Information bulletin - 2

SANKETHAM—THE REFUGIUM

Rehabilitating—the possible option

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Green Ahalia

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Striving for a better environment

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Preface

In recent times there has been perceptible change in plant populations and vegetation that we are able to notice. There are several species whose population has dwindled to such an extent they are likely to vanish from the face of the globe. Immediate conservation measures only can help them to resurge and survive. While there are others that are new to the floral component of any landscape. These alien and invasive plants have a great role in dismantling the native plants from their own homelands and thereby make them treated under threatened plant list. There are several other pressures and factors that pushes the plants to peril. In such a situation the need of the hour is to go for conservation measures programmed under in situ and ex situ approaches. Though costly an easy approach is ex situ conservation. This obviously is done through gardens and other cultivation efforts. At Green Ahalia we have embarked on such a journey to see the red listed plants to turn to greener stature. Accordingly, in a humble way we began with assembling few of these threatened plants accessible to us and assemble them as an RET garden which is indeed a refuge for such plants in peril. We fondly call this garden SANKETHAM—The refugium.

The process of garden development has not been very smooth and easy as we are not even aware of the IUCN categorised threatened plants and leave alone their distribution and habitat. It's not humanly

possible to grow all plants in all agroclimatic conditions. This warranted us to first search for Western ghats specific and relevant species for Threatened plant garden which could be grown in our sort of climate. We also needed to locate their availability and collect them, bring them and acclimatise them to Ahalia conditions. The location where this garden is set up has scattered trees that provided microclimate like shade for shade loving plants. Similarly open spaces in the site can support light demanders. Sufficient irrigation facility is also ensured before planting. The garden that began with few species in 2018 has grown year after year to an enviable size and stature. To generate awareness and self-learning each species in this garden are provided with self-explanatory signages. As of today, the garden has a total of 77 Species. It may be observed that the garden not only holds IUCN categorised species but also few of those rare species for the area. Thus, an otherwise common species elsewhere in the country might find a place in this garden.

We could pool so many species in such a short time mainly due to our networking approach and helps received from different gardens, nurseries and experts in the field. Few of these organisations are KFRI, MBGIPS, JNTBGRI, FRLHT, MSSRF, Calicut University, Rayirath Garden, Experts from GVC, and other research establishments and of course our own filed collections. We thankfully acknowledge their helps in establishing such a significant and important garden aiming at enriching biodiversity and its conservation.

The garden is aimed at providing a tool for outreach. It also helps to access propagation material for raising nursery stock. It is a source for researchers to experiment and study the selected species in one place. It has become a centre of learning for botany students. There are regular internship students from postgraduate college in the district to do their project work.

We could come to this level largely due to the unstinted support and encouragement from Dr. V. S. Gopal, Chairman Ahalia group and

its Management. The effort of our team coherently working with a focussed target for garden development is yielding rich dividends. We would also like to put on record the helps received from Prof. (Dr.) Maya C. Nair and Dr. Rekha Vasudevan for their inputs on these species dealt in this publication. We are especially indebted to Dr. K. K. Seethalakshmi (Former Scientist, KFRI and member of our Advisory Board) for critically going through the manuscript and providing useful suggestions for improvement.

As mentioned in the previous publication we are embarking on publication of a series of information bulletin based on the experience gained during the past five years. This publication is the second in line and deals with rare and threatened plants. It reflects our work and shall help others to take on our experience and establish such gardens elsewhere. We believe, this publication will be received well by several stake holders in the field of biodiversity arena.

Each species is given the desired information about its nomenclature, botany, ecology, and threat perspective with a remark on distribution. As far as possible wherever available photographs or pictures from our own collections or authentic publication are given for easy reference. With this many species we expect the reader would be familiarised with the most critical ones that we need to take care.

Since this publication is based on our short period of activity there could be omissions or gaps of minor nature. We have tried our best to avoid any glaring issues. The users of this book are suggested to use it cautiously so as to avoid any lapse and errors. Make use of this as a stepping stool to reach out gloriously.

There could be unavoidable minor mistakes of language or printing errors which are unintentional, and we wish to seek to rectify them in future editions.

