TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS

33rd Forestry and 14th Sericulture Scientists' Meet

(May 4-6, 2023)

LEAD CENTRE

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

Directorate of Research

Tamil Nadu Agricultural University
Coimbatore - 641 003

2023

PROCEEDINGS
33rd Forestry and 14th Sericulture Scientists' Meet
4-6 May, 2023

The 33rd Forestry and 14th Sericulture Scientists' Meet was held on 04.05.2023 and 06.05.2023 at Tamil Nadu Agricultural University, Coimbatore. The Technical review meeting was conducted on 04.05.2023 and 05.05.2023 at FC&RI, Mettupalayam and Dr. A. Balasubramanian, Dean (Forestry) reviewed the progress on University Research Projects, externally funded projects, Action Plans and Action taken on the recommendations of 32nd Forestry and 13th Sericulture Scientists' Meet.

The concluding session held on 06.05.2023 at Seminar Hall I was chaired by **Dr. V. Geethalakshmi**, Vice-Chancellor, TNAU, Coimbatore. The Vice Chancellor insisted on establishment of multi-functional forests in all KVKs. It was also suggested to study the bio-efficacy of the wild boar repellent prepared from Naga chillies (under protected cultivation) to mitigate Human wild boar conflicts. The need for promoting Trees outside forests as envisaged in the recent Agriculture Budget by Govt. of Tamil Nadu was also discussed.

Dr. M. Raveendran, Director of Research, TNAU, Coimbatore offered introductory remarks on Forestry and Sericulture research. It was insisted to take necessary steps to bring more area under forest in accordance with the Governments initiative on bringing 33% of area under forest cover.

Dr. A. Balasubramanian, Dean (Forestry) presented the action taken report on the recommendations of 32nd Forestry and 13th Sericulture Scientists meet, research highlights and action plan for the year 2023-24.

Dr. K. Subrahmaniyan, Director (TRRI) proposed the formal vote of thanks.

The proceedings of 33rd Forestry and 14th Sericulture Scientists' Meet are furnished under the following headings.

I. TREE IMPROVEMENT

A. ON FARM TRIAL

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

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			

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

Improved timber progenies

S. No.	Species	Superior genotypes
1.	Teak	FCRITK 28 & FCRITK 21
2.	Red Sanders	FCRIRS 16 & FCRIRS 10
3.	Thandrikkai (*Terminalia bellirica*)	FCRITB 03 & FCRITB 06
4.	Mahogany	FCRISM 07 & FCRISM 09

Based on their biometric attributes, physical and mechanical properties, the identified genotypes will be promoted to OFT

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

S. No.	Species	No. of genetic resources identified
1.	*Melia dubia*	28
2.	*Toona ciliata*	25
3.	*Chukrasia tabularis*	20
4.	*Khaya senegalensis*	17
5.	*Acacia* hybrid	12

The identified 5 different species will be promoted to OFT (5 Nos.)

4. Value chain on Plywood Agro forestry in Tamil Nadu
(Scientist-in-charge: Dr. K.T. Parthiban)
The screened *Melia dubia* clones of CW-17, CW-11, CW-12, CW-22 and CW-14 will be taken up for OFT (5 Nos.).

5. Improvement, Wood Quality Characterization and Utilization of pulpwood genetic resources amenable for Agroforestry
(Scientist-in-charge: Dr. K.T. Parthiban)

The identified promising clones of *Casuarina* (CJ 02, E-19A, E-13, CJ-01, A-02) and *Eucalyptus* (EH-4, ET-56, EH-01, EC-07, LBT, EG-09) will be promoted to OFT (5 Nos.).

MULTI LOCATION TRIAL

1. Evaluation of Saline/ Sodicity tolerant *Casuarina junghuhniana* clones (Scientist-in-charge: Dr. M. Murugesh)

Monitoring and data recording of sodicity tolerant clones of CJ3, CJ9 CJ15 CJ16 CJ17 and CJ18 at Madurai, Trichy, Thanjavur & Ramanathapuram as MLT studies will be continued.

2. MLT on *Ceiba pentandra* (Scientist-in-charge: Dr. M. Murugesh)

Clones: CP 28, CP 29, CP 30 and MTP 1. The trials will be laid out at Mettupalayam (Black soil), Periyakulam (Red laterite) and Vaigaidam (Red soil).

B. FOR INFORMATION AND ADOPTION

FOR INFORMATION

1. Promotion of natural dye yielding *Sapindus emarginatus*

Among the 30 CPT's assessed for Saponin content, KASE 28 (19.6 %), TNSE 27 (18.8 %) and TNSE 13 (18.6 %) expressed superiority in terms of saponin content. Hence these CPT's will be further used for tree improvement programme

2. Two Progeny Evaluation (Half-sib) for higher productivity in *Albizia lebbeck* L. (Benth.)

Growth parameters of *Albizia lebbeck* progenies at 50 months after planting were recorded. The identified best progenies will be utilized for further genetic improvement.
Among the 14 half-sib progenies of *Albizia lebbeck* L., the progenies from Kudumiyanmalai and Melapazhuvanchi observed higher growth parameters *viz*., height: 4.82 and 7.37cm; Girth: 35 and 32.33cm and volume: 3.436 and 2.413 meter square respectively at 50 months after planting. The identified best progenies will be utilized for further genetic improvement.

3. Enhancing seed yield in Neem (*Azadirachta indica* A.Juss.) through breeding and precision silvicultural approaches

Out of 37 progenies planted at Sivagangai, Tirunelveli and Cuddalore districts, KA CTD-17, KA MYS -01 and TN MTP-18 showed good yield (7 kg/tree). The study will be continued for another year to record the seed yield and azadirachtin content.

FOR ADOPTION

1. Varietal Development in Annatto (*Bixa orellana*) - TNBi 9

Seed yield per tree (kg)				Seed yield (t/acre)
I Year	II Year	III Year	IV Year	
2.548	1.455	2.185	1.98	0.93

TNBi 9 will be promoted for variety release

2. Tamarind domestication, conservation and deployment of genetic resources

The tamarind genotype FCRI-TAM-06 has recorded higher seed yield and seed gum yield. The pod yield of 9.05 kg/tree in 5 years and the gum yield (2.59 g/5 g of tamarind kernel powder) was found to be higher when compared to the check variety PKM 1. The Multi Location Trial has been completed.

