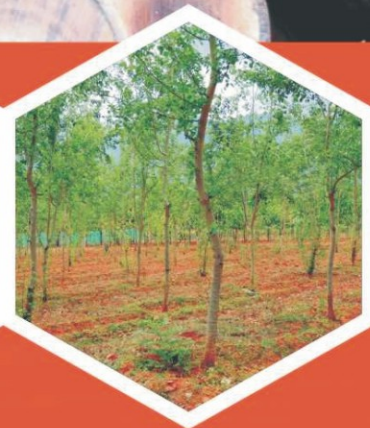




# Industrial Agroforestry

Perspectives and Prospectives



K.T. Parthiban  
S. Umesh Kanna  
P. Rajendran

R. Umarani  
I. Sekar  
P. Durairasu



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# **Industrial Agroforestry**

## **Perspectives and Prospectives**

**Dr. K.T. Parthiban** is a Professor of Forestry and is currently heading the Department of Tree Breeding, Forest College and Research Institute, TNAU, Mettupalayam. He is engaged in professional forestry teaching, research and extension for the past 18 years. He is pioneering in conceiving the value chain models for Industrial Agroforestry and promoted industrial wood plantation establishment in association with pulp, paper, match, plywood and biomass power generation industries. He is also pioneer in development of varieties in trees particularly in Casuarina, Eucalyptus and Melia and transferred these varieties to farm lands through Consortia mode Tree Farming. Recently he has conceived an innovative Tree Insurance Scheme and implemented in Tamil Nadu. He has vast experience in teaching UG, PG and Ph.D Programme in Forestry and has guided several M.Sc and Ph.D students. He has handled numerous projects funded by DST, DBT, ICAR, NOVOD Board and several wood based industries. He has published 7 books and over 100 research papers in forestry research. He widely travelled across the world and acted as a resource person for academic and industrial institutions.

**Dr. R. Umarani** is a Professor in the Department of Tree Breeding, Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam. She is a recipient of Prize for Best M.Sc. (Ag.) student in Seed Technology, Best Research Article Award (Seed Research) and Best Team Researcher Award (TNAU). She is involved in teaching seed science and technology courses for both under graduate and post graduate students for the past 18 years and also indulged in seed technological research and has guided more than 10 students. She has completed two externally funded projects and has filed 5 patent applications. Two of the products developed are being marketed viz., Nutri Gold and Seed Aid. Seed pelleting protocol developed for mustard and seed pelleting prototype developed through externally funded project projects are under commercialization. She has published more than 50 research papers, 12 review articles and 35 popular articles. She has been trained at International Rice Research Institute, Philippines.

**Dr. S. Umesh Kanna** is an Assistant Professor (Forestry) with Forest Biotechnology specialization working at Department of Tree Breeding, Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam. He has over 10 years of teaching, research and extension experience and guided more than 15 research scholars. He was trained in Single Nucleotide Polymorphism and Use of Molecular Markers in Tree Improvement at University of Melbourne, Australia. He had more than 85 peer reviewed papers, 12 books and 7 book chapters at his credit. He has organized more than 25 capacity building programmes to the various stake holders including line department officials, researchers, representative from forest based industries, self help groups and farmers. He is currently involved in the inventory and improvement of alternate High Yielding Short Rotation genetic resources for forest based industries.

**Dr. I. Sekar** is a Professor of Forestry and is currently heading the Department of Forest Products and Utilization, Forest College and Research Institute, TNAU, Mettupalayam. He is involved in teaching, research and extension for the past 18 years. He has got good experience in teaching UG, PG and Ph.D Programme in Forestry and has guided several M.Sc and Ph.D students. He has handled many external funded projects funded by Government of India and Tamil Nadu State Forest Department with special emphasize on wood technology, secondary timber forest product and value addition of forest and agroforestry residues. He has been trained in wood seasoning and preservation at University of Melbourne, Australia. He has published more than 5 books and over 70 research papers in forestry research.

**Dr. P. Rajedran** is an Assistant Professor (Forestry) working in the Department of Tree Breeding, Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam with Tree Improvement as specialization. He has got wide experience in teaching, research and extension. Currently he is involved in development of alternate pulpwood genetic resources through inventory and selection.

