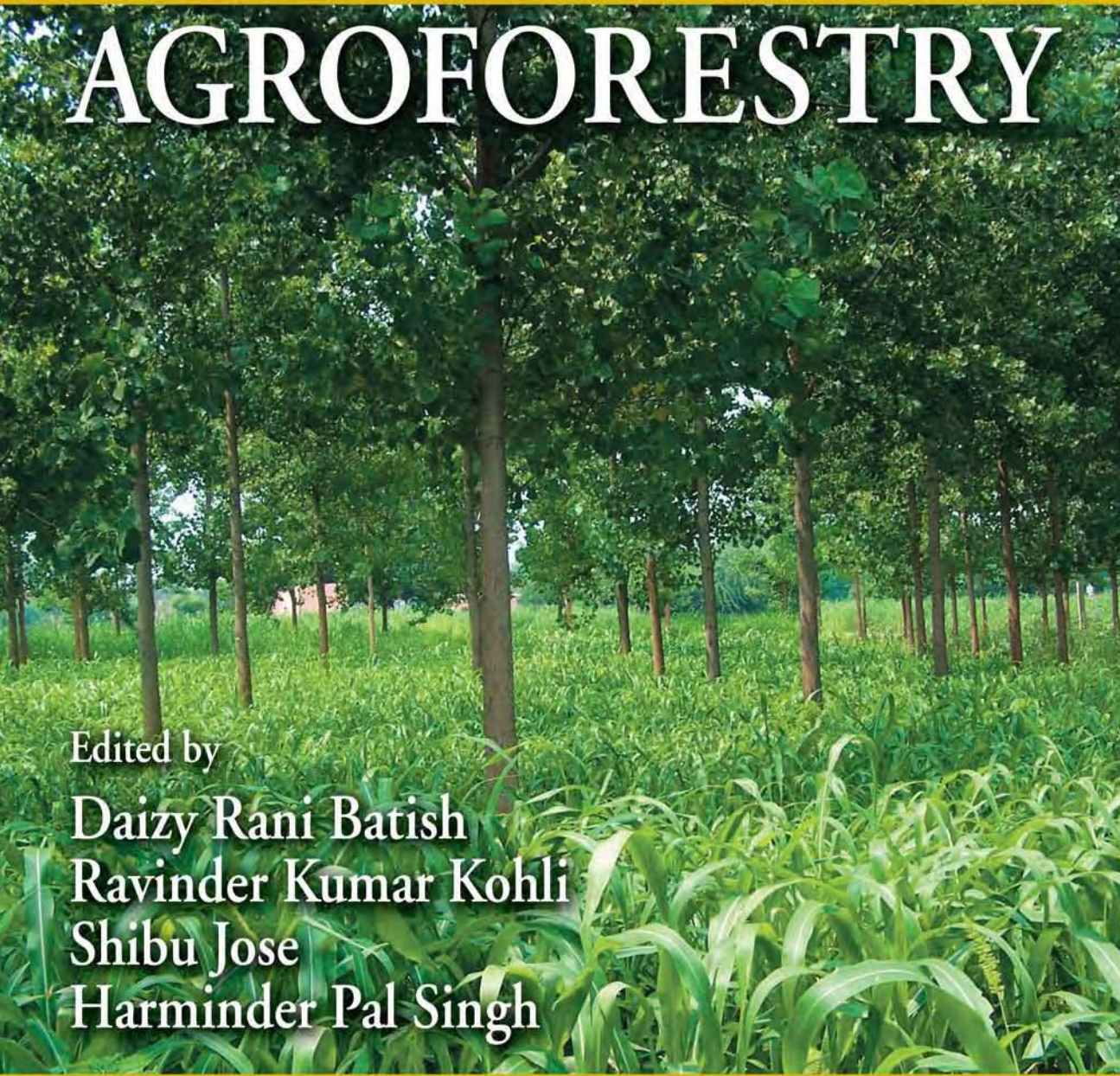


ECOLOGICAL BASIS OF AGROFORESTRY



Edited by

Daizy Rani Batish

Ravinder Kumar Kohli

Shibu Jose

Harminder Pal Singh



CRC Press
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Contents

Preface.....	ix
The Editors.....	xi
Contributors	xiii

Part I

Ecological Interactions: An Overview..... 1

Chapter 1	Ecological Interactions in Agroforestry: An Overview.....	3
	<i>Ravinder Kumar Kohli, Harminder Pal Singh, Daizy Rani Batish, and Shibu Jose</i>	
Chapter 2	Tree–Crop Interactions: Lessons from Temperate Alley-Cropping Systems.....	15
	<i>Shibu Jose, Samuel C. Allen, and P.K. Ramachandran Nair</i>	
Chapter 3	Allelopathic Tree–Crop Interactions under Agroforestry Systems	37
	<i>Daizy Rani Batish, Harminder Pal Singh, and Ravinder Kumar Kohli</i>	
Chapter 4	Approaches to Tree–Environment–Crop Interactions	51
	<i>Ramun M. Kho</i>	
Chapter 5	Weeds, Diseases, Insect Pests, and Tri-Trophic Interactions in Tropical Agroforestry	73
	<i>G. Sileshi, Götz Schroth, Meka R. Rao, and H. Girma</i>	
Chapter 6	Ecologically Based Pest Management in Agroforestry Systems	95
	<i>Miguel A. Altieri and Clara I. Nicholls</i>	
Chapter 7	A Case Study on the Potential of Contour Hedgerow Intercropping for Sustainable Crop Production on Sloping Highlands in Humid and Subhumid Zones of Sri Lanka.....	109
	<i>W.A.J.M. De Costa, A.G. Chandrapala, P. Surenthran, and L.G.N. Dharmasiri</i>	

Part II

The Belowground Ecology..... 157

