesis, hypothesis testing, sample size requirements, and spatial and temporal variability). After reading the entire book, I found an appendix on standardization of soil CO_2 efflux protocols, which was not previously cited and could have been better integrated into Chapter 2.

This book is approachable to non-soil scientists and those new to the field, giving it cross-discipline appeal. Chapter 4 introduces and defines the major C stocks and describes how soil properties affect C retention, followed by a critical assessment of the methodologies available to measure soil C, monitor its change over time and to scale C accumulation data to national level summations. The same may be said for Chapter 6, which covers the broad topic of soil organic matter classification, from methods to understanding the dynamics between categories. Trying to recreate the knowledge distilled from the literature in these chapters would be time consuming.

Chapter 5 defines litter decomposition, factors affecting litter quality and how soil fauna, fungi and bacteria cooperate to degrade biological compounds. Before reading this chapter, I did not fully appreciate how limited our knowledge of litter decomposition is. Methods described range from simple mass loss calculations from litter bags to stable isotope labelling and following labelled C as it moves from plant material to decomposition products. The focus is understandably on methods, although I would have liked to get more perspective on how litter decomposition varies between ecotype, climatic regions and land-use regimes, which can produce very different litter types.

This text is very strong on the role of plant and microbial physiology in soil C dynamics in a very pragmatic way (Chapters 7–9). It is easy to get caught up (or hopelessly lost) in the details and intricacies of physiology, but the focus on methodology and problem solving remains throughout the book, shedding light on root and microbial respiration, separating autotrophic and heterotrophic respiration and identifying microbial parameters relevant to soil C fluxes. There is critical assessment of modelling approaches for soil respiration and soil organic matter (Chapter 12). This is valuable information for researchers who generate data to feed models or those who use models, but are not modellers *per se*. This is followed by a discussion of the role of soils in the Kyoto Protocol (Chapter 13).

This text does an excellent job of integrating methodologies and knowledge specific to disciplines of soil science, plant ecology, plant and microbial physiology and ecosystem C flux dynamics. I would recommend this book to field experimentalists, graduate students or anyone administering or overseeing a C dynamics research or assessment programme.

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