Agroforestry

Theory and Practices

Antony Joseph Raj
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SCIENTIFIC PUBLISHERS (INDIA)
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THEORY AND PRACTICES

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FOREWORD

World’s total forest area is 4.03 billion hectares, corresponding to 31 per cent of the total land area or an average of 0.6 ha of per capita, whereas India’s forest and tree cover is 78.29 million hectares which is only 23.81 per cent of the geographical area. We are continuously putting efforts to achieve the national goal of 33 per cent geographic area of the country under the forest and tree cover as enshrined in the National Forest Policy, 1988. India has only 2.4 per cent of the world’s geographical area and 0.5 per cent of the world’s grazing area but supports over 16 per cent of the world’s human population and over 18 per cent of world’s cattle population. This ever increasing population places enormous demands and pressures on the land resources and forest resources. Agroforestry is the potential option for increasing the tree cover outside the notified forest areas.

India is endowed with a variety of soils, climate, biodiversity and ecological regions. An area of 46.70 million ha has been estimated under wastelands which is 14.75 per cent of the total geographical area of the country. The land degradation issue threatens country’s food security and the quality of the environment which assumes a major significance nowadays. Agroforestry practices are considered as most vital technology and potential farming system for minimizing the land degradation. Agroforestry practices increase farm productivity, diversify income sources for farmers and provide environmental services. Agroforestry improves soil, water and air quality, and biodiversity while supporting sustainable production of food, feed, fibre and energy. IPCC’s prediction of temperature increase between 1.1°C and 6.2°C by the end of the century due to excessive carbon dioxide emission will most likely create extreme changes in temperature and precipitation. Agroforestry represents a significant opportunity for sequestering more carbon per unit area on agricultural lands and it can be better climate change mitigation option than ocean and other terrestrial options because of vast production and protective benefits.

The new comprehensive editorial textbook “Agroforestry: Theory and Practices” by Dr. Antony Joseph Raj and Prof. S. B. Lal is a rich source of knowledge and practical information on agroforestry drawn from the scientific literature, databases and field experiences from all over world. This textbook provides thoroughly up-to-date principles and methods on agroforestry and excellently covers the latest and modern technologies in
the agroforestry field. This book, with its high standards, will enormously benefit the students for their preparation of competitive exams like UPSC-Civil Services, UPSC-Indian Forest Service, ICAR-ARS Scientist Exam, ICFRE Forestry Scientist Exam, NET Exam, State Public Service Commission Exams etc. I am confident that scientists, University and college teachers, and foresters from all over world should find this resource book useful in creating effective and innovative training programmes and manpower in agroforestry.

I welcome this latest Agroforestry textbook which will be most valuable to the students of agriculture, forestry, horticulture, soil science, water science, ecology, environment science and other plant sciences.

I would like to congratulate the authors, Dr. Antony Joseph Raj and Prof. S.B. Lal, for their tireless efforts in bringing this high quality textbook for the benefit of students, teachers, scientists and agricultural community.

[Rev. (Prof. Dr.) RAJENDRA B. LAL]

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Agroforestry provides a different land use option, compared with traditional agricultural and forestry systems. Agroforestry combines trees, shrubs, forages, grasses, livestock, and crops in innovative, flexible combinations tailored to the needs of farmers and landowners. This intensive integration in agroforestry ensures sustained availability of multiple products as direct benefits such as food, vegetables, fruits, fodder, fuel, manure, medicine, timber, etc. It makes use of the complementarity between trees and crops, so that the available resources can be more effectively exploited. It is a practice that respects the environment and has an obvious landscape benefit. The integration of trees, agricultural crops, and/or animals into an agroforestry system has the potential to enhance soil fertility, reduce erosion, improve water quality, enhance biodiversity, increase aesthetics and sequester carbon. Efficient, modern versions of agroforestry have been developed around the world which can be adapted to different agroclimatic conditions.

The agroforestry always remains productive for the farmer and generates continuous revenue. Agroforestry allows for the diversification of farm activity and makes better use of environmental resources. The goal of agroforestry is to optimize productivity and conservation benefits within a set of integrated land use practices. Agroforestry has interesting advantages from three different perspectives viz. agriculture, forestry and environment. The agroforestry practices enhance biodiversity, sequester more carbon dioxide from atmosphere, diversify farmers’ income sources, generate greater profits than annual crops, and create a more integrated, interesting, and visually appealing land use system that may be more environmentally, economically, and socially sustainable than the original farmland. With the shrinking per capita land availability, agroforestry system with the integration of perennial woody trees with crops/pastures is most suitable technology for increasing total productivity of food, feed and fuel and thereby reducing the risk of farming.