3. Value chain on Plywood Agro forestry in Tamil Nadu

Eucalyptus urograndis (EG 09) which recorded 150 t/ha in four years with veneer recovery of 86 %, Holo-cellulose (76 %) and pulp yield of 48 % will be proposed for variety release.

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

S. No.	Project No. and Title No.	Name and designation of the Project Leader	Duration	Remarks
University Research Project				
1.	SEC/MTP/FB&TI/FOR/2022/001 Assessment of correlation between seed oil rancidity and shelf life of neem seedsas influenced by storage factors	Dr. R. Vijayan, Assoc. Prof. (SST)	Nov 2022 to Mar 2024	Methodology may be revised in consultation with Technical Director
2.	FCRI/KDM/FOR/2016/001 Progeny Evaluation for Higher Productivity in *Albizia lebbeck* L. (Benth.) for Dry Land Agroforestry System	Dr. P. Rajendran Professor (Forestry)	July 2016 to Mar 2023	The project period is over and the project may be closed
3.	FC&RI/PKM/FOR/2020/001- Progeny Evaluation in Kapak (*Ceiba pentandra* (L.) Gaertn.)	Dr. M. Murugesh Prof. & Head (Agroforestry)	May 2019 to Mar 2024	Project may be continued
EXTERNALLY FUNDED / ICAR PROJECTS				
1.	Enhancing seed yield in neem (*Azadirachta indica* A. Juss.) through breeding and precision silvicultural approaches	Dr. K. Kumaran Prof (Forestry)	2022-2025	May be continued
2.	AICRP/FOR/MTP/FOR/002 AICRP on Potential Crops	Dr. K. Kumaran Professor (Forestry)	Since 1982	The project to be continued

3.	GOI-DBT/FCRI/MTP/2022/R002 Biotechnological applications for development of HYSR clones amenable for Multifunctional Industrial utility	Dr. K.T. Parthiban Professor (Forestry)	April 2022to Mar 2025	The project may be continued
4.	ICFRE/FCRI/MTP/DOS/2020/ R002: Tamarind domestication, conservation and deployment of genetic resources for sustenance and livelihood amelioration	Dr. A. Balasubramanian Dean (Forestry)	01.03.2020 to 31.12.2025	The project may be continued
5.	AICRP/FOR/MTP/FOR/001 Assemblage of germplasm in *Ceiba pentandra* and *Melia dubia* Scheduled Caste Sub Plan (SCSP)	Dr. I. Sekar Professor (Forestry) Dr. K. Vaiyapuri Professor (Agronomy)	Continuous project since 1983	The project may be continued
6.	TNSLURB/HCRI/PKM/DFL/2022 / R002: Multiplication and Popularization of High-Density Short Rotation (HDSR) Saline/Sodicity tolerant *Casuarina junghuhniana* clones through On Farm Trials/ Multi-Location Trials in Tamil Nadu	Dr. M. Murugesh Professor & Head (Agroforestry)	2021-2025	The project may be continued
7.	TNPL/FCRI/MTP/AGF/2020/ R003 Improvement, Wood Quality Characterization and Utilization of pulpwood genetic resources amenable for Agroforestry	Dr. K.T. Parthiban Professor (Forestry) Dr. C. Cinthia Fernandaz Assoc. Prof. (Agrl. Ext)	Jan 2020 to Dec 2025	The project may be continued
8.	SMM/FCRI/MTP/FOR/2021/R001 Improvement, Utilization and Value addition of Timber genetic Resources	Dr. K.T. Parthiban Professor (Forestry)	April 2022 to Mar 2026	The project may be continued

D. ACTION PLAN (2023 - 2024)

Theme 1: Genetic Improvement and Varietal Development in prioritized NTFP species and Industrial wood species			
Theme leader	Dr. K. Kumaran		
Theme Activity	**Name of the Scientist and centre**	**Works to be carried out**	**Deliverable/ Expected outcome**
1. Genetic improvement and popularization of NTFP species	Dr. K. Kumaran Dr. R. Revathi Dr.P.S.Devanand Dr. R. Vijayan Dr. P.Radha Dr. K. Hemaprabha Dr. A. Balasubramanian Dr. M. Murugesh Dr. I. Sekar Centre: FC&RI, MTP	Collection, Assemblage and evaluation of dye yielding species, TBO's, fruit yielding tree sp., Floss and fibre yielding tree sp.	Superior genotypes of the targeted tree species will be developed in Bixa, Neem, Tamarind and Silk cotton
2. Molecular characterization and varietal protection of tree species	Dr. K.T. Parthiban Dr. A. Balasubramanian Dr. K. Hemaprabha Centre: FC&RI, MTP	1.Genetic diversity analysis / Phylogenetic relationship studies in the identified tree genetic resources. 2. DUS descriptors & developing PVP regulation for varietal protection in Trees	1. To establish the identity of accessions and to discern genetic relationship among the assembled genotypes. 2. Developing PVP varietal protection

			regulation for Trees species
3. Inventory and assemblage of industrial wood genetic resources	Dr. K.T. Parthiban Dr. R. Revathi Dr. P. Rajendran Dr. P. S. Devanand Dr. K. Hemaprabha Dr. A. Balasubramanian Dr. M. Murugesh Dr. I. Sekar Centre: FC&RI, MTP	i. Germplasm assemblage and screening of Industrial wood species ii. Development of HYSR clones for multi-utility through classical and molecular breeding iii. Mass multiplication and Multi location testing of identified genotypes	Superior genotypes (5 nos.) for multipurpose industrial utility will be developed.

