TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS

34th Forestry and 15th Sericulture Scientists Meet
(07.05.2024)

LEAD CENTRE

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

Directorate of Research
Tamil Nadu Agricultural University
Coimbatore – 641 003

2024

PROCEEDINGS

34th Forestry and 15th Sericulture Scientists' Meet

The 34th Forestry and 15th Sericulture Scientists' Meet was held on 07.05.2024 at MAFBIF hall, Forest College and Research Institute, Mettupalayam.

The Meet was chaired by **Dr. V. Geethalakshmi**, Vice-Chancellor, TNAU, Coimbatore. Madam emphasized the importance of high-density planting in neem and suggested to standardize the technologies. It was insisted to identify suitable teak clones for planting in the coconut plantations damaged by wilt. Viable agro forestry models developed may be popularized through KVKs.

Dr. M. Raveendran, Director of Research, TNAU, Coimbatore delivered welcome address. It was suggested to identify suitable trees preferably TNAU released varieties for planting under trees outside (ToF) forest and popularized. Data on area of ToF in Tamil Nadu may be collected and documented. Trees identified for containing pollution may be popularized in urban areas through KVKs

Dr. A. Balasubramanian, Dean (Forestry) presented the research highlights (2023-24). All Heads of the Department presented the action taken on the recommendations of 33rd Forestry and 14th Sericulture Scientists' Meet and action plan for the year 2024-25. Dr. S. Hemalatha, Research Coordinator proposed formal vote of thanks.

The proceedings of the 34th Forestry and 15th Sericulture Scientists' Meet are furnished under the following headings.

I.TREE IMPROVEMENT

A. ON FARM TRIAL

1. Improvement, Utilization and Value addition of Timber genetic Resources (Scientists-in-charge: Dr. K.T. Parthiban)

Teak - MTP TK 07, MTP TK 16, MTP TK 21 and Mahogany SM 18 will be taken up for OFT in five agroclimatic zones

S. No.	Zones	Location
1.	Southern Zone	15 Trials will be conducted in Farmers field
2.	Northern Zone	
3.	Western Zone	
4.	North Eastern Zone	
5.	Cauvery Delta Zone	

2. Development of High Yielding Short Rotation Clones/ Progenies for Multifunctional Industrial utility (Scientist-in-charge: Dr. K.T. Parthiban)

Acacia Hybrid – AM 09, *Khaya* HYSR 1, *Toona* TC 01, *Melia* HYSR 1, *Melia* HYSR 5 and *Chukrasia tabularis* CT 03 will be taken up for OFT in five agroclimatic zones.

S. No.	Zones	Location
1.	Southern Zone	16 Trials will be conducted in Farmers field with block / border plantation for plywood industry
2.	Northern Zone	
3.	Western Zone	
4.	North Eastern Zone	
5.	Cauvery Delta Zone	

3. Annatto (*Bixa orellana*) -TNBi 20 (Scientists-in-charge: Dr. K. Kumaran, Dr. P.S. Devanand, Dr. S. Vennila, Dr. P. Radha)

Parent Code	Seed Yield (t/acre)	Bixin Content (%)	Nor Bixin content (%)
TNBi 20	0.90	3.214	2.005
• Promising genotype with white flower and green pods			

Two OFTs were completed and the OFT will be continued for one more year (Western Zone).

Locations

Tirupur	Moolanur, Dharapuram
Karur	Chinna Dharapuram, Vellaiyanai
Coimbatore	Sirumugai

MULTI LOCATION TRIAL

1. Mass multiplication and multilocation testing of identified genotypes
(Scientist-in-charge: Dr. K.T. Parthiban)

S. No.	Species	Improved Clones	No. of Locations
1.	*Casuarina*	CJ 02	2
		CJ 04	1
		CJ 05	1
		CJ 06	1
		CE 01	1
		CE 08	1
		CE 18	1
		E 2	4
		E 5	2
		E 9B	1
		A01	5
		A 06	4
		AF 01	1
		E 13	1
2.	*Eucalyptus*	DF 97	3
		EH 05	2
		LBT	2
		ET 01	1
		ET 02	2
		EG 14	3
		EG01	1
		EG 16	1
		EH 02	2
		EG 01	1
3.	*Toona ciliata*	TC 02	3
4.	*Terminalia bellirica*	FCRI TB 13	2

MLT will be conducted in three agroclimatic zones

	Zones	Location
1.	Western Zone	Trials will be conducted in Farmers field
2.	North Eastern Zone	
3.	Cauvery Delta Zone	

2. Field evaluation of Sodicity Tolerant Clones of *Casuarina junghuhniana* (MLT)
(Scientist-in-charge: Dr M. Murugesh)

I. Clones

T1 - MTP 2 (Check variety or Control)
T2 - STC CJ3 (Sodicity Tolerant Clones of *Casuarina junghuhniana*)
T3 - STC CJ9 (Sodicity Tolerant Clones of *Casuarina junghuhniana*)

T4 - STC CJ15 (Sodicity Tolerant Clones of *Casuarina junghuhniana*)
T5 - STC CJ16 (Sodicity Tolerant Clones of *Casuarina junghuhniana*)
T6 - STC CJ17 (Sodicity Tolerant Clones of *Casuarina junghuhniana*)
T7 - STC CJ18 (Sodicity Tolerant Clones of *Casuarina junghuhniana*)

II. MLT locations

S. No.	District	Location
1.	Madurai	Chellampatty
2.	Trichy	ADAC & RI Campus
3.	Thanjavur	Palluthur, Pattukottai,

S. No.	Parameters	Madurai	Thanjavur	Trichy
1.	Soil pH	9.50	8.70	9.00
2.	Soil EC (d Sm^{-1})	0.62	0.79	1.32
3.	Soil CEC (C mol (P^+) kg^{-1})	49.63	25.20	32.45
4.	Sodium Absorption Ratio (SAR) (Meq kg^{-1})	19.47	13.10	14.88
5.	Exchangeable Sodium Percentage (ESP) (%)	18.68	19.20	18.52

3. Field evaluation of yield and high floss content in *Ceiba pentandra* CPT 29 clones

(Scientist-in-charge: Dr M. Murugesh)

Treatments

1. MTP01 (Control)
2. CP28
3. CP29
4. CP 30

MLT –Locations

1. HC&RI Periyakulam : Red Laterite soil
2. FC&RI Mettupalayam : Red Soil
3. Samanayakkanpalayam : Block Cotton Soil

Observations

Height, collar diameter and floss content

B. FOR INFORMATION

1. Enhancing Seed Yield in Neem (*Azadirachta indica* A. Juss.) for high aza content through breeding and precision Silvicultural approaches

Fifty neem plus trees were collected from Coimbatore and Tirupur districts and assessed for their aza content. Among the fifty plus trees TN-MTP-140 recorded high aza content (1.263%).