**Dr. P. Durairasu, I.F.S.** is a Chief Conservator of Forests and currently working as a Dean, Forest College and Research Institute, Mettupalayam. As a Professional Forester he has a wider experience in managing, conserving and protecting forests and forests genetic resources. He has served as District Forest Officer, Working Plan Officer, Conservator of Forests and Chief Conservator of Forests and has implemented several projects funded by both state and central government agencies. As a Dean, he has introduced specialization programme in post graduate forestry programme and launched several contract farming projects leading to establishment of industrial wood farming in association with wood based industries. He has published several books and articles related to agroforestry, forest management and conservation. He has been serving as an expert member in forestry related committees of state and central government. He is a coordinator for Industrial Agroforestry Value Chain project and incorporated wood based industries in this value chain.

# **Industrial Agroforestry Perspectives and Prospectives**

*Editors*

**K.T. Parthiban**

**R. Umarani**

**S. Umesh Kanna**

**I. Sekar**

**P. Rajendran**

**P. Durairasu**

Forest College and Research Institute  
Tamil Nadu Agricultural University  
Mettupalayam - 641 301



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## FOREWORD

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In India, the forest cover is 23.81% against the mandated requirement of 33% and with the production potential of 0.5 m<sup>3</sup>/ha/annum compared to the global average of over 2.1m<sup>3</sup>/ha/annum. Forest in general and trees in particular are revered in our mythological scriptures and farmers have been maintaining sporadic trees of useful tree species in their farm lands and around their farm houses since time immemorial. National needs of timber, industrial wood for processing and to a large extent fuel wood have been traditionally met from forest resources. However, with the economic development and the concomitant industrial and urban development, the demand for timber and other wood based products has been growing continuously while sustainable supply of wood from forests has declined because of low growing stock, poor annual increment and degradation of nearly 42% of the country's forest cover. The National Forestry Action Programme estimated the timber requirement of 82 million m<sup>3</sup> against domestic availability of just 27 million m<sup>3</sup>. Timber and wood based products worth US dollar 3.88 billion were imported into India during 2012. Estimated domestic wood supply deficit in India is expected to exceed 19 million m<sup>3</sup> by 2020 – a substantial increase from round wood deficit of 21 million m<sup>3</sup> 1999.

As the Government owned forests cannot meet growing requirements of industrial wood, National Forest Policy, 1988 suggests that the wood based industries should source their future wood supplies through persuading farmers to raise agroforestry plantations. Substantial improvement in productivity of forest resources on sustainable basis and promotion of large scale industrial agroforestry plantations are most essential for meeting the national needs for domestic and industrial wood utility. However, lack of quality genetic resources, coupled with unorganized supply chain detracts the promotion of industrial wood plantation in farmlands.

Under such circumstances, the TNAU has implemented an innovative project on “A Value Chain on Industrial Agroforestry in Tamil Nadu” in association with paper and match industries in a consortium approach. This model has made profound impacts on establishment of industrial wood plantations over 25000 ha which has generated an average of 2.5 million tonnes of industrial wood. It has also created adequate income generation activities and has also attracted many wood based industries particularly the biomass based power generation industries, plywood and biofuel industries thereby attesting the successful demonstration of the value chain models on industrial agroforestry.

These successful models established for various wood based industries need to be disseminated across different stake holders to create awareness and to establish adequate industrial wood plantation to become self reliant in raw material availability. Under such circumstances, the scientists of Forest College and Research Institute has brought out a book on “**Industrial Agroforestry: Perspective and Prospective**” to address the needs of stake holders at all levels. This book has comprehensively reviewed the India's Forest and Agroforestry situation and the need

for industrial wood plantations. The book also contains judicial mixture of the status of various wood based industries and the requirement for different raw materials. The incorporation of Tree Improvement, Clonal Forestry, Precision Silviculture, Profitable Agroforestry Models, Supply and Value Chain Management and Price Forecasting are among the potential information addressed in this book which would be very useful to wood based industrial persons, academicians and researchers of SAUs, ICAR, ICFRE Institutes, graduating students, practicing foresters and forest entrepreneurs. I compliment the authors of the book for timely intervention and I convey my wishes for all their future endeavors.