Theme 2: Conservation of Forest Genetic Resources			
Theme leader	**Dr. R. Revathi**		
Theme Activity	**Name of the Scientist and centre**	**Works to be carried out**	**Deliverable/ expected outcome**
1. Assemblage and conservation of tree species	Dr. R. Revathi Dr. K. Kumaran Dr. S. Vennila Dr. R. Vijayan Centre: FC&RI, MTP	Continuing assemblage of ecologically important tree species	Conservation and maintenance of Forest genetic resources for further research and education activities
2. Phenological changes and physiological characterization of tree species in arboretum	Dr. R. Revathi Dr. K. Kumaran, Dr. P. Rajendran Dr. K. B. Sujatha Dr. R. Vijayan Centre: FC&RI, MTP	Continuing assessment of phenology and physiological characters of tree species will be evaluated	Phenological and physiological characters will be documented.

II. MANAGEMENT AND CONSERVATION

C. MULTILOCATION TRIAL

1. Management of teak root rot and sandal wilt using fungicides and biocontrol agents

(Scientists In-charge: Dr. C. Ushamalini, Dr. M. Sivaprakash and Dr. B. Sivakumar)

Experiment Details

Treatments

1. Seedling dip in Propiconazole (0.1%) + Soil application of *T. asperellum* @ 10g/ seedling at three months interval (three times) after planting
2. Farmers practice
3. Control

No. of replications : 7; Design of experiment : RBD

Observations to be recorded

1. Plant height
2. Disease Incidence
3. Microbial population

Locations

- Western zone : Farmer field at Coimbatore
- Southern Zone : Farmer field at Dindigul/ Thiruneveli Dt.
- Cauvery Delta Zone : Farmer's field at Trichy/ Tanjore Dt.

FOR INFORMATION AND ADOPTION

For Adoption

1. Fertigation in Teak (Up to three years)

- Irrigation level: 100 % PE and
- Fertilizer dose: 187:125:125 (N: P: K) kg/ha/year for 3 years plantation in western agroclimatic zone

2. **Host Management in Sandal**

A triple host technique was standardized for sandal.

Nursery host: *Alternanthra sessalis* (up to six months in nursery)
Transit host: *Sesbania grandiflora* (up to one year in the field)
Permanent host: *Casuarina equisetifolia*

3. Florigen Application for improving fruit yield in Tamarind

Genotypes	Treatments						
	Etherel 200 ppm	Etherel 500 ppm	Paclobu trazol 500 ppm	Paclobutr azol 1000 ppm	Mepiquat chloride 200 ppm	Mepiquat chloride 500 ppm	Untreated control
FCRI-TAM-06	4.16	3.73	9.05	3.02	2.22	0.81	0.10
FCRI-TAM-09	1.23	1.41	3.46	1.99	0.81	0.30	0.07
FCRI-TAM-03	0.54	0.77	1.93	0.87	0.46	0.25	0.05
FCRI-TAM-04	0.92	1.11	2.57	1.20	0.39	0.16	0.02
FCRI-TAM-08	2.51	6.22	5.49	2.41	1.26	0.51	0.22
PKM 1	1.85	2.24	5.42	2.49	1.07	0.74	0.29

Spraying of paclobutrazol 500 ppm improved the fruit yield (9.05 kg/tree) in five years old clonal tamarind genotype FCRI TAM 06 planted at an escapement of 3m x 3m under drip irrigated conditions.

4. Management of root knot nematode under agroforestry ecosystem

Soil Application of 2.5 kg *Purpureocillium lilacinum* + 250 kg FYM + Vermicompost 250 kg/ha and companion cropping with Marigold reduced the root knot nematode problem in Agroforestry

FOR INFORMATION

1. Management of wood boring beetles

- *Sinoxylon* sp. (Bostrychidae: Coleoptera) was the most dominant species accounting for 76.7% of the total abundance followed by *Lyctus* sp. (19.78%), *Dinoderus* sp. (2.19%) and *Scoltyus* sp. (1.31%)
- Borax 5 % treated blocks showed highest mortality (89.97 %) of *Lyctus* beetle and 90 to 100 % mortality in *Sinoxylon* sp. followed by the insecticide application.

2. Carbon storage

Ceiba pentandra (25.10 Kg/tree/year) followed by *Melia dubia* (10.65 Kg/tree/year) sequestrating higher Carbon. These species may be included as tree crop in agroforestry models

3. Suitable Inter Crops

- Cowpea is the best suitable intercrop under *Dalbergia sissoo* followed by *Melia dubia as* indicated by gas exchange and yield parameters.
- Fodder sorghum showed better performance under *Casuarina* compared to cowpea

S. No.	Tree Crop	Inter Crop	Yield (Kg/ha)
1.	*Dalbergia sissoo / Melia dubia*	Cowpea CO (CP) 7	923.33/865.00
2.	*Casuarina equisetifolia*	Fodder sorghum CO 37	16.2 tonns/ha/cut

