

## **EP NO: 25 /2023-24 ESTABLISHING SUITABLE AGROFORESTRY MODEL FOR THE NORTH EASTERN AGRO CLIMATIC ZONE**

### **INTRODUCTION**

Agroforestry is playing a vital role in maintaining natural resources and increasing overall productivity with minimizing risk against the vagaries of weather. A variety of tree-crop combinations are followed by the farmers according to their needs and variability in the agro-climatic zones of the state. Multipurpose tree species are the choice to integrate with annual crops/vegetables/ medicinal plants or with grasses. Although agroforestry is practised in India since ancient times, it has not gained importance due to dependency on multi-institutions and multi-disciplinary approach. Agroforestry is being practised in Tamil Nadu (TN), India, in all the districts falling in seven agroclimatic zones and these are in the form of traditional adoption from time immemorial to recent industrial agroforestry. The expansion of industrial agroforestry models is rapid in almost all the regions of TN along with traditional models.

Traditionally valuable trees like Teak (*Tectona grandis*), bamboo species, silk cotton (*Ceiba pentandra*), tamarind (*Tamarindus indica*), khamair (*Melina arborea*), Casuarina species, Eucalyptus species, Malabar neem (*Melia dubia*), Maha neem (*Ailanthus excelsa*), kadamba (*Neolamarkiacadamba*) and fruit trees, like mango, guava, lemon, sapota, papaya, amla, etc. Farmers commonly grow annual crops like cowpea, black gram, green gram, gingelly, turmeric, cotton and groundnut with teak, Eucalyptus, Casuarina and Gmelina due to its easy marketing and high economic returns under traditional and industrial agroforestry systems?

TN presently has 20.31% of forest and tree cover. However, for attaining 33% forest cover according to the National Forest Policy (NFP) 1988, it is essential to promote trees outside forests (TOF) through agroforestry under various schemes like farm forestry and social forestry through the establishment of industrial agroforestry.

With the increasing gap in demand and supply of forest produced in India from natural forests, the role of agroforestry seems to be significant in filling the gap. As far as agriculture in TN is concerned, it occupies a unique position with seven agroclimatic regions that grow all kinds of crops like rice, jowar, ragi, bajra,

maize and a variety of cereals, pulses, oilseeds, fruits and vegetables. The state also occupies a special place for agricultural produce in the country'.

During 2021-22 an experiment on non-conventional multi-functional agroforestry model was carried out in Harur Modern Nursery Centre and Mel Chengam Research Centre respectively. In that study, a total of 8 forestry tree species valued for its timber and pulpwood have been planted. The following species preferred by the farmer, viz. 1. *Teak*, *Mahagony*, *Khaya senegalensis* and *Pterocarpus marsupium* has also been planted in the above said models and are performing well. The data regarding the above said species is given in the annexure. Based on the survival, performance and preference by the farmer, these species have been chosen for the study and this project has been framed to establish a model agroforestry plantation in a farmer field at Arthipadi village near Chengam of Tiruvannamalai District.

#### **OBJECTIVES:**

- To develop profitable Agroforestry model.
- To evaluate the suitability of the species among the selected - species for profitable agro forestry.

#### **Methodology**

Seeds were collected from identified Candidate Plus Trees (CPTs) and were sown in the mother beds. Nursery was established at the Melchengan Research Centre of Chengam Research Range. Once seedlings reached 15 cm height or with leaf stage have been transplanted into 16 x 30 cm Polybags with inputs consists of The potting mixture consisted of red earth, sand, and farmyard manure (FYM) in a 1:1:1 ratio, supplemented with vermicompost (30 g/bag), VAM (15 g/bag), Azospirillum (6 g/bag), and Phosphobacteria (6 g/bag). A total of 1,100 seedlings of four different species have been established including 10% casualty rate (100 seedlings). The plantation area, spanning 1.60 hectares, was prepared by clearing and disc ploughing twice to ensure optimal soil conditions. Planting has been done with pit size of 100 cm<sup>3</sup> and pits filled with selected bio-fertilizers and bio-nutrients to enhance soil fertility and support the young plants' growth. The seedlings have been at an Espacement of 4 m x 4 m. The experimental plot has

been partially cultivated with Black gram (Urad dal) and Maize as intercrops in the experimental plot.

1. *Tectona grandis* (with intercrops like tomato, groundnut, and sorghum).
2. *Swietenia mahogany* (with intercrops like tomato, groundnut, and sorghum).
3. *Khaya senegalensis* (with intercrops like tomato, groundnut, and sorghum).
4. *Pterocarpus marsupium* + intercrop (Tomato, Groundnut, Sorghum etc.)

Irrigation was provided to the entire plot. Observations were recorded periodically to monitor plant development and assess the success of the plantation.

### **OBSERVATION TO BE RECORDED:**

1. Soil test will be done before planting and proper nutritional supplements will be noted for future reference.
2. Photo will be taken frequently to study the change in vegetation.
3. The planting cycle and yield of the agri crop will be measured and recorded.
4. Growth performance like Height, Girth and DBH will be recorded for the tree species.
5. The yield of the Agricultural crop grown and harvest from the nearby farm will be recorded.
6. At the end of harvesting of the trees, volume obtained and revenue generated from the tree species will be recorded.
7. Cost benefit ratio will be evaluated.

### **MEASUREMENT DETAILS:**

**TABLE 1 - DETAILS AS OF 2023 (INITIAL):**

Sl. No.	Species	Planted	Survival		Avg. height
			(No.)	(%)	
1.	<i>Tectona grandis</i>	250	250	100	36.82
2.	<i>Sweteniamahagony</i>	250	250	100	79.38
3.	<i>Kaya senegalensis</i>	250	250	100	71.14
4.	<i>Pterocarpus marsupium</i>	250	250	100	85.73
	<b>Total</b>	<b>1000</b>	<b>1000</b>	<b>100</b>	<b>68.26</b>

**TABLE 2 - DETAILS AS OF MARCH 2024:**

Sl. No.	Species	Planted	Survival		Avg. height
		(No.)	(No.)	(%)	(cm.)
1.	<i>Tectona grandis</i>	250	250	100	216.8
2.	<i>Sweteniamahagony</i>	250	250	100	168.96
3.	<i>Kaya senegalensis</i>	250	250	100	182.2
4.	<i>Pterocarpus marsupium</i>	250	250	100	210.3
	<b>Total</b>	<b>1000</b>	<b>1000</b>	<b>100</b>	

**INTERIM FINDINGS**

1. The experiment is ongoing.
2. Tree crops shows better survival and growth performance irrespective of intercrops effect initially.
3. Black gram has generated better yield under *Khaya senegalensis* based agro forestry system.
4. Revenue has been generated through intercrops and details provided below.

S. No	Intercrop	Expenses (Rs.)	Revenue (Rs.)
1	Tobacco	30000.00	60000.00
2	Black gram	10000.00	25000.00
3	Horse gram	5000.00	20000.00
4	Onion	2000.00	6000.00
5	Tomoto	6000.00	21000.00
6	Chilly	7000.00	20000.00
<b>TOTAL</b>		<b>60,000.00</b>	<b>1,52,000.00</b>

5. The effect of trees growth under intercrop will be studied.
6. Suitable crop for suitable tree species will be identified.



***Swietenia mahagoni* tree intercrop with cholam**



***Khaya senegalensis* tree with intercrop black gram**