
Soil Tillage in Agroecosystems addresses soil tillage for agricultural management in temperate regions. The authors argue that tillage, or the lack thereof, is central to most management systems and thus to sustainability. They discuss positive aspects of reduced or conservation tillage, which for most management systems does not mean a reduction in productivity—conservation tillage systems can have the same or even more yield than conventional systems. Reduced tillage and no-tillage are appropriate topics to revisit during these times of concern about rising fuel costs and the need for sequestration of soil organic carbon.

The book has 12 chapters that draw on current research from internationally known researchers and focus on various aspects of tillage and its effects on soil physical, biological, and chemical properties. Chapters 1 to 4 cover general areas of soil management and their associated changes due to tillage. The chapters have some areas of overlap but little to no repetition. Chapter 1 describes various forms of tillage, implements, and their effects on the soil. It compares their use in conventional tillage with conservation or reduced tillage and no-tillage. The chapter ends with a discussion of the fuel savings associated with conservation tillage. Chapter 2 describes the components, formation, and forces acting on soil structure. It then considers the impact of tillage on structure and tillage effects on productivity and solute transport. Chapter 3 discusses the soil microbial community and tillage. It first looks at the microbial community as a functioning part of the agroecosystem and then delves into the effects that tillage, rotation, and reduced tillage have on the microbial community. Chapter 4 analyzes the roles of conventional and reduced tillage in short- and long-term nutrient management, including losses to erosion, leaching, and the atmosphere.

Chapters 5 to 11 discuss the responses of various field flora and fauna to different tillage management practices. Chapter 5 describes the effect of tillage on crop and weed seed, including light, water, temperature, soil atmosphere, and predation effects on germination. The chapter also discusses seed dormancy, germination, and probability of emergence. Chapter 6 discusses soil tillage implications related to annual and perennial weed communities. It includes functions of noxious and beneficial weeds and functions of chemical and mechanical weeding. Chapter 7 addresses the implications of conventional and reduced cultivation on diseases of arable crops, including how diseases spread and how they affect the crop. Chapter 8 describes the effects of various tillage systems on slugs and their natural enemies. It includes sections on chemical control, biological control, and management practices to control slug populations. Chapter 9 considers the effects of earthworms on agroecosystems. It discusses earthworm population and activity in relation to soil temperature, pH, and type, as well as organic matter and tillage management. Chapter 10 deals with meso- and microfauna in the soil environment, including their adaptation to the various environments caused by conventional and reduced tillage systems. Chapter 11 considers the diversity of epigean predatory arthropods in agroecosystems and how various tillage systems influence their population dynamics at field, farm, and landscape levels.

Chapter 12 provides a synthesis of the book by the editor. It evaluates “tillage effects with a view to long-term ecosystem stability, soil fertility, and functioning” with positive recommendations for no-tillage or non-inversion tillage for most management systems when compared with more conventional systems. Although the book lacks significant discussion of erosion or movement of soil caused by tillage, it is very broad in its coverage of topics with extensive literature reviews for most chapters. It would make a good reference book.

Warren Busscher
USDA-ARS, Coastal Plains Research Center
2611 W. Lucas St.
Florence, SC
(busscher@florence.ars.usda.gov)