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

S. No.	Project Number and Title	Name and Designation of the Project leader	Duration	Remarks
University Research Project				
1.	CPPS/MTP/ENT/2019/01Bio-ecology, taxonomy and management of wood boring *bostrychid* beetles and its associated natural enemies in wood stored in depot	Dr. G. Asokan, Prof. (Agrl. Entomology)	01.08.2019 to 31.08.2022	Project may be closed
2.	CPPS/MTP/ENT/2020/01 Documentation of bee flora and foraging behaviour of *Apiscerana indica* f. and *Apis mellifera* (Hym: Apidae) in Mettupalayam area	Dr. G. Asokan, Prof. (Agrl. Entomology)	01.08.2019 to 31.08.2022	Project may be closed
3.	CPPS/MTP/ENT/2020/02 Biodiversity studies on Oribatid mites (*Crypto stigmatids*) in districts of Tamil Nadu, utilization for decomposition of farm waste and bio agent tool	Dr. G. Asokan, Prof. (Agrl. Entomology)	01.04.2020 to 31.08 2022	Project may be closed
4.	CPPS/MTP/PAT/2020/002 Development of management practices for the nursery diseases of forest trees (teak and sandal)	Dr C. Ushamalini, Prof. (Plant Pathology)	01.10.2020 to 31.03.2023	Project may be extended for one more year. More replications may be taken up in Multi locations
5.	FCRI/MTP/FOR/2021/002 Biodiversity studies of massive tree planting forest area in scrub jungle vegetation	Dr. K.R. Ramesh Assoc. Prof. (Forestry)	01.02.2021 to 31.12.2023	Project need to be completed in time
6.	FOR/MTP/SIL/FOR/2022/ 001 Standardizing precision silvicultural techniques for *Enterolobium cyclocarpum* clones for multiple utility.	Dr. M. Sivaprakash Assoc. Prof. (Forestry)	01.04 2022 to 31.03 2025	Nutritive value to be assessed. Yield in multiple locations need to be recorded
7.	HCRI/MTP/HOR/VEG/2019/001 Evaluation of Vegetable Cluster bean genotypes under *Melia dubia* based ecosystems	Dr. P. Hemalatha Assoc. Prof. (Hort.)	Oct. 2019 to Sep. 2022	Completion report submitted. Approval awaited.
8.	DCM/MTP/CRP/2021/001Studies on light use efficiency and associated physiological traits under different agroforestry systems	Dr. P. Boominathan, Prof. (CRP) Dr. K. Ramah, Assoc. Prof. (Agron.)	Feb. 2021 to Oct. 2022	Completion report may be submitted
9.	FCRI/YCD/FOR/2020/001 Introduction and evaluation of alternate industrial wood species for coffee-based agroforestry system	Dr. M. Kiruba Asst. Prof. (Forestry)	Jan 2021 toDec 2025	Project may be continued

Externally funded / ICAR Project				
1.	IINRG/FCRI/MTP/DOS/2014/R002 Network project on "Harvesting, processing and value addition of natural resins and gums" - Tamarind seed gum	Dr. A. Balasubramanian Dean (Forestry)	01.08.2014 to 31.03.2023	The project may be continued
2.	PPV/FOR/MTP/SIL/2009/R001 Distinctiveness, Uniformity and Stability (DUS) test centre for Neem, *Karanji* and *Jatropha* under PPV & FR Authority at FC&RI, TNAU, MTP	Dr. A. Balasubramanian Dean (Forestry)	01.08.2021 to 31.07.2023	The project may be continued
3.	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)	01.03.2020 to 31.12.2025	The project may be continued

D. ACTION PLAN (2023 - 2024)

Theme 1: Silviculture for Greening			
Theme leader	**Dr. A. Balasubramanian, Dean (Forestry)**		
Theme Activity	**Name of the Scientist and centre**	**Works to be carried out**	**Deliverable/ expected outcome**
Precision silvicultural techniques for farm grown trees	Dr. A. Balasubramanian Dr. S. Radhakrishnan Dr.B. Sivakumar Dr.C. Ushamalini Centre: FC&RI, MTP	Mandatory species *Tectona grandis* *Enterolobium cyclocarpum* *Terminalia bellirica* ✓ Scheduling of irrigation and nutrient ✓ Assessment of yield biometry ✓ Monitoring and management of Diseases	Precision silviculture techniques for the mandatory crops will be developed to meet the farmers/Tree growers requirements
Growth and Yield assessment of farm grown trees	Dr. S. Radhakrishnan Dr P. Kumar Centre: FC&RI, MTP Dr. K.R. Ramesh Centre: ADAC&RI, TRY M. Sivaprakash Centre:AC&RI,KKM	Mandatory species Teak Mahogany Kadam ✓ Estimation of Growth biometry of farm grown trees in different agro climatic zones of Tamil Nadu	Agro climatic influence on growth and yield of farm grown trees will be assessed
Technology transfer and multi locational testing of precision technologies	Dr. A. Balasubramanian Dr. S. Radhakrishnan Dr. B. Sivakumar Dr. P. Kumar Centre: FC&RI, MTP Dr. K.R. Ramesh Centre: ADAC&RI, TRY Dr. M. Sivaprakash Centre: AC&RI,KKM	✓ 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 Silviculture & NRM)		
Theme Activity	**Name of the Scientist and centre**	**Works to be carried out**	**Deliverable/ expected outcome**
Eco-restoration and regeneration	Dr. S. Radhakrishnan Dr. K. Suganya Dr. B. Sivakumar Centre: FC&RI, MTP	✓ Choice of species for restoration ✓ Biodiversity studies ✓ Carbon sequestration studies	Restoration of degraded lands through tree planting
Air pollution monitoring and abatement through trees	Dr. K. Suganya Dr. P. Kumar Centre: FC&RI, MTP	✓ Pollution monitoring in tree-based ecosystem ✓ Tree based pollution abatement ✓ Urban pollution monitoring and abatement	Status of air quality will be assessed and tree species will be screened for air pollution abatement

Theme 3: Designing, Developing and Popularizing Agroforestry Models			
Theme Leader	Dr. I. Sekar , Professor (Forestry)		
Theme Activity	**Name of the Scientist and centre**	**Works to be carried out**	**Deliverable/ expected outcome**
1. Multifunctional Agroforestry model	Dr. R. Jude Sudhagar, DARS, Chettinad Dr. S. Vennilla, AC&RI, VVNR	Designing and establishment of Multifunctional Agro-forestry model for dry lands at DARS, Chettinad and AC&RI, Vazhavachanur	Suitable Agro-forestry models will be developed for dry land ecosystem
2. Silviagricultural and Silvifloriculture models	Dr. I. Sekar, FC&RI, MTP Dr. K. Vaiyapuri, FC&RI, MTP Dr. M. Murugesh P&H, DAF, FC&RI MTP.	❖ Evaluation of suitable agricultural inter crops under Teak /Mahogany /Gmelina/ Melia/ Toona based Agroforestry system ❖ Evaluation of different medicinal plants under *Melia dubia* based Agroforestry system ❖ Introduction and evaluation of high yielding pulses/millets under kapak / *C. junghuhniana* progenies and clones ❖ Designing and establishment of economically viable Gmelina *arborea based Silvifloriculture model*	❖ Profitable inter crops suitable for tree species will be incorporated ❖ Silvifloriculture model comprising of *Gelina arborea, Michali sempaka* and *Jasminnum grandifloram* ❖ Increased farm income