S. No.	Parent tree code	Tree height (m)	DBH (cm)	Canopy height (m)	Canopy width (m)	Aza %
1.	TN-MTP- 121	12.5	75.0	7.0	11.0	0.842
2.	TN-MTP- 122	7.0	71.5	5.0	7.5	0.807
3.	TN-MTP- 123	11.5	87.0	5.0	4.0	0.807
4.	TN-MTP- 124	9.0	71.0	4.7	7.0	0.905
5.	TN-MTP- 125	12.0	113.0	11.5	13.0	0.909
6.	TN-MTP- 126	7.0	72.5	5.5	8.3	0.847
7.	TN-MTP- 127	13.0	113.0	7.0	13.0	0.935
8.	TN-MTP- 128	12.0	93.5	11.0	12.0	0.985
9.	TN-MTP- 129	6.0	71.0	4.7	7.0	0.955
10.	TN-MTP- 130	16.0	105.0	11.0	14.3	0.828
11.	TN-MTP- 131	11.0	92.7	8.5	7.5	1.030
12.	TN-MTP- 132	10.5	122.5	6.5	5.0	1.060
13.	TN-MTP- 133	11.5	105.5	7.0	11.0	0.845
14.	TN-MTP- 134	7.0	83.0	6.0	6.5	1.020
15.	TN-MTP- 135	8.5	91.5	6.5	10.5	0.939
16.	TN-MTP- 136	5.5	69.5	3.0	7.5	0.826
17.	TN-MTP- 137	14.5	136.5	11.5	18.5	0.935
18.	TN-MTP- 138	9.0	72.0	4.3	5.2	0.835
19.	TN-MTP- 139	10.0	77.5	6.7	8.5	0.895
20.	TN-MTP- 140	7.5	63.0	5.0	7.0	1.263
Mean		10.05	89.31	6.87	9.22	0.906
SED		0.23	2.17	1.08	1.68	
CD (5%)		0.46	4.34	2.16	3.36	

C. FOR ADOPTION

I. <u>Variety Release</u>

1. ***Melia*** **MD HYSR 05- Salient features**

Clone	Melia MD HYSR 05
Productivity	303.90 kg / tree
Utility	Paper, ply and energy
Rotation	5-6 years
Straight cylindrical bole	
Wood quality	
Density	555.14 kg/m^3

Veneer Recovery	80-85%
Holocellulose	75.50%
Calorific value	o 3946.34 Kcal

2*. Acacia* hybrid AHHYSR 09- Salient features

Clone	Acacia hybrid AH HYSR 09
Productivity	217.275 kg / tree
Utility	Paper, ply and energy
Rotation	5 – 6 years
Straight cylindrical bole	
Wood quality	
Density	555.84 kg/m^3
Veneer Recovery	6X 27, OT – 76%
Holocellulose	64.83 %
Calorific value	4034.42 Kcal

3. Eucalyptus EG09 - Salient Features

Clone & Parentage	EG09 (urophylla x grandis)
Productivity	150 mt/ha
Utility	Core veneer, Plywood, Energy, paper
Rotation	4 years (Plywood)
Straight cylindrical bole	
Wood quality	
Density	700-750 kg/m^3
Veneer Recovery	8X27, O.T %- 67

4. Tamarind FCRI TAM 06- Salient Features

Genotype	FCRI-TAM-06
Age	Seven years clonal plantation
Spacing	3m x 3m (High density planting- 444 trees per acre)
Yield	8 kg per tree at 5^{th} year 10.05 kg per tree at 6^{th} year 10.66 kg per tree at 7^{th} year

Seed gum yield	60 per cent
Check variety	PKM 1
Pruning height	2m from ground level
Irrigation	Drip
Florigen treatment	Paclobutrazol 500 ppm before flowering

II. Technology Release

1. Cleft Grafting in *Ceiba pendandra*

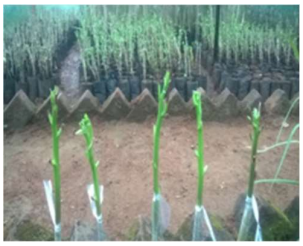
Cleft grafting in *Ceiba pentandra* is useful for developing early yield and drought tolerant planting material. FC&RI has developed cleft grafting technique for early bearing variety using apical shoot. The rootstock used is the seedlings developed from bulk collections of *Ceiba pentandra*

The Cleft grafting using apical shoots as a scion could be used and recommended.

- Rootstock height: 10cm; Scion apical shoot height: 10-15 cm
- Grafting success: 95 - 100%
- Age of grafts for field planting :3-4 months
- Scion height growth increment: 15 cm in 3 months
- Graft union is good and Low-Cost technology
- Field survival is 85-95 %

Advantages

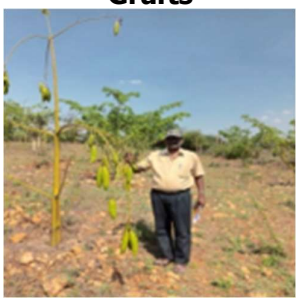
- Drought tolerant
- Early bearing
- Suitable for wind prone Areas



Grafts

Grafts

Field Established Graft



Pods Bearing Grafted Tree

D. REMARKS ON THE ONGOING UNIVERSITY RESEARCH PROJECTS /CORE PROJECTS/AICRP / EXTERNALLY FUNDED PROJECTS

S. No.	Project No. and Title	Name and designation of the Project Leader	Duration	Remarks
UNIVERSITY RESEARCH PROJECT				
1.	FC&RI/MTP/FOR/FOR & SER/2024/072-Genetic Genetic Evaluation of *Khaya anthotheca* genetic resources for industrial utility in Tamil Nadu	Dr. R. Revathi Prof & Head Dept. of Forest Biology & Tree Improvement	01.03.2024 to 01.03.2027	Project may be continued
2.	SEC/MTP/FB&TI/FOR/2022/001 Assessment of correlation between seed oil rancidity and shelf life of neem seeds as influenced by storage factors	Dr. R. Vijayan Assoc. Prof (SST)	01.11.2022 to 31.12.2024	Project may be continued
3.	FC&RI/PKM/FOR?2020/001 Progeny evaluation in Kapok (*Ceiba pentandra* (L.) Gaertn.)	Dr. M. Murugesh Prof. & Head Dept. of Agroforestry	01.05.2019 to 01.03.2024	Recommended for Closure
EXTERNALLY FUNDED / ICAR PROJECTS				
1.	CIL/FCRI/MTP/FBTI/2022/R005 Enhancing Seed Yield in Neem (*Azadirachta indica* A.J uss.) through breeding and precision Silvicultural approaches	Dr.K.Kumaran Professor (Forestry) Dr.P.S.Devanand Assoc. Prof. (PBG) Dr.K.B. Sujatha Assoc. Prof. (CRP)	01.03.2022 to 01.03.2025	Project may be continued
2.	ICFRE/FCRI/MTP/DOS/2020/R002 Tamarind domestication, conservation and deployment of genetic resources for sustenance and livelihood amelioration	Dr. A. Balasubramanian Dr. S. Radhakrishnan Dr. M. Sivaprakash Dr. M. Suganthy	01.03.2020 to 31.12.2025	Project may be continued
3.	SMM/FCRI/MTP/FOR/2021/R001Improvement, Utilization and Value addition of Timber genetic Resources	Dr. K.T. Parthiban Dr. S. Umesh Kanna Professor (Forestry) Dr. C. Cinthia Fernandaz Assoc. Professor (Agrl. Extn.) Dr. S. Manivasagan, Asst. Professor (FOR)	01.04.2022 to 31.03.2026	Project may be continued

