

Creating Sustainable Source of Raw Material through Agro Forestry Models

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Abstract: *To meet growing wood requirement, Forest Departments, Forest Development Corporations and Pulp & Paper industry joined hands together, leading to creation of a sustainable wood resource base of more than 3 million ha of plantations in last 25 years. This is achieved mainly by raising plantations on farm lands under farm / Agro forestry models promoted by Paper Industry, 70% of which is eucalyptus plantation. This could be made possible by massive investment of resources by the industry and the Corporations, to bring in genetic improvement, reducing the harvesting cycle and development of highly productive and disease resistant clones, which increased plantation productivity by more than 400%, making these plantations extremely viable for farmers, in terms of competitive land use. Secondly, by adoption of root trainer technology which promotes lateral root system / multiple root system and faster multiplication of clonal plants.*

Key words: Clonal Technology, Agro Forestry models, Bund planting

1. Introduction

Every year approximately 1.5 lac ha of eucalyptus plantations are raised in India, creating around 70 million man days employment in the rural areas. As per Centre for Science and Environment (CSE) Report, 2017 (Titled: The Puzzle of Forest Productivity), Eucalyptus plantation yields more net income/ha/annum to farmers than almost 60-70% of the agriculture crops, and can play a major role in increasing future farm level income. ITC has raised more than 6 lac acres of pulpwood plantations on farm lands in last 25 years.

2. Clonal Technology & Root Structure

Eucalyptus clonal plantations are fast growing and high yielding due to its site specific selection and insect-pest & disease resistant. ITC has developed more than 100 high yielding, site specific & disease resistant clones of Eucalyptus which are grown throughout the length and breadth of India. Eucalyptus clonal plantation has a root depth of 1.5-2.0 meter on an average and the root system is more specifically adapted to using rain-fed soil moisture from the upper soil profile, rather than from the groundwater table at considerable depth.



Eucalyptus Clonal Plantation

Eucalyptus Clonal Root System

Dr. Dinesh Kumar, a well-known scientist at the Indian Agricultural Research Institute, New Delhi, in his paper titled 'Place of Eucalyptus in Indian Agro Forestry Systems' in book on 'Eucalyptus in India-Past, Present and Future' (1986) states that: Eucalyptus is a xerophytic species, i.e. plant adapted to life in a dry or physiologically dry habitat by means of mechanism to prevent water loss and as such has low rates of transpiration. Further, eucalyptus has the ability to tolerate water stress by way of regulating its photosynthetic rate in the green leaves, thus, it can survive with less available water.

Report published by Mr. Vinayakrao Patil, an eminent forest scientist, titled 'Local Communities and Eucalyptus -An Experience in India' (1995) mentions that a) Eucalyptus does not compete for ground water and other nutrients with crops in its vicinity, b) Eucalyptus does not need plenty of water and does not drain away subsoil water, c) Eucalyptus does not cause degradation of land and does not hamper soil fertility.

It is therefore critical that eucalyptus plantations are raised, given its significant impact on wood availability, livelihood generation and carbon sequestration that addresses the challenges of global warming and climate change. It would be important to note that eucalyptus plantations under the Farm forestry / Agro forestry models are not guzzlers of water as has been wrongly perceived by few ill-informed people.

3. Sustainable Agro Forestry Models

Agro forestry is a much wider concept than tree planting. Agro forestry is a land use management system in which trees are grown on farm lands with agriculture crops. It is the need of the hour to develop sustainable Agro forestry models with wider spacing to meet the ever increasing demand of food and wood.

In first year of plantation farmer can grow a number of agriculture or vegetable crops because initial growth of tree is slow & planted at wider spacing leaving enough space for raising the crops. This is a common practice adopted by most of the small & medium farmers to generate additional income.

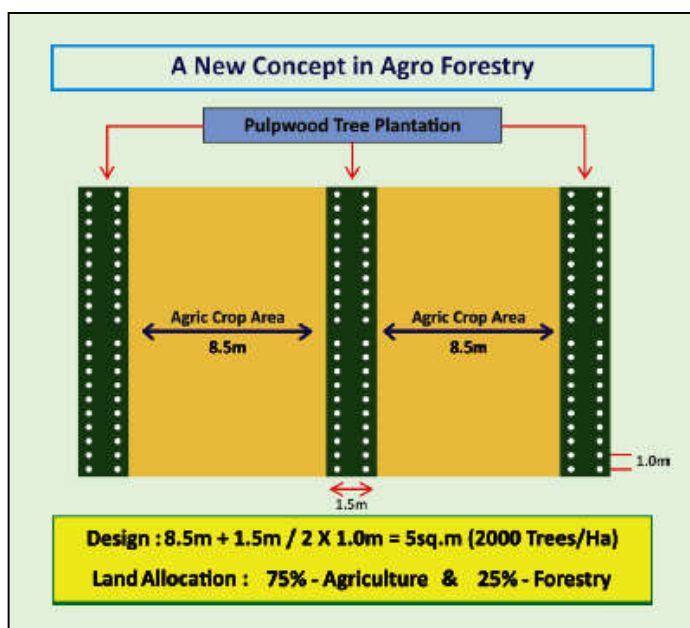


Eucalyptus with Chilli

Eucalyptus with Cotton

4. A New Concept in Agro Forestry

ITC PSPD is promoting wider spacing Agro forestry models to sustain farm profitability since land is limited and converting farm lands in to block plantations will have negative impact on Nations food security. These innovative models are developed taking into consideration the wood & food security. In this model 75% of land is allocated to agriculture crop & 25% to forestry plantation. By adopting this design farmers can harvest the same wood yield as in block plantation from an acre and agriculture crop will be a bonus. The model concept is as depicted below.



This novel concept in Agro forestry is based on paired row design where two rows of eucalyptus are planted at 1.5m apart with tree to tree spacing of 1M in the lines. Two pairs of eucalyptus trees are placed at 8.5m apart to create sufficient room for agriculture crop cultivation independently. In this wider spacing paired row design farmer can grow agriculture crop successfully throughout 4 years of cycle without much impact on its yield. This model can definitely improve farm profitability on sustainable basis. A few pictures of Agro forestry plantations are shared below.



Eucalyptus with Chickpea

Eucalyptus with Cotton



Eucalyptus with Maize

Eucalyptus with Banana – Paired Row



Eucalyptus with Watermelon

Eucalyptus with Wheat

5.0 Bund Planting – Value Addition

Farmers are encouraged to raise eucalyptus plantations on farm boundaries and field bunds to generate additional income without any effect on regular agricultural crop production.



The ideal tree spacing in paired row planting on bunds is one meter between the rows and two meters from tree to tree. In this way 100 trees can be grown on 100m long bund. Spacing in single line tree planting on farm boundaries should be 2.0m from tree to tree.

6.0 Benefits of Agro-Forestry Plantation

1. Improved productivity & profitability of farm lands
2. Increased diversity in farm lands usage

3. No additional inputs required for tree growth
4. Land use throughout the year in rain-fed conditions
5. Trees act as insect barriers
6. Higher carbon sequestration
7. Reduced risk due to Crop failure or Natural Disasters
8. Higher economic returns to the farmers
9. Contributing to the food and wood security
10. Mitigating the climate change.