Theme 4: Tree Fodder studies and development of concentrate feed			
Theme leader:	**Dr.K.Vaiyapuri, Professor(Agronomy)**		
Development of tree fodder-based animal feed concentrate	Dr. K. Vaiyapuri, FC&RI, MTP	❖ Nutrient fortified animal feed formulations will be developed by using the screened superior fodder trees + Grass fodder + Legumes + Oil cakes + Minerals ❖ Palatability studies ❖ Economic analysis with existing feed	➢ Supplement feed for animals ➢ Sustainable availability to the farmers

Theme 5: Quantification of Environmental Services of Agroforestry			
Theme Leader: Dr. M. Murugesh, Professor and Head (Agroforestry)			
Carbon sequestration assessment of important Agroforestry trees	Dr. M. Murugesh P&H, DAF FC&RI MTP	❖ Non-Destructive method assessment	❖ Carbon sequestration potential of important agro-forestry trees would be identified
Economic analysis of Agroforestry systems	Dr. M. Murugesh P&H DAF Dr. S. Varatharaj P&H - DBSS FC&RI, MTP	❖ Major Agroforestry models – Economic analysis	❖ High economic output agroforestry models will be recommended to farmers

III. VALUE ADDITION AND BUSINESS DEVELOPMENT

A. ON FARM TRIAL

Testing the bio -efficacy of Wild boar repellent to mitigate Human Wild boar conflicts
Scientist in charge: Dr. K. Baranidharan, Professor and Head

Location: Field trials of TNAU, Coimbatore
Farmers field at Tholampalayam
Farmers field at Sirumugai

T_1 – 100 % Plant combinations
T_2 - 100 % Naga chilli
Observations *viz.,* animal intrusions, plant damage percentage and frequency of visit

B. FOR INFORMATION

1. The medicinal tree species *viz*., *Terminalia chebula, Terminalia bellirica and Eucalyptus ficifolia* and the products developed from these species could be used in various pharmaceutical, cosmetics, tannin and various other industries.
2. *Albizia lebbeck, Morus alba, Swietenia mahagoni* and *Thespesia populnea* species and along with other nutrient ingredients-based animal pellets are having significant impact on weight gain of goats.
3. *Sambrani* and Mosquito repellents developed from Elephant dungs is an alternative livelihood options for the Indigenous community in and around Elephant Camps.

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

S. No.	Project Number and Title	Name and designation of project leader	Duration	Remarks
1.	FC&RI / MTP / FOR / TREE / 2021 / 001 Studies on Ethno-medicinal knowledge and phytochemistry of important medicinal trees in Nilgiris	Dr. S. Manivasakan	Apr. 2021 to Feb.2023	Project completed. The Completion report may be submitted

2.	FCRI/MTP/FOR/2021/001 Isolation and Characterization of Exudate gum of important native gum yielding trees	Dr. R. Ravi Dr. P. Radha	Jan. 2021 to Dec. 2022	Project completed. The Completion report may be submitted
3.	CARDS/MTP/ARM/2021/001 Performance analysis of Packing Case Industries in Coimbatore District, Tamil Nadu	Dr. S. Selvanayaki	Jan. 2021 to Dec. 2022	Project completed. The Completion report may be submitted
4.	CPMB/FC&RI/MTP/FOR/2021/001 Biochemical Profiling of Eco-friendly Natural Dye from Roselle (*Hibiscus sabdariffa L.)* and *Kadukkai* (*Terminalia chebula*) for industrial applications	Dr. P. Radha	May, 2021 to April, 2023	Project completed. The Completion report may be submitted
5.	AICRP/DCM/MTP/AGR/2021/001 Evaluation of tree fodders through feed pelletization for improving livestock productivity	Dr. K. Ramah	Jan 2021 to Dec 2022	Project completed. The Completion report may be submitted
6.	FC&RI/MTP/FPW/FOR/2023/001 Developing and validation of Elephant dung based *Agarbatti*	Dr. I. Sekar Dr. M.P. Divya Dr. R. Ravi	April 2023 To March 2024	Work is in progress and the project may be continued
External Funded Schemes				
1.	FCRI/MTP/TFDP/2022/R001 Studies on Suitability of bamboos for biochar, activated carbon, fodder pellets and briquettes.	**PIs** Dr. M.P. Divya Dr. R. Ravi **Co-PIs** Dr. K.T. Parthiban Dr. I. Sekar Dr. K. Baranidharan Dr. P. Hemalatha	April 2022 to Mar 2024	Work is in progress and the project may be continued
2.	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"	**PI** Dr. K. Baranidharan **Co PIs** Dr. M.P. Divya Dr. R. Ravi Dr. M. Viyabhama Dr. S. Selvanayaki	April 2022 to Oct 2023	Work is in progress and the project may be continued
3.	Assessing the Natural Resources of a Forest Ecosystem: A Comprehensive Study of Soil, Vegetation, and Non-Timber Forest Products in Dindigul Forest Division	**PIs** Dr.K.Baranidharan Dr.R. Ravi **Co-PIs** Dr. M. Viyabhama Dr. S. Selvanayaki Dr. M. Tilak Dr. R. Rajeswari	April 2023 to Mar 2024	Work is in progress and the project may be continued
4.	CIAF/FCRI/MTP/AGF/2016/R 004 Consortium of Industrial Agroforestry (CIAF)	Dr. K.T. Parthiban Dr. P. Rajendran Dr. R. Jude Sudhagar	Since April 2015	Work is in progress and the project may be continued
5.	Establishment of facilitation centre for strengthening of value chain process in agroforestry sector	Dr. I. Sekar Professor (Forestry)	2022-26	Project may be continued
6.	A value chain on Dendro-biomass energy resources	Dr. I. Sekar Prof. (Forestry)	2022-26	Project may be continued