This editorial textbook “Agroforestry: Theory and Practices” is one of the finest books on agroforestry that offers a global review of the basic approaches, tools and technologies, research innovations and real-world practices in agroforestry. The book offers a comprehensive guide to basic principles, techniques and applications, integrative strategies, economic and environmental concerns, and future trends in agroforestry in
different regions of the world. This textbook is an effort to create a coherent and wide-ranging guide to the practice of agroforestry. This book covers key areas in agroforestry, namely agroforestry practices and its distribution, agroforestry systems classification, agroforestry trees, agroforestry management, technologies and modern concepts in agroforestry, production benefits of agroforestry, environmental services of agroforestry, agroforestry education, research & extension, etc.

In many aspects, the topics and structure of this textbook is highly meritorious and unique than other agroforestry books. This textbook is intended for university & college students, professors, scientists, researchers, foresters, farmers, policy makers and professionals in the field of agriculture, forestry, horticulture, other agricultural sciences and biological sciences. The main intention of this textbook is to provide a state-of-the-art and up-to-date knowledge of recent developments in agroforestry as a potential future land use system. This textbook on agroforestry will enormously benefit the students for their preparation of competitive exams like UPSC-Civil Services, UPSC-Indian Forest Service, ICAR-ARS Scientist/NET Exam, ICFRE Forestry Scientist Exam, State Public Service Commission Exams and University Entrance Exam for admission to M.Sc. and Ph.D. programmes.

This agroforestry textbook will contribute significantly to academic teaching and scientific research. Additional information or suggestions are invited from experienced researchers and experts for improving the quality of the book in future editions. We thank Dr.(Mrs.) Roselin Antony, Assistant Professor of Mekelle University (Ethiopia) for her editorial help and for enhancing the English language & technical writing of manuscript. We are confident that this agroforestry textbook will become a huge success just like our earlier book “Forestry: Principles and Applications”.

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PART 1: OVERVIEW OF AGROFORESTRY

Chapter 1  Introduction to Agroforestry – Antony Joseph Raj  1-33


Chapter 3  Agroforestry and Ecosystem Services – Ramakrishna Hegde  54-66

Chapter 4  Agroforestry Systems Classification – S.J. Patil & Maheswarappa. V  67-90
Introduction - Classification of Agroforestry Systems - Structural Classification of Agroforestry Systems - Classification based on Nature of Components - Agrisilvicultural Systems - Silvopastoral Systems -
Agroforestry Theory and Practices

**PART 2: AGROFORESTRY TREES**

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5</strong></td>
<td><em>Multipurpose Trees in Agroforestry</em></td>
<td>Mengisteab Hailu &amp; Antony Joseph Raj</td>
<td>91-103</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td><em>Nitrogen Fixing Trees in Agroforestry</em></td>
<td>S.L. Madivalar &amp; Antony Joseph Raj</td>
<td>104-116</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td><em>Genetic Improvement of Industrial and Non-Industrial Agroforestry Trees</em></td>
<td>S. Umesh Kanna, K.T. Parthiban, S. Vennila &amp; P. Durairasu</td>
<td>117-149</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td><em>Domestication and Commercialization of Indigenous Trees in Agroforestry</em></td>
<td>Antony Joseph Raj</td>
<td>150-175</td>
</tr>
</tbody>
</table>


Introduction - Status of Tree Improvement: A Global Perspective - Genetic Improvement of Industrial Species - Genetic Improvement of Non-Industrial Species - Biotechnology and Its Applications in Tree Improvement - Micropropagation - Somaclonal Variation - Somatic Embryogenesis/Synthetic Seeds - *In Vitro* Selection - Protoplast Fusion - Haploid Cultures - Shoot-Tip/ Meristem Culture - Gametophyte Cultures - *In Vitro* Embryo Rescue - *In Vitro* Control of Maturation State - Cryopreservation and *In Vitro* Storage - Molecular Markers - Quantitative Trait Loci - Genetic Engineering - Conclusion

Introduction - What is Domestication? - Plant Species Domestication - History of Tree Domestication - Global Initiatives for Agroforestry Tree Domestication - Tree Domestication in Agroforestry - Stages of
Contents

Agroforestry Tree Domestication - Principles of Agroforestry Tree Domestication - Tree Domestication and Vegetative Propagation - Domestication of Trees for Wood and Non Wood Forest Products - Participatory Approach in Agroforestry Tree Domestication - ICRAF’s Global Research Project-1 (GRP 1): Domestication, Utilization and Conservation of Superior Agroforestry Germplasm

