

EP NO: 7/ 2022-23 ESTABLISHING A RESTORATION PLOT OF CRITICALLY ENDANGERED HILDEGARDIA POPULIFOLIA BY ASSEMBLING ALL POSSIBLE GERMPLASMS IN EDAIKKAL RESEARCH CENTRE

INTRODUCTION

Rare, Endangered, and Threatened (RET) plant species are integral to maintaining ecological balance and biodiversity. Unfortunately, these species are increasingly threatened by human activities, habitat destruction, and climate change. Among these, *Hildegardia populifolia*, a deciduous tree belonging to the family Malvaceae, holds significant ecological and potential economic value. This species is critically endangered, with its natural populations declining at an alarming rate.

The tree is ecologically significant, thriving in dry deciduous forests at altitudes of 300–700 meters, often found growing among rocky outcrops. Its flowers, lacking petals, are specialized and indicative of the evolutionary adaptations within the **Sterculioideae** subfamily. Given its restricted distribution, small population size, and ecological importance, *Hildegardia populifolia* demands immediate and focused conservation efforts. The species' distribution spans Tamil Nadu, Andhra Pradesh, and a small region in Karnataka. However, its conservation status has been variably assessed as Critically Endangered (Sarcar&Sarcar, 2002; WCMC, 1998) and Endangered or Vulnerable by others. These discrepancies highlight the urgent need for thorough evaluation and conservation measures.

This study aims to retrieve and conserve *Hildegardia populifolia* by assembling its genetic resources in a controlled research environment. By identifying superior phenotypes, propagating high-quality planting materials, and establishing restoration plots, the research seeks to create a replicable model for conserving other critically endangered species.

OBJECTIVES:

1. Conduct surveys and mapping of the species across Agro Climatic Zones (ACZs) in Tamil Nadu.

2. Identify phenotypically superior trees for genetic evaluation and seed collection.
3. Develop nurseries to produce quality planting materials for large-scale propagation.
4. Establish a restoration plot at the research center to assemble diverse genotypes.

MATERIALS AND METHODS

Populations of *Hildegardia populifolia* were identified in Kalrayan hills using GPS tools, the locations of the individual trees were recorded. 10 numbers of Superior Candidate plus Trees (CPTs), were selected based on key morphological characters viz., Height, Girth at Breast Height (GBH) and number of branches. CPTs details are tabulated below;

CPT Name	GPS Location	Tree height (m)	Girth (cm)	Branches (no's)
CPT 1	N 12.150127 E 079.284652	5.5	110.0	3.0
CPT 2	N 12.14972 E 079.284602	8.0	215.0	2.0
CPT 3	N 12.14974 E 079.284583	7.0	119.0	3.0
CPT 4	N 12.149888 E 079.284437	7.0	187.0	2.0
CPT 5	N 11.998311 E 078.801006	7.0	107.0	3.0
CPT 6	N 11.99841 E 078.80077	6.0	100.0	3.0
CPT 7	N 11.99841 E 078.80094	7.0	133.0	5.0
CPT 8	N 11.99825 E 078.80093	7.5	180.0	4.0
CPT 9	N 11.99862 E 078.80036	7.0	123.0	4.0
CPT 10	N 11.99828 E 078.80098	8.0	183.0	5.0

A nursery with 220 seedlings was raised from seeds from the CPTs. Poly bags (16x30 cm) were filled with a mixture of red earth, sand, and Farmyard Manure (FYM) in a 1:1:1 ratio. Additionally, 30 g vermicastings, 15 g Vesicular-Arbuscular Mycorrhiza (VAM), 6 g Azospirillum, and 6 g Phosphobacteria per bag has been applied. Seeds were initially sown in mother beds. Once seedlings reached a height of 15 cm, they were transplanted into poly bags.

The experiment was conducted by planting over an area of 0.5 ha with a spacing of 5 x 5 meters seedlings. A total of 200 seedlings were planted with 10 seedlings per treatment, replicated four times. The pit size is 45 cm³ and each pit was filled with inputs such as FYM, tank silt and microbial cultures (Azospirillum and Phosphobacteria) as per the treatment chart given below. The experiment was laid out in RBD statistical design with four replications. Planting was done during --. The details of treatments are as follows;

Experimental Design for Restoration Plot:

Design	:	RBD
Replication	:	Four
Treatments	:	Five
Number of CPT's	:	10
Spacing	:	5mx 5m

S.No.	Treatment	R1	R2	R3	R4
1	T1(control) - Rainfed	10	10	10	10
2	T2 – No Fertilizer	10	10	10	10
3	T3 – 3 Kg FYM + 1 Kg Poultry waste	10	10	10	10
4	T4 - Isolated from Hildebrandia populifolia Azospirillum + Phosphobacteria + Vermicastings +VAM	10	10	10	10
5	T5 – T4 + Sub soil Drip irrigation	10	10	10	10

Observations to be recorded:

1. Soil test will be done before planting and at the end of the experiment
2. Initial height of the plants will be recorded
3. Annual height and girth will be recorded
4. Effect of irrigation to the species and growth rate for different clones will be recorded.
5. Survival rate of the seedlings will be recorded.
6. Phenological data especially flowering , fruiting and seed formation as well as subsequent natural regeneration if any in the plantation will be recorded as a measure of success.
7. Photo will be taken frequently to study the changes in vegetation.



Observations recorded vis-à-vis objectives:

S.No	Treatment	Initial (Jan' 2024)			
		Planted (No.)	Survival (No.)	survival %	Avg. Height (m)
1	T1	40	40	100	0.33
2	T2	40	40	100	0.34
3	T3	40	40	100	0.33
4	T4	40	40	100	0.33
5	T5	40	40	100	0.32

S. No	Treatment	March 2024				
		Planted (No.)	Survival (No.)	survival %	Avg. Height (m)	Height Increment (cm)
1	T1	40	40	100	0.39	0.06
2	T2	40	40	100	0.40	0.06
3	T3	40	40	100	0.40	0.07
4	T4	40	40	100	0.38	0.05
5	T5	40	40	100	0.39	0.07

FINDINGS/INTERIM FINDINGS

1. Seedling survival rate: **100%** as of November 2024.
2. Monkey damage observed but caused no seedling losses.
3. Apical shoot growth rate increased after pruning side branches.
4. Growth of plants in the edges and in rocky portion of the experimental plot is retarded. This interesting fact is in contrast to its natural rocky habitat where the species is found however it is premature to assess.
5. Experiment ongoing.