4.	GOI-DBT/FCRI/MTP/2022/R002 Biotechnological applications for development of HYSR clones amenable for Multifunctional Industrial utility	Dr. K.T. Parthiban Professor (Forestry) Dr. P. Kumar Asst. Prof. (Forestry) Dr. M. Raveendran Director of Research Dr. P.S. Devanand Assoc. Prof. (PBG)	01.04.2022 to 30.03.2025	Project may be continued
5.	TNPL/FCRI/MTP/AGF/2020/R003 Improvement, Wood Quality Characterization and Utilization of pulpwood genetic resources amenable for Agroforestry	Dr. K.T. Parthiban Prof. (Forestry) Dr. C. Cinthia Fernandaz Assoc. Prof. (Agrl. Extn.) Dr. S. Umesh Kanna Prof. (Forestry), Dr. R. Jude Sudhagar Prof. (Forestry) Dr. M. Prasanthrajan Prof. (ENS) Dr. P. Boominathan Prof. (CRP)	01.01.2021 to 31.12.2025	Project may be continued
6.	CPL/FCRI/MTP/AGF/2022/R004 A Value chain on Plywood Agroforestry in Tamil Nadu	Dr. K.T. Parthiban Professor (Forestry) Dr. R. Jude Sudhagar Professor (Forestry) Dr. R. Ravi Assistant Professor (Forestry)	01.04.2022 to 31.03.2027	Project may be continued
7.	DBT/DPB/CPMB/CBE/2023/R003 Harnessing the genomic potential of Annatto (*Bixa orellano*) as a source of natural colorant	Dr. M. Raveendran Director of Research Dr. K. Kumaran (Forestry) Dr. S. Vennila (Forestry) Dr. V.P. Santhanakrishnan (Organic Chemistry) Dr. P.S. Devanand (Forestry Breeding) Dr P. Sudha (Food Processing) Dr N. Manikanda Boopathi (Biotechnology) Dr P. Radha (Biochemistry)	03.02.2023 to 02.02.2026	Project may be continued
8.	TNSLURB/HCRI/PKM/DFL/2022/R002 Multiplication and popularization of High-Density Short Rotation (HDSR) saline/sodicity tolerant *Casuarina junghuhniana* clones through On Farm	Dr. M. Murugesh Prof. (Forestry) Dr. K.M. Chellamuthu	2021-2025	Project may be continued

	Trials/Multi-Location Trials in Tamil Nadu			
AICRP SCHEMES				
1.	AICRP/FOR/MTP/FOR/002 AICRP on Potential Crops	Dr. K.R. Ramesh Professor (Forestry)	Continuous project Since 1982	Project may be continued

E. ACTION PLAN (2024-2025)

S. No.	Theme Activity	Name of the Scientist and centre	Works to be carried out	Deliverable/ Expected outcome
Theme1: Genetic Improvement and Varietal Development in prioritized NTFP species and Industrial wood species.				
Theme Leader: Dr. R. Revathi, Dr. A. Balasubramanian & Dr. K.T. Parthiban				
1.	Genetic improvement and popularization of NTFP and industrial wood species	Dr. K. Kumaran Dr. R. Revathi Dr. K.T. Parthiban Dr. P.S. Devanand Dr. R. Vijayan Dr. P. Radha Dr. K. Hemaprabha Dr. A. Balasubramanian Dr. M. Murugesh Dr. I. Sekar	• Collection, Assemblage and evaluation of dye yielding • Species, TBO's Fruit yielding tree sp, Fibre and floss yielding tree sp., industrial wood species • Field evaluation of Sodicity Tolerant Clones of *Casuarina junghuhniana* • Field evaluation of high floss yielding *Ceiba pentandra* CPT 29 clones • Field evaluation of Early Bearing *Ceiba pentandra* EB CPP 22,23	Superior genotypes of the targeted NTFP tree species (Bixa, Neem, Tamarind, Soapnut, Silk cotton and industrial wood species (*Melia*, *Toona*, *Chukrasia*, *Casuarina*, *etc*.) will be developed
2.	Molecular characterization and varietal protection of tree species	Dr. K.T. Parthiban Dr. A. Balasubramanian Dr. K. Hemaprabha	• Genetic diversity analysis/ Phylogenetic relationship studies in the identified tree genetic resources • DUS descriptors & developing PPV&FR regulation for *Toona ciliata*, *Chukrasia tabularis*, Neem, Karanja and *Khaya senegalensis*	•To establish genetic identity of the assembled genotypes. •Varietal protection for the assembled tree species

3.	Inventory and assemblage of industrial wood genetic resources	Dr. K.T. Parthiban Dr. R. Revathi Dr. K.R. Ramesh Dr. P. Rajendran Dr. P. S. Devanand Dr. K. Hemaprabha Dr. A. Balasubramanian Dr. M. Murugesh Dr. I. Sekar	• Germplasm assemblage and screening of Industrial wood species • Development of HYSR clones for multi-utility through classical and molecular breeding • Mass multiplication and Multi location testing of identified genotypes	Superior genotypes for multipurpose industrial utility (pulp and paper, plywood, energy) will be developed
Theme 2: Conservation of Forest Genetic Resources				
Theme Leader: Dr. R. Revathi, Professor & Head Dept of FB & TI				
1.	Assemblage and conservation of tree species	Dr. K. Kumaran Dr. R. Revathi Dr. S. Vennila Dr. K.R. Ramesh Dr. R. Vijayan	Continuous assemblage of ecologically important tree species	Conservation and maintenance of Forest genetic resources for research and education activities
2.	Phenological changes and physiological characterization of tree species	Dr. R. Revathi Dr. K. Kumaran Dr. P. Rajendran Dr. K.B. Sujatha Dr. R. Vijayan	Continuous assessment of phenology and physiological characters of the tree species will be evaluated	Phenological and physiological characters will be documented

II. MANAGEMENT AND CONSERVATION

A. MULTI LOCATION TRIAL

1. Precision Silviculture technique in *Enterelobium cyclocarpum*

(Scientists In–charge: Dr. S. Radhakrishnan, Dr. M. Sivaprakash, Dr. B. Sivakumar, Dr. R. Jude Sudhagar and Dr. A. Balasubramanian)

Experimental Details

1.	Tree Species	:	*Enterelobium cyclocarpum*
2.	Spacing	:	2 m x 2 m
3.	No. of Seedlings per acre	:	1000 Nos
4.	Clone	:	MTP EC2
5.	Irrigation	:	Drip Irrigation
6.	Treatment	:	
	Fertigation	:	a) 150:100:100 kg N, P, K ha^{-1}
		:	b) Humic acid (62.5 l ha^{-1})
8.	No.of replications	:	4
9.	No. Seedlings per replication	:	25
10	Design of the experiment	:	RBD

Observations to be recorded

1. Seedling height
2. Seedling collar diameter
3. Seedling volume

Locations

1. Western zone : Farmer's field at Coimbatore
2. Southern Zone : Farmer's field at Sivagangai
3. North Eastern Zone : Farmer's field at aduranthakam

2. Testing of Casuarina clones for high biomass and bioenergy

(Scientists In-charge: Dr. A. Balasubramanian, Dr. P. Kumar, Dr. B. Sivakumar, Dr. P.S. Devanand, Dr. M. Sivaprakash and Dr. S. Radhakrishnan)

Experimental Details

1.	No. of clones	:	6 (CH1, CH2, CH5, CJ1, CJ9, MTP A1)
2.	Spacing	:	1 m x 1 m and 1.5 m x 1.5 m
3.	No. of Seedlings per acre	:	4000 and 1777 Nos.
4.	Design of the experiment	:	RBD
5.	Irrigation	:	Drip Irrigation
6.	Fertigation	:	150:100:100 kg N,P,K ha^{-1}
7.	Treatment	:	6 (CH1, CH2, CH5, CJ1, CJ9, MTP A1)
8.	No. of replications	:	4
9.	No. Seedlings per replication	:	10

Observations to be recorded

1. Seedling height
2. Seedling collar diameter
3. No. of branches
4. Above ground biomass
5. Below ground biomass
6. Total biomass
7. Calorific value of Wood from clones
8. Pelleting of tending waste and asses the calorific value

Locations

1. Western zone : Farmer's field at Coimbatore
2. Southern Zone : Farmer's field at Sivagangai
3. North Eastern Zone : Farmer's field at Maduranthakam

B. FOR INFORMATION

1. Carbon Sequestration in farm grown Teak

Age (years)	Zone	Above Ground Biomass (t ha^{-1})	Below Ground Biomass (t ha^{-1})	Total Biomass (t ha^{-1})	Total Carbon (t ha^{-1})	Total CO_2 (t ha^{-1})
Block plantations						
15-20	HRZ	0.4716	0.1226	0.5942	0.2971	1.0903
	SZ	0.3953	0.1028	0.4981	0.2491	0.9141
	CDZ	0.4385	0.1140	0.5526	0.2763	1.0139
Boundary plantations						
15-20	HRZ	0.6841	0.1779	0.8620	0.4310	1.5817
	SZ	0.5032	0.1308	0.6340	0.3170	1.1634
	CDZ	0.5918	0.1539	0.7457	0.3728	1.3683

In High rainfall zone of Tamil Nadu, twenty years old farm grown teak sequestered 1.58 tonnes of total CO_2 equivalent per hectare.