We wish the readers a pleasant experience with this short publication.

Foreword

Anthropogenic disturbances during the last few decades have altered the natural habitats drastically and have rendered a large number of plant species and their habitats threatened. Today, World over there is an increased concern for conservation of critically endangered species and their habitats. Organisations like world conservation union and IUCN are working on understanding the threat perspectives and different levels of conservation to save the threatened species. This helps in taking up appropriate projects and programmes to save our plants that are likely to perish and face extinction. The IUCN categorisation is a monumental effort to prioritise the threatened species of the world into different categories organising them corresponding to their threat status. In India thanks to Botanical Survey of India and a multi-institutional project called POSSEF, a great amount of literature piled up in the country which also indicate regional prioritised lists. Thus, we have attempts for Western Ghats, Kerala and so on. There has also been attempts to prioritise plants belonging to resource groups like Medicinal plants pioneered by FRLHT a centre of excellence for medicinal plants and traditional knowledge through rapid threat assessment more popularly known as CAMP process. This has an output of threatened medicinal plants for over 13 states in India. Further attempts by several other agencies have also resulted in

substantial publications on threatened plants. But despite all these concerted efforts, the conservation programmes focused on plants is grossly inadequate, particularly attempts on ex situ conservation and cultivating them offsite is limited.

I had the opportunity of visiting Ahalia campus last year and I could see a well-established threatened Plant section in the garden where they have been growing few threatened plants which fall into different IUCN categories. The experience here indeed is an eye opener and will be of help to others wanting to start similar ventures. This publication brought out by Green Ahalia narrates the process and development details of their garden. It will also be useful to others for their cultivation projects either for specific plant species individually or in groups. Bringing out such information bulletins limiting to focused areas in a national perspective, could deal with ecosystem specific needs and act as conservation corridors.

I hope the publication will be useful to conservation biologists, gardeners and other agencies interested in embarking on such ventures. I congratulate and extend my best wishes to the entire team Green Ahalia for bringing out such a useful and timely publication.

Dr. R.R. Rao,
FNA, FNASc, FASc.
Former CSIR Emeritus Scientist,
Bengaluru

Message

Ahalia group is conscious about the environmental health and striving towards making the habitat greener. It has been investing on alternate energy, sustainable resource utilisation, promoting herbal gardens and afforestation/ plantation activities, etc. It has created a special group as Green Ahalia with a small team of experts and they are into action with a well-planned strategy. Their activities span over conservation, biodiversity, education and awareness creation, outreach and sustainable model developments. A priority area is conservation of threatened plants in a scientific way. As such green Ahalia has created an RET garden over the past 5 years and provide refuge to some of the most prominent threatened plants that can be grown in Ahalia campus conditions. This is located at a strategic location where any visitors to the campus will see the garden and can easily access the facility. Already we see foot fall on the garden from students, teachers and researchers. Each of the species in the garden has been provided with self-explanatory signages that will be useful as an outreach tool.

Based on the experience gained from this garden Green Ahalia team has brought out this information bulletin which is the second in the series. This publication will be very useful for all those interested in establishing similar gardens and conservation research. It will also act as a garden manual easily explained. Such gardens at multiple

locations are essential for the survival of the species. I congratulate the team for bringing out this useful publication that will create awareness about threatened plants and conservation dependant species of this region.

Dr. V.S. Gopal
Chairman
Ahalia Group.

Introduction

Green Ahalia has created thematic gardens that are broadly grouped into Diversity, Conservation, Utilisation, Culture and Tradition, outreach, etc. Our conservation gardens **Sanketham** under the theme RET garden established during 2018 is an important location to visit and understand the different threatened species which could be seen at one single place. The live collection in this garden harbours over 77 species in multiple numbers which are categorised under IUCN categories. There are 6 Critically Endangered (CR), 14 Endangered (En), 26 Vulnerable (VU) and the remaining under other categories. There are few species which are Rarely seen in Palakkad Gap but are often not categorised under any threat categories. Since these are rare, we have taken conscious decision to grow them here. One such species is *Dillenia pentagyna*. There are species that grow under shade, in moist and marshy areas, open places, dry lands etc having wide ranging habitat preference. We have taken care to provide each plant the agroclimatic condition that they require. In this garden one can find diverse habits of the plants ranging from herbs, shrubs to trees and climbers.