Chapter 9 Traditionally Important Trees in Indigenous Agroforestry Systems
– Harsh Mehta, Sanjeev Chauhan, Pankaj Panwar & O.P. Chaturvedi


PART 3: AGROFORESTRY MANAGEMENT

Chapter 10 Tree Architecture and Tree Management in Agroforestry – Maheswarappa V, Ramakrishna Hegde, Ashok B Divatar & B.G. Nayak

Introduction - Tree Structure and Growth - Tree Crown Architecture - Tree Root Architecture - Above and Below Ground Competition in Agroforestry - Silvicultural Options for Minimizing the Negative Interactions - Pruning - Pollarding - Thinning - Coppicing

Chapter 11 Crop Planning and Management in Agroforestry – D.R. Palsaniya, Sunil Tiwari & Mukesh Chaudhary


Chapter 12 Disease Management in Tropical Agroforestry Landscapes – A. Sudha

Plant and Tree Diseases - Scope and Scale of Pathogens and their Impacts - Symptoms of Plant/Tree Diseases - General Methods for Plant Disease Control - Seed Diseases - Nursery Diseases - Foliar Diseases - Root Diseases - Heart Rots - Disease Management in Agroforestry Trees (Neem, Albizia, Gmelina, Pongamia, Teak, Shisham, Casuarina, Ailanthus, Jackfruit, Eucalyptus) - Disease Management of Crops under Agroforestry (Rice, Sorghum, Maize, Wheat, Pearl Millet, Red Gram, Green Gram)
Chapter 13  Insect Pest Management in Tropical Agroforestry Systems –
C.T. Ashok Kumar, S.C. Topagi & Veereshkumar

Introduction - Factors Contributing to Insect Pest Problems in Agroforestry - Pest Control, Pest Management and Integrated Pest Management - Overview of Pest Management Options - Natural Forest Pest Control - Artificial or Applied Control of Tree Pests - Silvicultural Control - Mechanical and Physical Control - Semiochemicals (Behaviour Inducing Chemicals) - Biological Control - Microbial Control - Chemical Control - Constraints to Forest Pest Management in the Tropics - Need for Further Research

PART 4: AGROFORESTRY CONCEPTS

Chapter 14  Tree Crop Interactions in Agroforestry –
M.P. Divya, V. Priyanka & B. Vinothini


Chapter 15  Diagnosis and Design in Agroforestry –
M.N. Ramesha & N. Gurunathan


Chapter 16  Economic Analysis of Agroforestry Systems –
Anol Vasishth & Vipan Guleria

Introduction - Agroforestry Investment Valuation - Key Factors in Economic Analysis of Agroforestry - Economics of Agrisilviculture Systems - Economics of Silvipasture Systems - Economics of Agrihorticulture Systems - Two Tier Cropping Systems based on Poplar Plantation - Conclusion


Introduction - Timber Markets - Major Markets for Forest, Farm and Agroforestry Products - Wood based Products Trade in India - Wood Production in Agroforestry and Its Sale and Marketing - Industrial Raw Material Based Agroforestry Products Markets and Marketing - Conclusion
PART 5: IMPORTANT AGROFORESTRY SYSTEMS

Chapter 18 Alternatives to Shifting Cultivation – K. Sasikumar

What is Shifting Cultivation? - Overview of Shifting Cultivation - Soil Dynamics in Shifting Cultivation - Positive and Negative Aspects of Shifting Cultivation - Controlling Shifting Cultivation: Strategies and Initiatives - Improvements and/or Alternatives to Shifting Cultivation - Successful Experiments for Potential Management of Shifting Cultivation - Technological Guidelines for Improvement of Shifting Cultivation

Chapter 19 Taungya Systems – N. Satheesh, T. Mohan Raj & S. Kala

What is Taungya System? - Types of Taungya Systems - Taungya System in some Tropical Countries - Taungya System in India - Management of Taungya System - Taungya Plantations Establishment and Biodiversity Conservation - Advantages and Disadvantages of Taungya System - Improvements to Taungya System

Chapter 20 Alley Cropping System – R. Kaushal, Raj Kumar, J.M.S. Tomar & O.P. Chaturvedi


Chapter 21 Tropical Homegardens – T.K. Kunhamu


PART 6: DISTRIBUTION OF AGROFORESTRY SYSTEMS

Chapter 22 Agroforestry Systems of World – Etefa Guyassa, Samuale Tesfaye & Antony Joseph Raj