2. Carbon Sequestration Potential of trees in mine spoiled afforested areas:

S. No.	Tree Species	Age (year)	Avg tree height (m)	Avg DBH (m)	Avg tree vol (m3)	AGB (t ha-1)	BGB (t ha-1)	TB (t ha-)	TC (t ha-1)	Tt CO_2 (t ha-1)
1.	*Tectona grandis*	25	7.02	0.03	0.29	0.20	0.10	0.31	0.15	0.56

DBH-Diameter at Breast Height
AGB- Above ground Biomass
BGB-Below ground biomass
TB-Total biomass
TC-total carbon
Tt CO_2 (t ha-1)- Total Co2 Equivalent

In mine spoil afforested areas of NLCIL, Neyveli, among the ten tree species evaluated for their carbon sequestration potential, 25 years old *Tectona grandis* sequestered 0.56 tonnes per hectare of carbon dioxide equivalent.

3. *Enterelobium cyclocarpum* - A Multipurpose tree:

S. No.	Spacing	Height (m)			DBH (m)			Volume (m^3)
		12 MAP	24 MAP	36 MAP	12 MAP	24 MAP	36 MAP	36 MAP
1.	2.0 m x 2.0 m	4.80	5.35	7.14	0.050	0.092	0.267	0.763

The optimum spacing for pulpwood production is 2 m x 2 m, pollarding height is 4 feet and the interval for multiple fodder-cut is 60 days.

Treatments	No. of sprouts/stem*			
	15 DAP	30 DAP	45 DAP	60 DAP
T_4 -Pollarding at the height of 4 feet	16.75[a]	27.75[a]	35.50[a]	42.75[a]

4. High carbon sequestration trees recommended for agroforestry practising farmers (Villupuram, Pudukottai, Cuddalore, Sivagangai, Tirunelveli, Virudunagar and Ramanadapuram districts) are listed below

Biomass and carbon storage of trees under the Agroforestry system

S. No.	Tree species	Age (yrs)	Total Carbon storage (kg/tree)	Carbon sequestration per year/tree (Mt)
1.	*Azardirachta indica*	30	226	7.53
2.	*Ceiba pentandra*	15	180	12.00
3.	*Ailanthus excelsa*	25	109	4.36
4.	*Pterocarpus santalinus*	20	80	4.00
5.	*Melia dubia*	6	79	13.16
6.	*Gmelina arborea*	12	35	2.91
7.	*Tectona grandis*	6	19	3.16
8.	*Swietenia macrophylla*	7	16	2.28

C. FOR ADOPTION

1. In Teak, the irrigation level of 100 % PE and fertigation dose of 187:125:125 (N: P: K) kg/ha/year is recommended for adoption for three years plantation.

1.	Age	Three years plantation
2.	Recommended Fertigation dose	187:125:125 (N: P: K) kg/ha/year
3.	Pan Evaporation	100 %

2. *Enterelobium cyclocarpum* - A new tree species for multipurpose utility has the following industrial uses

S. No.	Utility	Property
1.	Pulpwood utility	Holocellulose - 72.25 %
2.	Fodder value	Crude protein - 20.5 %
3.	Gum characteristics	Protein - 6.68 %, Fat - 1.6 %, Viscosity - 56 CP
4.	Packing case utility	Density - 0.4 g/cm^3

D. REMARKS ON THE ONGOING UNIVERSITY RESEARCH PROJECTS /CORE PROJECTS/AICRP / EXTERNALLY FUNDED PROJECTS

S. No.	Project No. and Title	Name and designation of the Project Leader	Duration	Remarks
UNIVERSITY RESEARCH PROJECT				
1.	FOR/MTP/SIL/FOR/2022/ 001 Standardizing precision silvicultural techniques for *Enterolobium cylocarpum* clones for multiple utility	Dr. M. Sivaprakash	01.04.2022 to 31.03.2025	Project may be continued
2.	FCRI/MTP/FOR/2021/003 Effect of spacing regimes on growth and yield of *Enterolobium cylocarpum*	Dr. B. Sivakumar Dr. M. Sivaprakash	01.04.2021 to 31.10.2024	Project may be continued
3.	FCRI/YCD/FOR/2020/001 Introduction and evaluation of alternate industrial wood species for coffee based agroforestry system	Dr. M. Kiruba Assistant Professor (Forestry)	01.01.2021 to 01.12.2025	Project may be continued
EXTERNALLY FUNDED / ICAR PROJECTS				
1.	NLC/TRRI/SRS/CDL/2023/R001 Studying the suitability and selection of tree species in mine spoils of NLCIL mines in Neyveli	Dr. S. Radhakrishnan Professor & Head, FC&RI, Mettupalayam Dr. M.P. Sugumaran Professor (ENS), KVK, Vridhachalam	01.07.2023 to 31.03.2024	Recommended for closure
2.	BE/BIOTHERM/FCRI/MTP/2023/ R001 Design and development of value chain based dendro-energy generation	Dr. P. Kumar Professor (Forestry) Dr. K.T. Parthiban Professor (Forestry)	01.11.2023 to 31.10.2026	Project may be continued
3.	IINRG/FCRI/MTP/DOS/2014/ R002 Network project on "Harvesting, processing and value addition of natural resins and gums" - Tamarind seed gum (C31QQ)	Dr. A. Balasubramanian Dean (Forestry) FC&RI, Mettupalayam	01.08.2014 to 31.03.2025	Project may be continued
4.	ICFRE/FCRI/MTP/DOS/2020/R001 Silvicultural interventions for productivity enhancement and carbon sequestration in plantations of important tree species.	Dr. A. Balasubramanian Dean (Forestry) FC&RI, Mettupalayam	01.03.2020 to 31.12.2025	Project may be continued

5.	TNFD-HOSUR/FCRI/MTP/2023/R006 Evaluation of growth and biometric attributes in few farm grown trees of Hosur Forest Division (Krishnagiri District)	Dr. A. Balasubramanian Dean (Forestry) FC&RI, Mettupalayam	01.09.2023 to 31.08.2024	Project may be continued
6.	TNFD-TBGPCCR/FCRI/MTP/2023/R005 Compendium on Heritage Trees of Tamil Nadu	Dr. A. Balasubramanian Dean (Forestry) FC&RI, Mettupalayam	01.07.2023 to 31.06.2024	Project may be continued
7.	TNFD-TBGPCCR/FCRI/MTP/2023/R003 Manual for Urban Tree Planting	Dr. A. Balasubramanian Dean (Forestry) FC&RI, Mettupalayam	01.07.2023 to 31.06.2024	Project may be continued
10.	NMSA-RKVY/FCRI/FCRI/MTP/FOR/2023/R001 RKVY –Agroforestry Component – Nursery Establishment and QPM (Tree Seedling Production) and Supply to the farmers	Dr. A. Balasubramanian Dean (Forestry) Dr. M. Murugesh, Professor & Head, (DAF) Dr. R. Revathi Professor & Head (DFB&TI), Dr. S. Radhakrishnan Professor & Head, (DSNRM)	01.09.2023 to 31.03.2025	Project may be continued
11.	CIAF/FCRI/MTP/AGF/2016/R004 Consortium of Industrial Agroforestry (CIAF)	Dr. K.T. Parthiban Professor (Forestry) Dr. I. Sekar Professor (Forestry)	01.04.2016 Continuous project	Project may be continued
12.	USAID/FCRI/MTP/2022/R003 Trees Outside Forests in India (TOFI)	Dr. K.T. Parthiban Professor (Forestry)	01.04.2022 to 31.03.2027	Project may be continued
13.	ICAR/CAFRI/FCRI/MTP/FOR/2024/R001 Developing Nursery Protocol and Validation of Propagation Techniques for Deregulated Agroforestry Tree Species in Tamil Nadu	Dr. I. Sekar, Professor (Forestry) Dr. M. Murugesh Prof. and Head (DAF) Dr. P. S. Devanand Associate Prof. (PBG)	01.03.2024 to 31.05.2024	Project may be continued
AICRP / ICAR				
1.	AICRP/FOR/MTP/FOR/001 AICRP on Agroforestry Management theme	Dr. M. Murugesh Professor and Head (DAF) Dr. I. Sekar, Professor (Forestry)	Continuous project since 1983	Project may be continued

