EP NO: 16/ 2022-23 ECOLOGICAL RESTORATION OF *DECALEPIS ARYALPATHRA* TO EASTERN GHATS (JAWADHU HILLS) – A CRITICALLY ENDANGERED ETHNO-MEDICINAL PLANT OF WESTERN GHATS

INTRODUCTION

Decalepisaryalpathra is a highly significant species endemic to the Southern Western Ghats, where it grows in montane grasslands and rocky habitats. This critically endangered plant belongs to the family Periplocaceae and is characterized by its tuberous root system, which allows it to survive in nutrient-deficient, rocky soils. Its habitat is unique, often limited to narrow rock fissures and crevices in exposed gneissic formations, with very few populations scattered across a highly restricted geographic range.

The plant holds immense ethno botanical value due to its tubers, which are widely used in traditional medicine for their health benefits. The tubers are processed to prepare sarbat (a local soft drink) and pickles, making it a popular plant among local communities. Medicinally, the plant has been cited for its potential antioxidant, anti-inflammatory, and other therapeutic properties. Its high demand has driven overharvesting, where entire plants are uprooted, causing irreparable damage to its natural populations. The introduction of plantation crops like tea during the colonial period and subsequent land-use changes have drastically reduced the plant's natural habitats.

Tubers are illegally collected by locals and neighboring communities for commercial and subsistence use. This practice often involves uprooting, destroying the plant's ability to regenerate. Seeds of *Decalepis arayalpathra* exhibit high germination rates, natural regeneration are limited due to its dependence on specific rocky habitats. Strong winds in its open montane environments further reduce seed dispersal success. Increasing human encroachment and unregulated collection activities continue to threaten the species. The species' limited range and ecological specialization render it extremely vulnerable to extinction from catastrophic environmental or anthropogenic events. In addition to its ethno botanical importance, *Decalepis arayalpathra* plays a crucial ecological role in stabilizing rocky soils in montane ecosystems. It supports the biodiversity of these fragile habitats by creating niches

within rocky crevices, facilitating the establishment of other plant species, and contributing to the overall health of the ecosystem. Given the critically endangered status of *Decalepis arayalpathra*, there is an urgent need for effective conservation strategies.

This project aims to address the limitations of past efforts by focusing on habitat restoration, macro propagation, and the creation of ex-situ germplasm banks. By reintroducing the species into the Eastern Ghats (Jawadhu Hills) and ensuring a sustainable approach to its utilization, this project seeks to protect the species from extinction while supporting local livelihoods and biodiversity conservation.

OBJECTIVES:

1. Identify and conserve superior genetic resources of *Decalepis arayalpathra*.
2. Determine genetic estimates through progeny evaluation and analysis.
3. Develop seed and macro clonal propagation protocols.
4. Establish a germplasm bank for long-term conservation.

MATERIALS AND METHODS

superior phenotypedwere identified based on traits like maximum seed pods and secondary shoot production in Kalakkad Mundanthurai Tiger Reserve, Tamil Nadu (Vellachipudavu, Oothu, Vistharamottai, Thaipathamottai). Seeds collected from identified phenotypes and sown in mother beds. Mother beds were prepared in with sand and red-earth in the ratio of 1:1 inside mist chamber. poly bags (16 cm x 30 cm) filled with a soil-sand-FYM mixture (2:1:1) were utilized for the study.Hardwood, semi-hardwood, and leafy cuttings trimmed to 15 cm with 2-5 nodes treated with 0.2% bavistinin 10 minutes to prevent fungal infections. Root-inducing hormones (IBA) applied at 4000 ppm. Planted in mist chambers with controlled humidity (80-90%) and temperature (33 ± 1°C).Vegetative propagules in the form of shoot tip cuttings and stem cuttings were used for rooting. 200 no’s shoot tip cuttings and 500 no’s stem cuttings planted initially. After 30 days of propagules planted in the polybags, leafs emerged from stem cuttings treated with 400 ppm IBA. At the same time maximum number of cuttings is died due to wilting.

Again, vegetative progagules are collected and tried. A total of 700 vegetative propagules in the form of cuttings were tried. Then again 400 new propagules (cuttings)were collected and planted in poly bags for rooting. Out of 900 cuttings tried, 400 emerged successfully. In all out of 1100 vegetative propagules only 450 No. emerged successfully with survival % of 40%.

Decalepis aryalpathra plant in its natural habitat – KMTR Tirunelveli

Collection of plant material from its original habitat

Decalepis aryalpathra Seeds

Decalepis aryalpathra cuttings

Few Surviving propagules in the nursery

DCF Inspection of the nursery on 21.11.2024

OBSERVATIONS TO BE RECORDED:

1. The planted sites will be periodically monitored to study the growth attributes of the selected plant in the introduced area.
2. The geo ordinates of all the planted sites will be marked for future reference.
3. The survival percentage of planted seedlings. (separately for seed origin and vegetatively propagated plants will be recorded once in three months in each site of planting and casualties will be replaced.
4. Pest and disease attack in the planted seedlings will also be recorded.
5. Survival percentage of seedlings after 2 years will be recorded and tabulated.
6. Tuber formation in the planted seedlings will be evaluated after six months of planting in the site.
7. Flowering and fruiting pattern will be recorded for the collection of good quality
8. Wild Animals damage (if any) will also be recorded.

FINDINGS / INTERIM FINDINGS:

1. Shoot tip cuttings not performed well, 50 numbers of cuttings only developed as plant with a survival % of 25% (50 out of 200).
2. Stem cuttings with two internodes performed well, 400 cuttings emerged as plant and cuttings to plant percentage is 44% (400/900 cuttings)
3. After 45 days planted cuttings developed as plant with 4-5 leafs.
4. Seed not germinated in the mother beds and its shows the seeds of Decalepis has poor germination capacity.
5. *Decalepsis aryalpathra* plants shows chlorosis symptoms on shifting out from the mist tents and plants are stared wilting.
6. Currently only 30 number of plants only surviving out of 450 successful emergents. (as on 11.11.2024).
7. The reason more casualties of *Decalepsis aryalpathra* may be the edaphic and climatic factors mainly temperature.
8. The propagules tend to perform well under controlled climatic conditions inside the mist chamber.
9. But the propagules could not withstand the climatic conditions prevailing even under 50% shade under the attenuation chamber.
10. The experiment is ongoing