D. Action Plan 2023-2024

Theme 1. Value Addition in Wood and Non-Timber Forest Products

Theme Leader: Dr. R. Ravi, Assistant Professor (Forestry)				
S. No.	**Action Plan/ Activity**	**Name of the Scientist and centre**	**Work to be carried out**	**Deliverables /expected outcomes**
1.	Bamboo Residue based value added products	Dr. M.P. Divya Professor (Forestry) Dr. R. Ravi Asst. Prof. (For.) Centre: FC&RI, MTP	Development and characterization of energy properties of bamboo residue-based briquettes. Analyzing the nutritive value in bamboo leaves and production of fodder pellets. Assessing the nutritive parameters in fodder pellets and studying the palatability and digestibility of fodder pellets with ruminants	Bamboo residue-based briquettes and fodder pellets will be developed for industrial utility
2.	Value addition in Elephant Dungs	Dr. I. Sekar Professor (Forestry) Dr. M.P. Divya Professor (Forestry) Dr. R. Ravi Asst. Prof. (For.) Centre: FC&RI, MTP	Development and validation of Elephant dung based *Agarbatti*	Elephant dung based *Agarbatti* will be developed for commercial utility.

Theme 2. Wildlife Management

Theme Leader: Dr. K. Baranidharan, Prof. & Head (FPW)				
S. No.	**Action Plan/ Activity**	**Name of the Scientist and centre**	**Work to be carried out**	**Deliverables /expected outcomes**
1.	Mitigation Measures for Man Animal Conflicts	Dr. K. Baranidharan Prof. & Head (FPW)	Testing the efficacy of the plant based wild boar repellent through OFTs	Plant based wild boar repellent will be developed and promoted
2.	Biodiversity Assessment in restored landscapes	Dr. K. Baranidharan Prof. & Head (FPW) Dr. R. Ravi Asst. Prof. (For)	Ecological Impacts of Mine spoil afforestation programs on Avian Diversity of Neyveli Lignite Corporation India Limited	Influence of mine spoil plantations on avian diversity Recommendation for choice of tree species to improve the habitat
3.	Biodiversity Assessment in different landscapes		Biodiversity assessment of Dindigul Forest Division Biodiversity Indices	Documentation of baseline biodiversity data will be used for writing Forest working plan and effective management

IV. SERICULTURE

A. ON FARM TRIAL

1. Evaluation of "NutriStick" organic growth promoter for Mulberry cuttings

Scientist in charge: Dr. R. Shanmugam, Assistant Professor (Seri.)
Location 1: Government Farm, State Dept. of Sericulture at Masinagudi, The Nilgiris
Location 2: Mulberry Nursery at T.N. Palayam, Sathyamangalam, Erode
Location 3: Commercial Mulberry Nursery at Thungavi, Udumalpet, Tiruppur
T_1 - 1 pellet of Nutristick for four cuttings
T_2 -Farmer's practice
Replications: 13

Observations *viz.,* root initiation (%), survival rate (%), rooting percentage (%), root length (cm), shoot length (cm), no. of leaves per plant, nursery duration and benefit cost ratio will be worked out

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

Scientist in charge: Dr. K. A. Murugesh, Assistant Professor (Seri.)

Locations: FC&RI, Mettupalayam
T1 - Glycine 10 ppm + Alanine 100 ppm + Serine 100 ppm
T2- Farmer's Practice

- Benefit cost ratio for application of amino acid mixture is 2.05 as against 1.91 for farmers' practice
- Amino acid mixture will be made available in Sachet
- One sachet contains 1.05 g of amino acid mixture
- Cost: Rs. 6.50/sachet
- Application: Dissolve 1 sachet in 5 litres of water, spray on mulberry leaves and feed 100 dfls of 5^{th} instar silkworm larvae daily once in the morning, for six days.
- Shelf-life studies have to be continued.

B. FOR INFORMATION

Crop improvement

- Mulberry accession, MI-0532 recorded highest number of branches per plant (10 branches /plant), MI-0670 exhibited longest shoot length (267.56 cm) followed by MI-0790 (258.40cm). Maximum leaf area was recorded in ME-0169 (289.65cm^2) and 100 leaves weight was recorded maximum in MI-0252 (823.38g). MI-0665 (*M. latifolia*) recorded high moisture content (76.94%) and leaf yield per plant (1279.20 g)

Crop Management

Effect of foliar spray on biometric and yield characters of *Morus sinensis*

EM @ 1% significantly enhanced the different biometric parameters of mulberry such as shoot length, internodal length, no. of shoots/plant and no. of leaves/shoot by 25.71, 13.48, 17.31 and 27.85 per cent, respectively on 30th DAP; 28.20, 15.33, 20.00 and 29.03 per cent, respectively on 45th DAP and, 41.77, 16.59, 22.33 and 30.00 per cent, respectively on 60th DAP over the absolute control.

Effect of seri vermicompost on growth and yield parameters on mulberry and Silkworm

- Seri-vermicompost @ 400 g/plant + 100 % RDF *+ Trichoderma asperellum* @ 2.5 kg/ha/year significantly increased the yield parameters of both mulberry (G4 variety) and silkworm recorded better mulberry growth and yield parameters *viz.,* shoot length (160.4 cm), number of branches per plant (13.3), number of leaves per branch (35.2), internodal length (6.81 cm), 100 leaves weight (385.0 g) and leaf yield (11555 kg/ha/harvest) followed by T11 - Seriwaste compost @ 400 g/plant +100 % RDF + *Trichoderma asperellum* @ 2.5 kg/ha/year.
- Treatment also recorded the better silkworm (Double Hybrid) economic parameters *viz.,* larval weight (3.91 g), cocoon weight (2.17 g), shell weight (0.50g), shell ratio (23.04 %) compared to control (3.00 g, 1.45g, 0.17g,11.72%).