E. ACTION PLAN (2024 - 2025)

S. No.	Theme Activity	Name of the Scientist and centre	Works to be carried out	Deliverable/ Expected outcome
Theme 1 Silviculture for Greening.				
Theme Leader : Dr. A. Balasubramanian, Dean Forestry				
1.	Precision silvicultural techniques for farm grown trees	Dr. A. Balasubramanian Dr. S. Radhakrishnan Dr. C. Ushamalini Dr. M. Sivaprakash Dr. P. Kumar Dr. B. Sivakumar Centre: FC&RI, MTP Dr. R. Jude Sudhagar Centre: DARS, Chettinad	• Mandatory species *Tectona grandis* *Casuarina* clones *Enterolobium cyclocarpum* • Density Trials • Scheduling of irrigation and nutrient • Assessment of yield • Bio-metry • Monitoring and management of diseases	Precision silviculture techniques for the mandatory crops will be developed to meet the farmers/ tree growers requirements
2.	Growth and Yield assessment of farm grown trees	Dr. S. Radhakrishnan Dr. M. Sivaprakash Dr. P. Kumar Dr. B. Sivakumar Dr. R. Jude Sudhagar DARS, Chettinad	• Mandatory species Casuarina clones *Dalbergia sissoo, Sweitenia macrophylla* • Estimation of Growth • biometry in farm grown trees	Growth and yield of farm grown trees will be assessed
3.	Technology transfer and multi locational testing of precision technologies	Dr. A. Balasubramanian Dr. S. Radhakrishnan Dr. M. Sivaprakash Dr. P. Kumar Dr. B. Sivakumar	• Transfer of precision tree farming techniques • Testing of technologies through MLTs in farmers' field • Conducting trainings and demonstrations	Precision silvicultural techniques developed will be transferred to farmers through training and demonstration.
Theme 2 Restoration and Pollution Abatement				
Theme Leader: Dr. S. Radhakrishnan Professor & Head Dept of S&NRM				
1.	Eco-restoration	Dr. S. Radhakrishnan Dr. K. Suganya Dr. B. Sivakumar	• Choice of species for restoration • Biodiversity studies • Carbon sequestration studies	Restoration of degraded lands through tree planting
2.	Studies on urban heat island effect in urban and peri urban areas	Dr. K. Suganya Dr. P. Kumar Dr. B. Sivakumar	• Urban heat island intensity (UHII) will be assessed using surface daytime and night time temperature based on LST data correlation analysis	UHII effect will be assessed in urban and peri-urban areas will be computed

			between UHII and air p ollutants will be assessed	
Theme 3 : Designing, Developing and Popularizing Agroforestry Models				
Theme Leader: Dr. I. Sekar Professor (Forestry) Dept of AGF)				
1.	Multifunctional Agroforestry Model	Dr. R. Jude Sudhagar, DARS, Chettinad Dr. P. Vennilla, AC&RI, Vazhavachanur	Designing and establishment of Multifunctional Agroforestry model for dry lands at DARS, Chettinad and AC&RI, Vazhavachanur	For demonstrating to farmers
2.	Introduction and evaluation of high yielding pulses/millets /Cereals/Cotton under kapok */C. junghuhniana*	Dr. I. Sekar, Dr. M. Murugesh	Inter crop studies of High yielding varieties viz., Pulses/Millets /Cereals /Cotton etc which was released by TNAU	The suitable inter crop will be recommended to the Agroforestry farmers
3.	Developing Dendro energy-based Agroforestry Model	Dr. I. Sekar,	• Biometrical data recording of HDRS clones of Casuarina, Dalbergia and Eucalyptus • Study of thermo chemical properties of above clones	Suitable HDSR clones will be recommended for dendroenergy based agroforestry system.
4.	Soil biological properties studies under agroforestry systems	Dr. M. Thilak, Associate Professor (Agri. Microbiology)	• Soil Microbial Population count with species • Soil microbial carbon assessment • Soil Microbial respiration	Results help for the Soil fertility management and improvement under various Agroforestry systems
Theme 4 : Developing Nursery Protocol for QPM (Tree Seedlings) of Important Farm grown Trees				
Theme Leader: Dr. I. Sekar Professor (Forestry) Dept of AGF)				
1.	Studies on Fixing certification standards for Tree Nursery and QPM	Dr. I. Sekar, Dr. M. Murugesh Dr. A. Shanthi	• Fixing standards for potting media • Fixing the Poly bags size • Fixing the minimum standards of tree seedlings parameters for QPM production and certification • QPM –Tree seedlings health standards (Pest, Disease & Nematode assessment and management)	QPM protocol will be developed for important Farm Grown tree species

III. VALUE ADDITION AND BUSINESS DEVELOPMENT

B. FOR INFORMATION

1. Activated Carbon from *Lantana camera* An Invasive Alien Species

Activated carbon was prepared through a one-step activation process using orthophosphoric acid in a 1:1 ratio at various temperatures, specifically 500°C, 550°C, 600°C, 650°C, and 700°C, to determine the optimal conditions. The iodine number, which measures the microporosity of the activated carbon, was found to be highest for activated carbon derived from *Lantana camara* produced at 700°C. It was concluded that *Lantana camara* has greater potential for the production of activated carbon compared to *Prosopis juliflora and Senna spectabilis.*

2. Identified Native Grasses for Grass Land Restoration Work

Surveyed and assessed native and invasive grass species suitable for grassland restoration across 22 Forest Divisions of Tamil Nadu. Approximately 73 grass species, noted for their high palatability and ease of propagation, among which 10 species as follows were identified and recommended for restoration initiatives in various divisions of Tamil Nadu Forest Department.

S. No.	Common Name	Botanical Name
1.	Buffel grass	*Cenchrus ciliaris*
2.	Bermuda grass	*Cynodon dactylon*
3.	Golden false beard grass	*Chrysopogon aciculatus*
4.	Angleton grass	*Dichanthium aristatum*
5.	Tufted grass	*Enteropogon monostachyos*
6.	Black spear grass	*Heteropogon contortus*
7.	Natal grass	*Melinis repens*
8.	Basket grass	*Oplismenus burmannii*
9.	Indian comet grass	*Perotis indica*
10.	Kangaroo Grass	*Themeda triandra*

3. Documentation of Birds Diversity in NLCIL Areas

A total of 107 avian species have been documented in NLCIL restoration sites. In terrestrial areas, 77 avian species belonging to 11 orders and 33 families were observed in Neyveli. The restored sites are showing positive trends of growing biodiversity, as evidenced by the increasing bird population and density. Additionally, a coffee table book on Avian Diversity in NLCIL was published to provide further information.