Our efforts.

Our experience in developing the garden, we consider, will be of use to other agencies who would like to establish such gardens dedicated to threatened plants. The efforts span over literature consultation,

prioritising species, pooling plants/ saplings, site preparation, lay out preparation, planting saplings considering their habitat and microclimatic needs. Keeping plantation journal, documenting growth data and making phenological observations etc. Each plant in the garden is provided with detailed self -explanatory signages as in the attached model pictures. The information given in the boards include botanical name, local names, family to which the species belong, IUCN threat category to which this species belong. The garden is provided with irrigation facility and cattle guard to protect the saplings from biotic factors that disturbs the plant. Our experience in these areas is detailed briefly in the section given in separate box.

The landscape:

The landscape of Ahalia campus is mostly plain having cultivation fields as main feature. Generally, it falls under the broad forest type of dry deciduous type of vegetation. Climatically it has lesser rain fall and tend more towards semi -arid condition. The campus has perhaps the largest population of Palmyra palm (Borassus flabellifer) which is considered the landscape feature of the Palakkad gap. The campus has several institutional buildings and network of roads, drains etc. part of the area is still with exposed rocks and scanty vegetation. The campus has patches of man-made forests, captive plantations, man -made lakes and thematic gardens scattered over a large area. With green Ahalia efforts there is perceptible change of green cover for a better habitat and landscape. This is the case with areas in Palakkad gap zone.

Flora and vegetation

The campus flora consists both native and introduced species. Except for one or two patches which are remnants of primary vegetation, mostly the vegetation is of disturbed and degraded types broadly falling under dry deciduous type. The introduced ones are either of plantations, germplasm banks or of medicinal and other gardens. One

can also encounter here a number of invasive species growing as weeds which include *Chromolaena odorata, Lanatana camara, Parthenium hysterophorus, Alternanthera bettzikiana, Mimosa diplotricha, Mikania micrantha*, etc The weeds mostly appear seasonally but for the perennilas.

Threats and Pressures on plants

There are mainly 5 major criteria which are used to assess the threatened species.

These are linked with :

1. population decline
2. range of distribution
3. small population size and decline
4. very small or restricted population
5. quantitative analysis indicating the probability of extinction in the wild.

As an example, the criteria given along with CAMP reports prepared by FRLHT is given box below:

IUCN categories

Criteria:

IUCN categories of Threatened plants:

These are used in CAMP workshops for assigning various threat categories to the assessed medicinal Plants

Extinct (EX)

A taxon is Extinct where there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times(diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

Extinct in the wild (EW)

A taxon is extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times(diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

Threatened:

Critically Endangered (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (See section V), and it is therefore considered to be facing an extremely high risk of extinction (50% in 5 years) in the wild.

Endangered (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction (20% in 20 years) in the wild.

Vulnerable (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction (10% in 100 years) in the wild.

Not-Threatened:

Near Threatened (NT)

A taxon is Near threatened when it has been evaluated against the criteria but does not qualify for Critically endangered,

Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

Least Concern (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

Data Deficient (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available.

For a more information and latest details please visit:
http://www.iucnredlist.org/static/categories_criteria_2_3

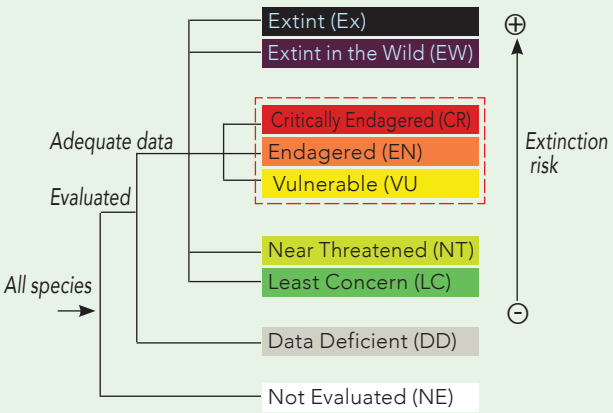
Rapid Threat Assessment: CAMP (Conservation Assessment and Management Plan)