Chapter 8	Belowground Interactions in Tree–Crop Agroforestry: Need for a New Approach.....	159
	<i>Götz Schroth, Michaela Schaller, and Francisco Jiménez</i>	

Chapter 9	Tree–Grass Interactions and Water Use in Silvopastoral Systems in N.W. Patagonia	171
	<i>Javier E. Gyenge, María Elena Fernández, and Tomás M. Schlichter</i>	
Chapter 10	Litter Dynamics in Plantation and Agroforestry Systems of the Tropics—A Review of Observations and Methods	181
	<i>B. Mohan Kumar</i>	
Chapter 11	Developments in the Research of the Potential of Agroforestry for Sustaining Soil Fertility in Zimbabwe	217
	<i>S. Zingore, R. Chikowo, G. Nyamadzawo, P. Nyamugafata, and P.L. Mafongoya</i>	
Chapter 12	Soil Sustainability in Agroforestry Systems: Experiences on Impacts of Trees on Soil Fertility from a Humid Tropical Site	239
	<i>Florencia Montagnini</i>	
Chapter 13	Root Competition for Water between Trees and Grass in a Silvopastoral Plot of 10 Year Old <i>Prunus avium</i>	253
	<i>Philippe Balandier, François-Xavier de Montard, and Thomas Curt</i>	

Part III

Models in Agroforestry	271
-------------------------------------	-----

Chapter 14	Relationship of Three-Dimensional Structure to Shelterbelt Function: A Theoretical Hypothesis	273
	<i>Xinhua Zhou, James R. Brandle, Eugene S. Takle, and Carl W. Mize</i>	
Chapter 15	Modeling a Field Shelterbelt System with the Shelterbelt Agroforestry Modeling System	287
	<i>Carl W. Mize, Joe Colletti, William Batchelor, Jong-Sung Kim, Eugene S. Takle, and James R. Brandle</i>	