4. Biodiversity indices of Dindigul Forest Division

In the Dindigul Forest Division, *Albizzia amara* was the most dominant species in four ranges. The highest tree density for *Albizzia amara* was observed in Sirumalai (4.50/ha), Ayyalur (2.83/ha), Natham (6.80/ha), Azhagarkovil (7.00/ha), and Kannivadi (1.40/ha). In Vattalakundu, *Anogessius latifolia* had a tree density of 2.00/ha, while *Commiphora caudata* had a density of 6.25/ha. Oddanchatram exhibited the highest species richness and maximum density. Among the ranges,

Oddanchatram exhibited the maximum total density and species richness. The highest Shannon-Weiner index and species evenness were recorded in Kannivadi.

5. Status of Non-Timber Forest Products (NTFPs) in the Dindigul Forest Division

The primary Non-Timber Forest Products (NTFPs) in the Dindigul Forest Division include *Phoenix sylvestris, honey, Terminalia chebula, Acacia concinna,* and *Emblica officinalis*. It was also found that that majority (67%) of the surveyed population were earning daily wages in addition to their income through collection of NTFPs (Non-Timber Forest Products). 32% of the participants were involved in a combination of activities such as NTFPs collection, agriculture, and daily wage labour etc.

C. FOR ADOPTION

I. Technology Release

1. *Melocanna baccifera* based Fodder Pellets

Bamboo leaf-based fodder pellets were developed and assessed their nutritive and anti-nutrient properties for fodder suitability.

TECHNOLOGY

Composition of Bamboo Pellet

S. No.	Item	Percent
1.	*M. baccifera* leaf powder	70
2.	Groundnut oil cake	15
3.	Rice bran	4
4.	Maize grain	4
5.	Ragi grains	4
6.	Molasses	1
7.	Mineral mixture	1
8.	Salt	1

Nutritive value of Bamboo Pellet

S. No.	Item	Per cent
1.	Crude Protein	19.86
2.	crude fat	3.34
3.	crude fibre	21.9
4.	carbohydrates	40.1

2. Elephant dung based Agarbatti

The Elephant dung based Agarbatti was developed and validated based on the burning properties like burning time, flammability, ash content, binding properties (binding quality and moisture absorption in storage) and fragrant properties (best ratio and sensory score). Based on the results, the developed Agarbatti from Elephant dung have better flammability, burning time and binding quality for commercial utility.

TECHNOLOGY

Composition of Elephant dung based Agarbatti

S. No.	Item	Per cent
1.	Elephant dung	80
2.	Saw Dust cum Jigat powder	20

Quality Parameters of Elephant dung based Agarbatti

S. No.	Parameter	Value
1.	Weight	10.00 g
2.	Flamability	7 seconds
3.	Burning Time	61 minutes
4.	Ash Content	0.68 g
5.	Burning Quality	Continuous

II. <u>Products Developed - Patent</u>

Plant Based Wild Boar Repellent

A plant-based wild boar repellent, consisting of a 100% plant extract combination with a dosage ratio of 1:9, has shown potential in preventing wild boar entry and damage.

S. No.	Treatment	Level of intrusion (m)			
		5 DAS	10 DAS	15 DAS	20 DAS
1.	100 % Plant Combination	-	-	-	-

Control: Untreated field

D. REMARKS ON THE ONGOING UNIVERSITY RESEARCH PROJECTS /CORE PROJECTS/AICRP / EXTERNALLY FUNDED PROJECTS

S. No.	Project No. and Title	Name and designation of the Project Leader	Duration	Remarks
	UNIVERSITY RESEARCH PROJECT			
1.	FC&RI/MTP/FPW/FOR/2023/001 Developing and validation of Elephant dung based Agarbatti	Dr. I. Sekar Prof. (Forestry)	01.04.2023 to 01.03.2024	Project may be continued
2.	HC&RI/MTP/HORT/HORT.CROPS/ 2024/041 Evaluating the suitability of medicinal plants for *Melia dubia* and *Toona ciliata* based Agroforestry system	Dr. P. Hemalataha Assoc. Prof. (Horti.)	01.04.2024 to 01.03.2025	Project may be continued
	EXTERNALLY FUNDED / ICAR PROJECTS			

1.	TNFD-WP / FCRI / MTP / FPW / 2023 / R002 Assessing the Natural Resources of a Forest Ecosystem, A Comprehensive Study of soil, Vegetation, and Non – Timber Forest Products in Dindigul Forest Division	Dr. K. Baranidharan Prof. (Forestry) Dr. R. Ravi Asst. Prof. (Forestry)	01.04.2023 to 01.03.2024	Recommended for Closure
2.	TNFD/WPG/ FCRI / MTP / FPW / 2024 / R001 Assessing the Natural Resources of a Forest Ecosystem: A Comprehensive Study of Carbon Estimation, Soil and Non-Timber Forest Products in Gudalur Forest Division	Dr. K. Baranidharan Prof. (Forestry) Dr. R. Ravi Asst. Prof. (Forestry)	01.04.2024 to 01.03.2025	Project may be continued
3.	TNFD-TBGPCCR/FCRI /MTP/2023 /R004 Strengthening field level staff capacity in documentation, screening and standardization of mass multiplication technology for native fodder grasses	Dr. K. Baranidharan Prof. (Forestry)	01.04.2022 to 01.06.2024	Recommended for closure
4.	TNFD-TBGPCCR/FCRI/MTP/2023/R007 Hands on Training program on Enhancing Field-Level Staff Competence in Grassland Ecology and Restoration Techniques	Dr. K. Baranidharan Prof. (Forestry)	01.12.2023 to 01.11.2024	Recommended for closure
5.	TNFD-TBGPCCR/FCRI/MTP/2024/R001 Restoration of Grassland in the Sirumugai Range of Coimbatore Forest Division.	Dr. K. Baranidharan Prof. (Forestry)	01.01.2024 to 01.12.2024	Project may be continued
6.	FCRI / MTP / TFDP 2022 / R001 Studies on suitability of Bamboos for biochar, activated carbon, fodder pellets and briquettes.	Dr. M.P. Divya Prof. (Forestry) Dr. R. Ravi Asst. Prof. (Forestry)	01.04.2022 to 01.03.2024	Recommended for closure
7.	TNFD/FCRI/MTP/FPW/2022/R001 Isolation of Plant Alkaloids and Development of Plant Based Wild Animal Repellent to Mitigate Human Wild Boar Conflicts in Tamil Nadu	Dr. K. Baranidharan Prof. (Forestry)	01.04.2022 to 01.03.2024	Recommended for closure
8.	FCRI / MTP / NLC / 2022 / R001 Documentation and Seasonal Variations of Avifaunal Diversity in different Ecosystems of Neyveli Lignite Corporation India Limited	Dr. K. Baranidharan Prof. (Forestry)	01.03.2022 to 01.09.2023	Recommended for closure

E. ACTION PLAN (2024-2025)

S. No.	Theme Activity	Name of the Scientist and centre	Works to be carried out	Deliverable/ Expected outcome
Theme 1: Value Addition in Wood and Non-Timber Forest Products				
Theme Leader: Dr. R. Ravi				
1.	Development of organic cosmetic product from the seeds of *Sapindus emarginatus*	Dr. R. Ravi Dr. R. Revathi Dr. M. Tilak Dr. R. Radha FC&RI, MTP	Extraction of properties responsible for cosmetic products from the Seeds	Development of Organic Soap
2.	Development of value-added product in Wild Cucurbit – *Citrullus colocynthis*	Dr. P. Hemalatha Dr. R. Ravi Dr. R. Radha FC&RI, MTP	Isolation and characterization of bio chemical constituent from the fruits	Development of natural Hair Rejuvenation oil
3.	Value added product from the latex of *Pterocarpus marsupium*	Dr. R. Ravi Dr. K. Baranidharan Dr. P. Hemalatha Dr. S. Manivasakan FC&RI, MTP	Identification and quantification of biochemical constituent from the Latex	Development of Value-added product
4.	Suitability of *Chukrasia tabularis* Clones for Ply wood, pulp and paper production	Dr. I. Sekar Dr. M.P. Divya Dr. R. Ravi FC&RI, MTP	Core veneer, pulp and paper properties of *Chukrasia tabularis* Clones	Suitability of *Chukrasia tabularis* clones for Core veneer, pulp and paper production
Theme 2: Wildlife Management				
Theme Leader: Dr. K. Baranidharan				
1.	Mitigation Measures for Man Animal Conflicts	Dr. K. Baranidharan Dr. R. Ravi Dr. P. Priyadharshini	Extration of alkoloids from indetified Mulberrry for the development of repellent.	Plant based animal repellent will be developed and promoted
2.	Biodiversity Assessment in different landscapes	Dr. K. Baranidharan Dr. R. Ravi Dr. P. Kumar	Biodiversity Assessment of Gudalur Forest Division NTFP Survey Biodiversity Indices	Documentation of base line biodiversity data will be used for writing Forest working plan and effective management
3.	Development of GIS maps for Protected areas	Dr. K. Baranidharan Dr. P. Ragunath Dr. R. Ravi	Developing LCLU maps for Gudalur Forest Division and	Maps will be used as tool to reduce Human Animal Conflicts in Gudalur.