Crop Protection

Arthropod diversity and insect pest intensity in mulberry under forestry and agroforestry ecosystems

- No variety showed multiple resistance to insect pests. Under both ecosystem MR2 was tolerant to Leaf webber. Considering the high yielding varieties, G4 was more tolerant to both leaf webber and pink mealy bug. V1 was more tolerant to thrips.
- Irrespective of varieties and ecosystem, rainfall and RH had positive correlation with incidence of leaf webber. Temperature, RH and wind velocity had significantly positive correlation with incidence of pink mealybug.
- Rainfall had negative association and wind velocity had positive association with incidence of thrips. Peak period of occurrence varies with the pests. However, all the key pests were found throughout the year depending on the climatic factors.

Value Addition

Mulberry fruit extract of MR2 possess stronger antioxidant activity than ascorbic acid (standard) which could be exploited for commercial natural antioxidants in food, pharmaceutical and cosmetic industries.

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

Department	Centre	URP	AICRP	External funded project	Total
Sericulture	FC&RI	7	-	-	07

S. No.	Project Number and Title	Name and designation of project leader	Duration	Remarks
1.	CPPS/MTP/SER/2020/001 Development of package of practices for tree type Mulberry	Dr. S. Susikaran, Asst. Prof. (Seri.)	May 2020 to Apr. 2023	Completion report may be submitted
2.	CPPS/MTP/PAT/2020/001 Development of IDM Package for the Management of Root Rot Complex of Mulberry incited by *Lasiodiplodia theobromae* and *Macrophomina phaseolina*	Dr. N. Indra, Assoc. Prof. (Pl. Patho.)	July 2020 to June 2023	Project may be completed
3.	CPPS/MTP/SER/FOR/2021/001 Arthropod diversity and insect pest intensity in mulberry under forestry and agro forestry eco systems	Dr.S. Manimegalai Professor (Agrl.Entomology)	March 2021-February 2023	Completion report may be submitted
4.	CPPS/MTP/SER/FOR/2021/002 Studies on seri-composting on soil properties, mulberry leaf quality and sericultural parameters of silkworm	Dr. R. Shanmugam Assistant Professor (Sericulture)	June 2021-May 2023	Project may be completed
5.	CPBG/MTP/SERI/SERI/2021/001 Breeding for sustainable growth and leaf yield in mulberry	Dr. P. Mangammal Assistant Professor (Sericulture)	Nov-2021 – Oct- 2024	Project may be continued
6.	CPPS/MTP/SER/FOR/001 Development and evaluation of high value fruit-based food products from different mulberry varieties	Dr. P. Priyadharshini, AP (Sericulture) Dr. P. Geetha, Prof. (FSN), CPHT, AEC&RI, TNAU, CBE	Oct- 2021 – Sept- 2023	The project may be continued
7.	CPPS/MTP/SER/FOR/002 Effect of organic foliar sprays on the qualitative and quantitative attributes of mulberry and silkworm	Dr. K.A. Murugesh Assoc. Professor (Sericulture)	Nov- 2021 – Oct- 2023	The project may be continued

D. Action Plan 2023-2024

Theme 1. Crop Improvement

Theme Leader: Dr. P. Mangammal, Assistant Professor (Sericulture)				
S. No.	**Action Plan/ Activity**	**Name of the Scientist and centre**	**Work to be carried out**	**Deliverables /expected outcomes**
1.	Screening of mulberry germplasm accessions for abiotic and biotic factors	Dr. P. Mangammal Asst. Prof. (Sericulture)	Evaluation of identified pest and disease tolerant germplasm accessions for leaf yield and economic parameters of silkworm	Pest and disease resistant mulberry accessions will be identified

Theme 2. Crop Management/Protection

Theme Leader: Dr. K.A. Murugesh, Professor (Sericulture)				
S. No.	**Action Plan/ Activity**	**Name of the Scientist and centre**	**Work to be carried out**	**Deliverables /expected outcomes**
2.	Standardizing the inorganic and organic source of nitrogen for mulberry leaf yield	Dr. J. Balamurugan Assistant Professor (SS&AC)	75 per cent of Nitrogen (Urea) will be supplied through inorganic source and 25 per cent Nitrogen supplied through organics (Farm Yard Manure, Vermi compost and Seri waste compost	Effective organic source will be identified for 25 % substitution of N in recommended dose of fertilizers for mulberry
3.	Supplementation of *Spirulina* to silkworm for enhancing cocoon productivity	Dr. K.A. Murugesh Professor (Sericulture)	Feeding of silkworm larvae with spirulina treated mulberry leaves to identify minimum effective concentration Observation on larval growth, development and cocoon economic traits	Enhancement of cocoon yield

Theme Leader: Dr. S. Manimegalai, Professor and Head				
S. No.	**Action Plan/ Activity**	**Name of the Scientist and centre**	**Work to be carried out**	**Deliverables /expected outcomes**
4.	Identification of alternate insecticide molecule and botanical for management of key pests of mulberry	Dr. S. Manimegalai Professor (Agrl. Entomology)	Testing the bio-efficacy of newer insecticide molecules and botanicals against leaf webber and thrips	Newer insecticide molecule and botanical will be identified in place of Dichlorvas (Recommended insecticide for mulberry and banned) for management of key pests of mulberry

Theme 3. Value Addition in Sericulture

Theme Leader: Dr. P. Priyadharshini, Assistant Professor (Seri.)				
S. No.	**Action Plan/ Activity**	**Name of the Scientist and centre**	**Work to be carried out**	**Deliverables /expected outcomes**
5.	Value addition to plant residues of mulberry	Dr. P. Priyadharshini Assistant Professor (Seri.) Dr. K.T. Parthiban Professor (Forestry)	Utilization of left-over mulberry shoot for briquette/pellet/carbon/other industrial utility	Alternate energy source with high acceptable energy values Identification of new and alternate business enterprise Development of wealth from waste through new bio products

Theme 4. Non-Mulberry Sericulture

Theme Leader: Dr. R. Shanmugam, Assistant Professor (Seri.)				
S. No.	**Action Plan/ Activity**	**Name of the Scientist and centre**	**Work to be carried out**	**Deliverables /expected outcomes**
6.	Evaluation of Tasar silkworm ecoraces for its suitability to Tamil Nadu	Dr. R. Shanmugam, Assistant Professor (Seri.)	Screening of different Tasar silkworm eco races for their suitability to Tamil Nadu conditions Growth and economic parameters will be studied	Superior Tasar silkworm eco races for Tamil Nadu conditions will be identified