Threat Assessment

It is pertinent to understand the need for conservation and the approach that is to be adopted. With such a vast diversity and species composition it certainly is impractical with the current level of understanding to know fully well about each species. The Global Strategy for Plant Conservation (GSPC) target demands for a full taxonomic understanding by 2020 which is not likely to attain in our

country due to obvious reasons. Perhaps the possible option could be prioritising the threatened plants into different categories as per IUCN criteria which in other words are conducting threat assessment studies on our species exposed to peril. The threat assessment has been attempted in the past and brought out prioritised lists largely based on herbarium studies. The red data book on Indian plants (3 vols by Nayar& Sastry,1987-1990) is the outcome of such studies. The botanical survey of India has been bringing our threatened plant list for the country. These are definitely significant contributions to our understanding of threatened species and form base work for conservation research and action.

Another more commonly used and practical method is the Conservation Assessment and Management Prioritisation (CAMP) popularised by Zoo Outreach (Sally Walker, Sanjay Molur etc) and FRLHT (D.K. Ved, Vinay Tandon and others) (Saha & Ved 2015). This rapid method is also been relying on information gathered from herbarium specimens but augmented through information shared by local resource persons. That included experiences of local experts and field botanists, foresters, traders, and other stake holders who are knowledgeable in the field. FRLHT Bangalore has conducted over 14 CAMP workshops on medicinal plants across 17 states. Their study results relating to Kerala are given in the table:



List of CAMP assessed Medicinal plant species for Kerala
(Source: FRLHT)

Family	*GENUS*	*SPECIES*	*AUTHOR*	*Kerala*
Araceae	*Acorus*	*calamus*	*L.*	*Endangered*
Passifloraceae	*Adenia*	*hondala*	*(Gaertn.) W.j.de Wilde*	*Vulnerable*
Acanthaceae	*Adhatoda*	*beddomei*	*C.b.clarke*	-
Rutaceae	*Aegle*	*marmelos*	*(L.) Correa Ex. Schultz*	*Not Evaluated*
Araceae	*Amorphophallus*	*commutatus*	*Engl.*	*Vulnerable*
Araceae	*Amorphophallus*	*paeoniifolius*	*(Dennst.) Nicolson*	*Near Threatened*
Vitaceae	*Ampelocissus*	*araneosa*	*(Dalz. & Cribbs.) Planch.*	*Vulnerable*
Vitaceae	*Ampelocissus*	*indica*	*(L.) Planch.*	*Endangered*
Meliaceae	*Aphanamixis*	*polystachya*	*(Wall.) Parker*	*Vulnerable*
Aristolochiaceae	*Aristolochia*	*tagala*	*Cham.*	*Least concern*
Moraceae	*Artocarpus*	*hirsutus*	*Lam.*	*Vulnerable*
Liliaceae	*Asparagus*	*rottleri*	*Baker.*	*Extinct*
Euphorbiaceae	*Baliospermum*	*montanum*	*(Willd.) Muell.-Arg.*	*Vulnerable*
Clusiaceae	*Calophyllum*	*apetalum*	*Willd.*	*Vulnerable*
Burseraceae	*Canarium*	*strictum*	*Roxb.*	*Vulnerable*
Vitaceae	*Cayratia*	*pedata*	*Juss. Ex Gagnepain*	*Endangered*
Celastraceae	*Celastrus*	*paniculatus*	*Willd.*	*Vulnerable*
Apocynaceae	*Chonemorpha*	*fragrans*	*(Moon) Alston*	*Vulnerable*
Lauraceae	*Cinnamomum*	*macrocarpum*	*Hook.*	*Vulnerable*