			Ossudu Bird Sanctuary	Habitat improvement programs in Ossudu Bird sanctuary
4.	Development of Grass land Restoration Techniques	Dr. K. Baranidharan Dr. R. Ravi Dr. M. Tilak	Development of field trials with different native grass species and its restoration techniques	Catalogue on grass land restoration techniques will be developed for effective management of grassland

IV. SERICULTURE

A. ON FARM TRIAL

1. Effect of foliar spraying of effective microbes (EM) on yield and quality of mulberry

(Scientist In-charge: Dr. K.A. Murugesh, Professor (Sericulture))

Locations

1. Thoppampatti
2. Chikkarasampalayam
3. Puthuvadavalli

Treatments

T_1: RDF + Foliar spray of EM @ 1% thrice
T_2: RDF + Poshan @ 7 ml/l (Treated Check)
T_3: Farmers practice

Time of application: 15, 30 & 45 days after pruning

Observations to be recorded

In mulberry: Shoot length, No. of shoots/plant, No. of leaves/shoot, Crude protein, moisture content, moisture retention capacity, weight of 100 leaves and shoot yield.

In silkworm: Matured larval weight, ERR, cocoon weight, shell weight, shell ratio, cocoon yield and filament length.

B. FOR INFORMATION

I. Mulberry Crop Protection

1. Alternate insecticide molecule & botanical for the Management of key pests in Mulberry

a. Bio efficacy of Insecticides against mulberry leaf webber and thrips

- Spraying of Flubendiamide 39.35 SC @ 0.25 ml/L was the most effective against leaf webber followed by Chlorantraniliprole 18.5 SC @ 0.30 ml/L
- Fipronil 5SC @ 2ml/L was the most effective in controlling thrips followed by Spinetoram 11.7 SC @ 0.84 ml/L
- Mean reduction in leaf webber and thrips incidences was:

Pests	Flubendiamide 39.35 SC	Chlorantraniliprole 18.5 SC
Leaf webber	88.11%	81.49%
	Fipronil 5SC	Spinetoram 11.7 SC
Thrips	87.83%	81.24%

b. Bio efficacy of Botanicals against mulberry leaf webber and thrips: Spraying of

- TNAU Bio G3 @ 5% was the most effective botanical against leaf webber followed by *Eupatorium adenophorum* extract @ 3%
- Mean reduction in the pests incidence

Pests	TNAU Bio G3@ 5%	*Eupatorium adenophorum* extract@ 3%
Leaf webber	70.19%	61.72%
Thrips	69.75%	63.23%

2. Screening of Mulberry accessions for resistance to insect pests, yield, suitability for silkworm rearing and cocoon production

Screening of 40 mulberry accessions for their tolerance to insect pests indicated, 14 mulberry accessions showed tolerance to leaf webber and 21 showed tolerance to thrips.

- Accessions tolerant to leaf webber and pink mealy bug: MI-0145, ME-0025 and MI-0252
- Accessions tolerant to leaf webber, thrips and pink mealy bug: ME-0174 and MI-0790
- Mulberry accessions, MI-0174, MI-0145 and MI-0790 showed higher tolerance to insect pests, better leaf quality parameters and enhanced cocoon yield.

3. Efficacy of *Lantana camara* against Wood Eating Termites

The termite population collected from TNAU insectary; Coimbatore was identified as *Coptotermes heimi* by morphological measurements. The methanolic extract of *Lantana camara* was tested against *Coptotermes heimi* through toxicity and fumigation tests.

- LC_{50} value (95% confidence limits) for toxicity: 0.484%
- LC_{50} value (95% confidence limits) for fumigation test: 0.0008 µg/ml

II. <u>Value addition in Sericulture</u>

1. Thermochemical characterization and energy recovery potential of mulberry genetic resources

- *Morus nigra, M. laevigata,* and *M. australis* were superior genotypes for bioenergy generation due to their higher fixed carbon.
- *M. nigra* emerged as the most promising option for efficient gasification, ensuring high energy output and effective energy conversion.
- *M. rotundiloba, M. macroura*, *M. cathayana*, *M. alba* and G2 have recorded superior thermochemical properties like calorific value, fuel value index *etc*.

2. Silkworm Pupae Based Feed for Aquaculture

Substitution of aqua diet with 20% de-oiled silkworm pupal meal to common carp fingerling showed higher

- Body weight gain (2.77±0.10) and survival rate (86.6%)

- Feed efficiency (1.13±0.01) and protein efficiency ratio (0.79±0.03)
- Replaces 20% fish meal
- Reduced the production cost (BC ratio: 2.05).

C. FOR ADOPTION

1. Amino acids as exogenous modulator for enhancing yield and quality of silk

- Composition of modulator: Glycine 10 ppm + Alanine 100 ppm + Serine 100 ppm
- 1 sachet of amino acid mixture dissolved in 5 litres of water to feed 100 dfls of 5th instar larvae
- Daily spraying once in the morning for six days
- Increased the cocoon yield by 16%
- Improved the raw silk quality traits *viz*., Filament length (7.37 %), Fibroin (11.44 %) and sericin (9.78 %)
- BC ratio of 2.08 as against 1.85 in the farmer's practice.

2. NutriStick- organic growth promoter for Mulberry cuttings

- 1 pellet (4g) of "Nutristick" between four mulberry cuttings at the time of planting.
- Increased the root initiation, survival rate, rooting percentage, root length, shoot length and no. of leaves per plant
- Reduced the nursery period by 15 days
- Enhanced survival (90.33%) and benefit cost ratio (1.90)

3. High value-added food products from mulberry fruits

The high value-added food products from mulberry fruits *viz*., jam, squash, ready to serve (RTS) and dehydrated fruits were developed and tested.

- Shelf life of 6 months for all products except RTS (3 months) under ambient conditions.
- All the products got highly acceptable sensory scores.
- Cost varied from Rs.130 to 200/- except RTS (Rs.22/100 ml).
- Mulberry variety MR2 was found as good source for preparing value added products.