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
</table>

**PART 7: AGROFORESTRY PRACTICES FOR EXTREME SITE CONDITIONS**

- Chapter 26: Agroforestry Practices for Arid and Semi-Arid Regions
- Chapter 27: Agroforestry Practices for Salt Affected Lands (Biosaline Agroforestry)


PART 8: AGROFORESTRY PRACTICES FOR SOCIO-ECONOMIC DEVELOPMENT


Chapter 30  Bamboo based Agroforestry Systems – M.S. Malik & Antony Joseph Raj


Chapter 31  Fruit Trees based Agroforestry Systems – K.S. Pant, A.G. Yewale & Prem Prakash

Trees based Agroforestry Research in Dr.YSPUHF, HP - Horti-Medicinal Agroforestry System

Chapter 32 Medicinal and Aromatic Plants based Agroforestry Systems – Ajay Thakur & Puran Chandra

Medicinal and Aromatic Plants: A Valuable Resource - Significance and Utilization of Medicinal and Aromatic Plants from Forest - Conservation of MAPs in Farm Cultivation - Medicinal and Aromatic Plants based Agroforestry Systems - Medicinal and Aromatic Plants in Pure Stands/Orchards - Medicinal and Aromatic Plants as Overstorey Trees - Medicinal and Aromatic Plants as Intercrops - MAPs in Homestead Gardens - MAPs in Traditional Agroforestry Practices - Conclusion

Chapter 33 Fodder Production from Agroforestry Trees – Raj Kumar, J.Jayaprakash, J.M.S. Tomar, O.P. Charurvedi, Charan Singh & A.C. Rathore


Chapter 34 Agroforestry Practices for Fuelwood Production – Sharad Nema

Introduction - Overview of Forest and Fuelwood Status - Agroforestry for Meeting Fuelwood Demand - Scope and Approaches for Fuelwood Production in Land Use Systems - Choice of Fuelwood Species in Agroforestry - Management of Fuelwood Trees - Conclusion

PART 9: ENVIRONMENTAL SERVICES OF AGROFORESTRY

Chapter 35 Agroforestry and Biodiversity Conservation – Munesh Kumar

Introduction - Agrobiodiversity - Significance of Agrobiodiversity - Changes in Agrobiodiversity - Threats to Agrobiodiversity - Conservation Strategies of Agrobiodiversity - Agroforestry and Biodiversity Conservation - Conservation of Tree Diversity in Agroforestry

Chapter 36 Soil Fertility Improvement and Nutrient Cycling in Agroforestry – S.K.Uttam, Munish Kumar & Antony Joseph Raj

Introduction - Soil Fertility and Productivity - Effects of Agroforestry Trees on Soil Quality Improvement - Concept of Nutrient Cycling - Nutrient Cycling in Agroforestry Systems


<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>Windbreak and Shelterbelt Agroforestry Systems</td>
<td>C. Buvaneswaran</td>
<td>689-701</td>
</tr>
<tr>
<td>40</td>
<td>Agroforestry for Carbon Sequestration, Climate Change Mitigation and Adaptation</td>
<td>Antony Joseph Raj</td>
<td>702-736</td>
</tr>
<tr>
<td>41</td>
<td>Tree Borne Oilseeds (TBOs) based Agroforestry Systems</td>
<td>C. Buvaneswaran &amp; Afaq Majid Wani</td>
<td>737-754</td>
</tr>
<tr>
<td>42</td>
<td>Tree Growth and Yield Modelling in Agroforestry</td>
<td>Ajit</td>
<td>755-772</td>
</tr>
</tbody>
</table>

**PART 10: MODERN APPROACHES IN AGROFORESTRY**
Chapter 43  Remote Sensing and GIS Application in Agroforestry – Hailemariam Gebrewahid & Emiru Birhane


PART 11: AGROFORESTRY EDUCATION, RESEARCH AND EXTENSION

Chapter 44  Agroforestry Education, Research and Extension – N. Kaushik

Introduction - Agroforestry Education in India - Global Experiences in Agroforestry Education - Agroforestry Research in India - Agroforestry Research in World - Agroforestry Extension

Chapter 45  On-Farm Research in Agroforestry – M.P. Divya, V. Priyanka & B. Vinothini


Chapter 46  Experimental Designs in Agroforestry Research – Emiru Birhane, Hailemariam Gebrewahid & Antony Joseph Raj


Chapter 47  International and National Organizations of Agroforestry – Antony Joseph Raj & Afaq Majid Wani

International Organizations - Regional Organizations - National Organizations - Agroforestry/Forestry Journals

Bibliography