V. REMARKS

- Efforts may be taken to promote Trees outside forests (**Action**: Dept. of Agroforestry and Silviculture and Natural Resource Management)
- Research on carbon Sequestration potential of trees may be prioritized (**Action**: All Departments, FC&RI, MTP)
- Mulberry germplasm may be strengthened and attempts may be made to widen the genetic base (**Action**: Dept. of Sericulture))
- Multi-functional agroforestry models may be established in all KVKs (**Action**: Dept. of Agroforestry and Basic and Social Sciences/Prog. Coordinators of all KVKs/DEE)
- Suitable management practices for the control of Wild boar problems in Farm lands may be developed. Bio-efficacy of wild boar repellent from Naga chillies (under protected cultivation) may be studied (**Action**: Dept. of Forest Products and Wildlife)
- All the scientists are encouraged to propose externally funded projects and publish articles in Scopus indexed journals / > 7 NAAS rated Journals (**Action**: All Scientists)

VI. List of participants

S. No.	Name	Designation and Department
1.	Dr. A. Balasubramanian	Dean (Forestry), FC&RI, Mettupalayam
2.	Dr. R. Revathi	Professor and Head (FB&TI), FC&RI, Mettupalayam
3.	Dr. M. Murugesh	Professor and Head (AF), FC&RI, Mettupalayam
4.	Dr. S. Radhakrishnan	Professor and Head (Silviculture & NRM), FC&RI, MTP
5.	Dr. S. Varadha Raj	Professor and Head (BSS), FC & RI, Mettupalayam
6.	Dr. K. Baranidharan	Professor and Head (FP&W), FC & RI, Mettupalayam
7.	Dr. S. Manimegalai	Prof. and Head, Dept. of Sericulture, FC&RI, MTP
8.	Dr. K.T. Parthiban	Professor (Forestry), FC & RI, Mettupalayam
9.	Dr. K. Kumaran	Professor (Forestry), FC & RI, Mettupalayam
10.	Dr. A. Christopher Lourduraj	Professor (ENS), Directorate of Research, TNAU, Cbe
11.	Dr. M.P. Divya	Prof. (Forestry), Directorate of Research, TNAU, Cbe
12.	Dr. C. Babu	Professor (PBG), Directorate of Research, TNAU, Cbe
13.	Dr. N. Manikanda Boopathi	Prof. (Bio Tech.), Directorate of Research, TNAU, Cbe
14.	Dr. N. Balakrishnan	Prof. (Agrl. Ento.), Directorate of Research, TNAU, Cbe
15.	Dr. I. Sekar	Professor (Forestry), FC&RI, Mettupalayam
16.	Dr. R. Jansi Rani	Professor (Agrl. Extn), FC&RI, Mettupalayam

17.	Dr. K. Vaiyapuri	Professor (Agronomy), FC&RI, Mettupalayam
18.	Dr. P. Rajendran	Professor (Forestry), FC&RI, Mettupalayam
19.	Dr. S. Umesh Khanna	Professor (Forestry), DPM, TNAU, Coimbatore
20.	Dr. R. Jude Sudhagar	Professor (Forestry), DARS, Chettinad
21.	Dr. C. Ushamalini	Professor (Plant Pathology), FC&RI, Mettupalayam
22.	Dr. K.A. Murugesh	Professor (Sericulture), FC&RI, Mettupalayam
23.	Dr. P. Boominathan	Professor (CRP), Dept. of Crop Physiology, TNAU, Cbe
24.	Dr. S. Selvanayaki	Assoc. Professor (ARM), FC&RI, Mettupalayam
25.	Dr. M. Sivaprakash	Assoc. Prof. (Forestry), Dept. of Horti., AC&RI, Killikulam
26.	Dr. K.R. Ramesh	Assoc. Prof (Forestry), ADAC&RI, Trichy
27.	Dr. M. Tilak	Assoc. Professor (Agrl. Micro.), FC&RI, Mettupalayam
28.	Dr. P.S. Devanand	Assoc. Professor (PBG), FC&RI, Mettupalayam
29.	Dr. R. Vijayan	Assoc. Professor (Seed Tech.), FC&RI, Mettupalayam
30.	Dr. K. Suganya	Assoc. Professor (ENS), FC&RI, Mettupalayam
31.	Dr. K. Hemaprabha	Assoc. Professor (Biotechnology), FC&RI, Mettupalayam
32.	Dr. N. Indra	Assoc. Prof. (Plant Patho.), HC&RI, Cbe
33.	Dr. P. Hemalatha	Assoc. Professor (Horti), ARS, Bhavanisagar
34.	Dr. K. Ramah	Assoc. Professor (Agronomy), ARS, Bhavanisagar
35.	Dr. S. Manivasakan	Assistant Professor (Forestry), KVK, Ooty
36.	Dr. J. Balamurugan	Assistant Professor (SS&AC), FC&RI, Mettupalayam
37.	Dr. K.B. Sujatha	Assistant Professor (CRP), FC&RI, Mettupalayam
38.	Dr. R. Ravi	Assistant Professor (Forestry), FC&RI, Mettupalayam
39.	Dr. S. Vennila	Assistant Professor (Forestry), AC&RI, Vazhavachanur
40.	Dr. P. Kumar	Assistant Professor (Forestry), FC&RI, Mettupalayam
41.	Dr. B. Sivakumar	Assistant Professor (Forestry), FC&RI, Mettupalayam
42.	Dr. P. Priyadharshini,	Assistant Professor (Sericulture), FC&RI, Mettupalayam
43.	Dr. R. Shanmugam	Assistant Professor (Sericulture), FC&RI, Mettupalayam
44.	Dr. P. Mangammal	Assistant Professor (Sericulture), FC&RI, Mettupalayam

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