D. REMARKS ON THE ON- GOING UNIVERSITY RESEARCH SUB PROJECTS

S. No.	Project Number and Title	Name and designation of project leader (s)	Duration	Remarks
1.	CPBG/MTP/SERI/SERI/2021/001: Breeding for sustainable growth and leaf yield in mulberry	Dr. P. Mangammal Assistant Professor (Sericulture)	01.11.2021 to 01.10.2024	Project may be continued
2.	CPPS/MTP/SER/FOR/2021/002: Studies on sericomposting	Dr. R. Shanmugam	01.06.2021 to	Recommended for closure

	on soil properties, mulberry leaf quality and sericultural parameters of silkworm	Assistant Professor (Sericulture)	01.05.2023	
3.	CPPS/MTP/SER/FOR/001 Development and evaluation of high value fruit-based food products from different mulberry varieties	Dr. P. Priyadharshini, Assistant Professor (Sericulture) Dr. P. Geetha Professor (FSN), CPHT, AEC&RI, TNAU, Coimbatore	01.10.2021 to 01.09.2023	Recommended for closure
4.	CPPS/MTP/SER/FOR/002 Effect of organic foliar sprays on the qualitative and quantitative attributes of mulberry and silkworm	Dr. K.A. Murugesh Professor (Sericulture)	01.11.2021 to 01.10.2023	Recommended for OFT

E. Action Plan (2024-2025)

S. No.	Action Plan/ Activity	Name of the Scientist and centre	Work to be carried out	Deliverables /expected outcomes
Theme 1. Mulberry Crop Improvement				
Theme Leader: Dr. P. Priyadharshini, Assistant Professor (Sericulture)				
1.	Screening of mulberry fruit yielding accessions for higher fruit yield and quality	Dr. P. Priyadharshini, Dr. V. Ulaganathan, Dr. A. Thangamalar,	Studying the reproductive descriptors of mulberry fruit yielding accessions and assessing the physico chemical characteristics of mulberry fruits	Mulberry accessions with potential for higher fruit yield and quality will be identified.
Theme 2. Mulberry Crop Management				
Theme Leader: Dr.T. Chitdeshwari, Professor (SS&AC)				
1.	Standardising micronutrients (Zn & Fe) foliar spray for enhanced leaf yield and quality in mulberry	Dr. T. Chitdeshwari, Dr. K.A. Murugesh,	Standardize the micronutrients (Zn & Fe) spray for improving leaf yield & quality of mulberry	Optimum Zn and Fe spray for increased leaf yield and quality will be standardized.
2.	Crop Management strategies for enhancing mulberry fruit yield	Dr. P. Priyadharshini, Dr. T. Chitdeshwari, Dr. P. Boominathan,	Optimizing the pruning schedules for induction of flowering and standardizing the fertilizer schedule and growth promoters for	The best pruning schedule, dose of fertilizers and growth promoters will be arrived for enhanced fruit setting and yield.

			enhancing the fruit set	
Theme 3. Mulberry Crop Protection				
Theme Leader: Dr. K. Senguttuvan, Assistant Professor (Entomology)				
1.	Investigation on Novel Insecticides with Minimum Residue Level for Mulberry Crop Protection	Dr. K. Senguttuvan, Dr. R. Aruna	Identifying Novel Modes of Action (MoA) insecticides for mulberry crop protection	Effective insecticide with novel mode of action will be identified for mulberry crop protection
2.	Studies on seasonal occurrence of leaf blight in mulberry and its management strategies	Dr. C. Ushamalini Dr. R. Aruna	Studying the severity of leaf blight in mulberry at different seasons and to identify effective fungicide for its management.	Identifying effective fungicide for leaf blight management
3.	Survey for insect pest incidence in major mulberry growing areas for pest forecasting	Dr. M. Senthilkumar	Assessing the diversity and intensity of mulberry pest and relate the effect of weather parameters on the incidence of insect pests	Forecasting the incidences of major pests in mulberry growing tracts
4.	Effect of seriwaste composts on pest and disease incidence in Mulberry	Dr. K. Senguttuvan Dr. C. Ushamalini, Dr. R. Shanmugam,	Studying the impact of seriwaste composts on pest and disease incidence in mulberry	The beneficial effect of seriwaste composts on pest and disease incidences in mulberry will be ascertained
Theme 4. Silkworm Crop Production				
Theme Leader: Dr. K.A. Murugesh, Professor (Sericulture)				
1.	Effect of different protein sources on growth of silkworm and cocoon yield	Dr. K.A. Murugesh, Dr. R. Shanmugam	Studying the effect of silkworm growth and cocoon parameters for better economic returns to the farmers.	Effective protein sources and dose of administration will be identified for better cocoon yield and raw silk quality

V. REMARKS

- Efforts may be taken to bring more area under forest in accordance with the Governments initiative on bringing 33% of area under forest cover through Green Tamil Nadu Mission (**Action**: Dept. of AF).

- The wild boar repellent developed at FC&RI may be evaluated with the repellent developed at ARS, Virinjipuram (**Action**: Dept. of FPU &WL).

- Clonal technology for mass multiplication of Naga chillies under controlled cultivation may be standardised (**Action**: Dept. of FPU &WL).

- Promising Teak clones may be identified for planting in the coconut plantations damaged by wilt (**Action**: Dept. of FB&TI).

- High Density Planting in neem may be standardized (**Action**: Dept. of S&NRM)

- Biochemical characterization of Neem germplasm may be carried out. Efforts may be taken to introgress genes responsible for faster growing to Neem to enhance growth rate (**Action**: Dept. of FB&TI/DCPMB&B).

- Seed Technologists may be involved in DUS characterization of tree crops. (**Action**: Dept. of S&NRM/DSS&T).

- The naval seed and pulp powder developed by FC&RI may be evaluated with the products available in the market. Nutritive profile of naval seed and pulp powder may be analysed (**Action**: Dept. of FB&TI/DCSC&RI).

- An empirical model of carbon sequestration may be developed for farm grown trees (**Action**: Dept. of S&NRM).

- RS & GIS and other modern tools may be employed for quick assessment of biomass of trees (**Action**: Dept. of S&NRM).
- Research on growth rate of trees under polluted environment may be taken up (**Action**: Dept. of S&NRM/DNRM).

- Data on income generated by farmers through multifunctional agroforestry models may be collected and documented (**Action**: Dept. of AF).

- Suitable trees may be identified for trees outside forest and popularized. Data on area of ToF in Tamil Nadu may be collected and documented (**Action**: Dept. of AF).

- Trees identified for containing pollution may be popularized in urban areas through KVKs (**Action**: Dept. of S&NRM/DNRM/DEE).

- The ratio of tree fodder pellets and economic viability for utilization may be standardized in association with Vet. Asst. Surgeons (**Action**: FPU &WL/Dept. of BSS/DCM).

- Efforts may be taken to popularize viable agro-forestry models through KVKs (**Action**: Dept. of AF/Dept. of BSS/All KVKs/DEE).

- The nutritive profile of mulberry fruits may be analysed and newer products may be developed (**Action**: Dept. of Sericulture/DCSC&RI).

- Characterization of mulberry germplasm may be carried out involving Plant Breeder (**Action**: Dept. of Sericulture/ Dept. of FB&TI).

- TNAU Bio G3 may be validated at lesser dose for mulberry pest management (**Action**: Dept. of Sericulture).

- Zinc and iron solubilizing microbes may be explored for increasing sericulture productivity (**Action**: Dept. of Sericulture/DNRM).

- All the scientists are encouraged to propose externally funded projects and publish articles in Scopus indexed journals / > 7 NAAS rated Journals (**Action**: All Scientists).

- Melia and Kapok based intercrop studies may to be conducted with TNAU varieties (**Action**: Dept. of AF).

VI. LIST OF PARTICIPANTS

S. No.	Name	Designation and Department
1.	Dr. M. Raveendran	Director of Research, TNAU, Coimbatore
2.	Dr. A. Balasubramanian	Dean, (Forestry)
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10.	Dr. D. Suresh Kumar	Director, CARDS, TNAU, Coimbatore
11.	Dr. A. Raviraj	Dean (Agrl. Engg.), AEC&RI, TNAU, Coimbatore
12.	Dr. S. Radhakrishnan	Prof. & Head, Dept. of Silvi. & NRM, FC&RI, MTP
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17.	Dr. K.T. Parthiban	Professor, O/o, Dean (Forestry), FC&RI, Mettupalayam
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