

# **Sustainable Agriculture Reviews**

Volume 28

## **Series editor**

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Sustainable agriculture is a rapidly growing field aiming at producing food and energy in a sustainable way for humans and their children. Sustainable agriculture is a discipline that addresses current issues such as climate change, increasing food and fuel prices, poor-nation starvation, rich-nation obesity, water pollution, soil erosion, fertility loss, pest control, and biodiversity depletion.

Novel, environmentally-friendly solutions are proposed based on integrated knowledge from sciences as diverse as agronomy, soil science, molecular biology, chemistry, toxicology, ecology, economy, and social sciences. Indeed, sustainable agriculture decipher mechanisms of processes that occur from the molecular level to the farming system to the global level at time scales ranging from seconds to centuries. For that, scientists use the system approach that involves studying components and interactions of a whole system to address scientific, economic and social issues. In that respect, sustainable agriculture is not a classical, narrow science. Instead of solving problems using the classical painkiller approach that treats only negative impacts, sustainable agriculture treats problem sources. Because most actual society issues are now intertwined, global, and fast-developing, sustainable agriculture will bring solutions to build a safer world. This book series gathers review articles that analyze current agricultural issues and knowledge, then propose alternative solutions. It will therefore help all scientists, decision-makers, professors, farmers and politicians who wish to build a safe agriculture, energy and food system for future generations.

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Sabrina Gaba · Barbara Smith  
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# Sustainable Agriculture Reviews 28

Ecology for Agriculture

 Springer

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# Preface

The true roots of agroecology probably lie in the school of process ecology as typified by Tansley (1935), whose worldview included both biotic entities and their environment.

Dalgaard, Hutchings and Porter [https://doi.org/10.1016/S0167-8809\(03\)00152-X](https://doi.org/10.1016/S0167-8809(03)00152-X)

Food security is and will increasingly be a major world issue in the context of ever-growing population, limitations of land resources and changing climate. Agroecology offers a promising alternative to industrial and pesticide-based crop production. However, agroecology cannot be restricted to the study of ecological processes that underlie the functioning of agroecosystems, and it engages multiple disciplines. Ecology is a science of complexity that provides a panel of theories, concepts and approaches to increase our understanding of farming systems by integrating different levels of life organization at multiple scales of time and space. This book presents reviews that analyse current challenges faced by agriculture from an ecological perspective, through the eye of several disciplines such as



Grass weeds invading maize plots (Fanazo et al., Chap. 4)



Foxglove aphid (Shah et al., Chap. 5)

eco-evolution, ecotoxicology, ecological economics and political ecology. This book is joined initiative of the Agricultural Ecology Group of the British Ecological Society and the Ecologie and Agriculture Group of the Société Française d'Ecologie.

This book presents principles and applications of ecology in agriculture. The first chapter by Gaba et al. reviews ecological concepts that are applicable for agricultural production, with emphasis on the effect of the landscape on biodiversity and ecosystem functions. The use of allelopathy, a kind of biochemical war between species, to control weeds is explained by Aurelio et al. in Chap. 2. Then, Rayl et al. teach us how to manipulate agroecosystems to favour natural pest enemies, a process known as conservation biological control, in Chap. 3. In the same vein, Fanadzo et al. provide in Chap. 4 examples of weeds and pest management using conservation agriculture practices such as cover crops. The ecology of aphids, pests that transmit viruses to tomatoes, is reviewed by Shah et al. in Chap. 5. Francaviglia et al. present the ecosystem services of soil organic carbon, with focus on carbon sequestration and irrigation, in Chap. 6. The effects of conventional and organic fertilizers on soil organic carbon and soil fungi are reviewed by Souza and Freitas in Chap. 7. Deguine et al. reveal successful agroecological control in mango production, with focus on arthropods, in Chap. 8. The last chapter by Keshavarz and Karami presents ecosystem services used to manage drought in agriculture, in the context of climate change.

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