Part IV

Ecological Economics	301
-----------------------------------	-----

Chapter 16	Social and Economic Implications of Agroforestry for Rural Economic Development in Temperate Regions	303
	<i>Chris J. Doyle and Tony Waterhouse</i>	
Chapter 17	Forest Patches in Northeast Luzon (the Philippines): Their Status, Role, and Perspectives for Conservation in Integrated Land-Use Systems	319
	<i>Denyse J. Snelder and Gerard A. Persoon</i>	

Chapter 18	Adoption, Profitability, Impacts, and Scaling up of Agroforestry Technologies in Southern African Countries	343
	<i>Oluyede Clifford Ajayi, Festus K. Akinnifesi, Joyce Mullila-Mitti, Judith J. DeWolf, Patrick W. Matakala, and Freddie R. Kwesiga</i>	
Chapter 19	Pasture Production and Tree Growth in Agroforestry Systems of Northwest Spain	361
	<i>M.P. González-Hernández and M.J. Rozados Lorenzo</i>	
Index		377

Preface

The world at present is facing innumerable problems such as burgeoning population, ecosystem degradation, particularly in the tropics, declining agricultural productivity, and changing environment. In order to sustain in the future, it is essential to find solutions to these problems, particularly with regard to ensuring food security and coping with the changing environment. Existing approaches to enhance productivity and mitigate environmental degradation are inadequate. Proper land-use patterns, sustainable agroecosystems, and resource management are possible alternatives to these problems. Agroforestry—a traditional practice of combining trees with agricultural crops or pasture—can contribute substantially in this direction through its multiple benefits and ecosystem services. If properly designed, agroforestry may help in alleviating poverty, providing food security and livelihood, maintaining ecosystem health, managing pest and weeds, conserving biodiversity, and mitigating greenhouse effects by carbon sequestration. Conversely, a poorly designed agroforestry system may lead to problems such as loss of productivity due to resource competition and allelopathy or negative effects of shading, aggravated problems of pest and weed infestation, loss of diversity, and ecosystem degradation due to the introduction of invasive species.

For an agroforestry system to be profitable, better understanding of various ecological processes that govern these complex systems is required. This volume aims at providing knowledge as to how ecologically sustainable agroecosystems can meet the challenges of enhancing crop productivity, soil fertility, and environment sustainability. The topics of the 19 chapters were carefully selected to accomplish the above objectives. These are divided into four sections—Ecological Interactions: An Overview (seven chapters), Belowground Ecology (six chapters), Models in Agroforestry (two chapters), and Ecological Economics (four chapters).

Part I focuses on various tree–crop interactions in different ecoregions of the world. Various above- and belowground interactions, especially in alley-cropping systems in temperate zones, have been critically analyzed and will be of immense help to readers. Among various interactions that affect crop productivity, allelopathy—a chemical-mediated interplant interaction—has often been rejected because of lack of sufficient field demonstration. A chapter is devoted to this important aspect of chemical ecology, which also highlights how allelopathy and the chemicals involved therein can be put to some practical use. The proof of attempt has also been made to include other important issues such as tri-trophic interactions and ecologically based pest management in agroforestry and how crop production can be enhanced. Part II is devoted to root-mediated belowground interactions in agroforestry systems and their role in enhancing crop productivity, soil fertility, and sustainability. An exhaustive study on litter dynamics in plantation and agroforestry systems and various factors affecting nutrient release may be beneficial to readers. Part III provides insight into the role of ecological modeling of complex agroforestry systems such as shelterbelts and how they help in choosing suitable computer-based designs to gain profitability. Part IV deals with various socioeconomic aspects of agroforestry and technological tools that benefit society in different eco-regions of the world. It also intends to supply in-depth knowledge on various farming systems and technologies that help enhance the socioeconomic status of farmers and provide environmental benefits to land users.

In sum, efforts have been made to integrate the relevant information on various ecological processes in the agroforestry system into a single comprehensive volume that will be useful to