**Dr. K. Ramasamy, Ph.D**

Vice Chancellor  
Tamil Nadu Agricultural University  
Coimbatore  
Tamil Nadu, India

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## PREFACE

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India is housed with 78.29 million ha land under the forest and tree cover which accounts 23.81% of the total geographic area of the country. India occupies 10<sup>th</sup> rank among the most forested countries of the world. The Forests resources are represented by sixteen major forest types and are unevenly distributed. These forests are mostly confined to Himalayan belt, Central India, Western ghats, North east and Andaman Nicobar Islands. Indian Forests support livelihood around 200 million people in the country besides ensuring ecological and environmental security. Such forests have been under severe pressure for meeting growing demands for alternate land uses, fuel, fodder, grazing, timber, pulpwood, other industrial wood requirement from ever growing human and livestock population, industrial development and other infrastructural needs. The per capita forest area is only 0.064 ha against the global average 0.64 ha. The productivity of Indian Forest is also one of the lowest i.e., 0.7 m<sup>3</sup>/ha/annum against the World average of 2.1 m<sup>3</sup>/ha/annum. Due to rapid economic development coupled with increase in human and animal population the gap between demand and supply of both domestic and industrial requirement has widened.

Forests in India are treated primarily as social and environmental resource and only secondarily as commercial resources. The Forest management in the country has seen a paradigm shift from traditional to participatory approach with the promulgation of National Forest Policy, 1988. The policy has directed all wood based in the country to develop their own raw material resources without depending on Forest Department supply. The wood based industries in the country have not taken the policy suggestion seriously barring a few industrial exceptions. The country largely depends upon the Forests for its requirement of wood and wood products from private lands. However, for want of suitable institutional mechanism the industrial wood plantation development programme has not taken the pace that was expected. Under such circumstances, the Forest College and Research Institute of Tamil Nadu Agricultural University has conceived and designed A Value Chain Model for Industrial Agroforestry funded by the National Agricultural Innovation Project (NAIP) of Indian Council of Agricultural Research (ICAR), New Delhi. The project has identified lack of quality planting stock, unavailability site specific silvicultural technologies, poor understanding on processing and value addition technology and unorganized market and trade as key constraints in the industrial wood plantation development programme. The scientific team has made significant interventions through technological, organizational and marketing by linking all levels of stake holders *viz.*, Research Institutes, Wood Based Industries, Farmers and Financial Institutions in a consortium approach and demonstrated this model across the state of Tamil Nadu and contributed towards development of over 25,000 ha of industrial wood plantations in association with paper and match industries.

In order to further promote this model and to disseminate the concept of industrial wood value chain model, the scientific team has brought out a book on



Industrial Agroforestry which incorporated 24 chapters. These manuscripts included information on Forest Based Industries, demand and supply pattern of raw material of various wood based industries and the case studies of the current value chain model of industrial Agroforestry. Besides, the precision silviculture, Integrated Nutrient Management and profitable Agroforestry models suitable for various agroclimatic zones and amenable for various wood based industries are also included. The large scale plantation programme of monoculture nature will have susceptibility towards pest and diseases and this book has addressed suitably the integrated pest and disease management technologies for various industrial wood species.

The productivity and profitability of the plantations are directly dependent on the species and the variety specific to site and utility. The current book has incorporated complete tree improvement programme coupled with major biotechnological tools for development of varieties, strategies of evaluation and methods of protecting the IPR generated through the tree improvement programme. It can be very well useful to the breeders and wood based industries for adoption and commercial exploitation.

Many plantation programme are suffered for want of human resources and efficient harvesting devices in order to reduce the logging impact and to enhance the productivity. Traditionally, plantation operations in the country are done manually. But labour scarcity and migration of labourers have created a vacuum to meet the man power needs for forestry operations. The book has suitably addressed the mechanization possibility in industrial wood plantation programme.

The plantation and industrial processing activities accounts for 20-30 per cent of wood residues which are either unutilized or underutilized for want of suitable recycling technologies. The current publication has included value addition process for various plantation and industrial residues. Above all, the marketing and trade is one of the key constraints in the industrial wood plantation sector which is suitably addressed by incorporating a chapter on marketing and trade of Forest products. This besides, price forecasting, growth models, forestry extension and role of financial institutions are also incorporated.

In a holistic view, the current book on Industrial Agroforestry has incorporated judiciously all needed information for the Academicians, Researchers, Wood based industries, Graduating students and Practicing Forester. This publication can act as a ready reckoner for all those involved in promotion of industrial wood plantations in a consortium approach.

Suggestions, corrections and modifications if any are welcome from the readers of this book.

**Authors**

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