1. **Project Title and Code** : **Studies on genetic variability, reproductive biology, and optimization of nursery and propagation techniques of *Diospyros ebenum* and *Xylia xylocarpa* (Phase-I) (RP 192/2023-2028)**

2. **Name of the Principal Investigator** : Dr. Archana, R., Scientist-C, GTI
3. **Date of start & duration** : May 2023 -2028 (05 Years)
4. **Total Budget** : Rs. 26.00 lakhs

5. Main Objectives

1. Collection and assessment of morpho-metric variability present in natural populations and assemblage of germplasm of *D. ebenum,* and *X. xylocarpa*.
2. Studies on reproductive biology and breeding behaviour of *X. xylocarpa*.
3. Standardization of seed and propagation techniques, and establishment of germplasm bank in *D. ebenum,* and *X. xylocarpa*.
4. Assessment of genetic diversity, population structure and identify adaptive genetic hotspot areas for conservation using molecular markers.
5. Establishment of germplasm of *D. ebenum,* and *X. xylocarpa* under Agroforestry/farm forestry system.

6. Outline of Research programme (yearly plan of action)

Year	Activity
First year	• Collection of information on species distribution from Herbarium, literature, etc. • Survey the native forests of selected states (TN, KA, KL, AP -*X. xylocarpa* and TN, KA, KL, AP, A&N-*D. ebenum*) • Identification and marking CPTs of *D. ebenum and X. xylocarpa.* • Optimization of selection criteria for selecting CPTs • Selection of CPTs from selected states of India based on DBH class and other morphological parameters. • Collection of leaves and seeds of two species from the marked CPTs.
Second year	• Study of reproductive phenology of *X. xylocarpa* • Flowering and fruiting phenology, pollination visitors, anthesis time, pollen viability and pollen tube germination tests will be conducted in all selected populations • Crossing and selfing, seed set ratio and barriers to seed set will be studied. • Optimization of Propagation and other nursery techniques. • Conduct of cytological work (mitosis slide observations)

Third year	• Assessment of morphological variability using leaf and seed variations among the selected populations using Image analyser and Data analysis using Genstat for analyzing spectra of morphological diversity. • Study of reproductive phenology of *X. xylocarpa* • Establishment of base population/ germplasm banks. • Collection of leaf and DNA will be isolated using standard CTAB procedure.
Fourth year	• Introducing species for Agroforestry and farm forestry systems. • Assessment of genetic variability exists among the populations using DNA markers/Transcriptomic sequencing.
Fifth year	• Maintenance of germplasm bank in different locations. • Data collection & analysis. • Report preparation and submission.

7. Progress of the project in brief:

- 09 CPTs of *Diospyros ebenum* were identified in the Kolli hills of Tamil Nadu. Passport data and GPS coordinates were recorded for these selected trees.
- 5 kg of seeds of *D. ebenum* were collected from the selected CPTs located in the Anamalai Tiger Reserve (ATR) of Tamil Nadu.
- Morphometric variations among leaves, fruits, and seeds of *D. ebenum* were documented using an image analyser, providing quantitative data on the species' phenotypic characteristics.
- Leaf skeletonizers have been recorded on *D. ebenum* CPTs in the Anamalai Tiger Reserve (ATR) region. These insects typically feed on the leaf tissue, leaving behind the skeletal structure of the leaf veins.
- Growth data from nursery seedlings of *D. ebenum* raised in the SFM nursery at IFGTB were recorded, offering insights into the early growth performance of the species under nursery conditions.
- Vegetative propagation methods for *D. ebenum* are being optimized at the Plant Biotechnology nursery of IFGTB. Specifically, the rooting pattern in shoot cuttings treated with 1000 ppm Indole-3-butyric acid (IBA) was observed after one year of planting, indicating the response of *D. ebenum* to this concentration of IBA for root induction.

8. Action taken on the recommendation of RAG 2024: Nil

9. Publications: Nil