Lauraceae	*Cinnamomum*	*sulphuratum*	*Nees.*	*Vulnerable*
Lauraceae	*Cinnamomum*	*wightii*	*C.f.w.meissn*	*Endangered*
Burseraceae	*Commiphora*	*wightii*	*(A.) Bhandari*	*Not Evaluated*
Menispermaceae	*Coscinium*	*fenestratum*	*(Gaertn.) Coleb.*	*Critically Endangered*
Zingiberaceae	*Curcuma*	*pseudomontana*	*Graham*	*Vulnerable*
Cycadaceae	*Cycas*	*circinalis*	*L.*	*Vulnerable*
Asclepiadaceae	*Decalepis*	*hamiltonii*	*Wight & Arn.*	*Endangered*
Ebenaceae	*Diospyros*	*candolleana*	*Wight*	*Vulnerable*
Ebenaceae	*Diospyros*	*paniculata*	*Dalz.*	*Vulnerable*
Dipterocarpaceae	*Dipterocarpus*	*indicus*	*Bedd.*	*Endangered*
Droseraceae	*Drosera*	*indica*	*L.*	*Least concern*
Droseraceae	*Drosera*	*peltata*	*Sm.willd.*	*Vulnerable*
Meliaceae	*Dysoxylum*	*malabaricum*	*Bedd.*	*Endangered*
Myrsinaceae	*Embelia*	*ribes*	*Burm.f.*	*Near Threatened*
Orchidaceae	*Eulophia*	*cullenii*	*(Wight) Blume*	*Critically Endangered*
Clusiaceae	*Garcinia*	*gummi-gutta*	*(L.) Robs.*	*Near Threatened*
Clusiaceae	*Garcinia*	*indica*	*(Dup.) Choisy*	*Vulnerable*
Clusiaceae	*Garcinia*	*morella*	*(Gaertn.) Desr.*	*Near Threatened*
Clusiaceae	*Garcinia*	*travancorica*	*Beddome*	*Endangered*
Rubiaceae	*Gardenia*	*gummifera*	*L.f.*	*Vulnerable*
Liliaceae	*Gloriosa*	*superba*	*L.*	*Vulnerable*
Rutaceae	*Glycosmis*	*macrocarpa*	*Wt.*	*Vulnerable*
Asclepiadaceae	*Gymnema*	*khandalense*	*Santapau*	*Endangered*
Asclepiadaceae	*Gymnema*	*montanum*	*(Roxb.) Hook*	*Endangered*

Zingiberaceae	*Hedychium*	*coronarium*	*Koenig*	*Near Threatened*
Boraginaceae	*Heliotropium*	*keralense*	*Siv. & Manl.*	*Critically Endangered*
Ophioglossaceae	*Helminthostachys*	*zeylanicus*	*(L.) Hook.*	*Vulnerable*
Apiaceae	*Heracleum*	*candolleanum*	*(Wt. & Arn.) Gamble .*	*Vulnerable*
Asclepiadaceae	*Holostemma*	*ada-kodien*	*Schult.*	*Endangered*
Caesalpiniaceae	*Humboldtia*	*vahliana*	*Wight*	*Endangered*
Flacourtiaceae	*Hydnocarpus*	*alpina*	*Wt.*	*Vulnerable*
Flacourtiaceae	*Hydnocarpus*	*macrocarpa*	*(Bedd.) Warb.*	*Endangered*
Flacourtiaceae	*Hydnocarpus*	*pentandra*	*(Buch.-Ham.) Oken*	*Vulnerable*
Caesalpinaceae	*Kingiodendron*	*pinnatum*	*(Roxb. Ex Dc.) Harms*	*Vulnerable*
Sapotaceae	*Madhuca*	*longifolia*	*(Koen.) Macler*	*Not Evaluated*
Sapotaceae	*Madhuca*	*neriifolia*	*(Moon) Lam*	*Least concern*
Magnoliaceae	*Michelia*	*champaca*	*L.*	*Near Threatened*
Magnoliaceae	*Michelia*	*nilagirica*	*Zenk.*	*Vulnerable*
Moringaceae	*Moringa*	*concanensis*	*Nimmo Ex Dalz. & Gibson*	*Not Evaluated*
Myristicaceae	*Myristica*	*dactyloides*	*Gaertn.*	*Vulnerable*
Myristicaceae	*Myristica*	*malabarica*	*Lam.*	*Vulnerable*
Orchidaceae	*Nervilia*	*aragoana*	*Gaud.*	*Vulnerable*
Acanthaceae	*Nilgirianthus*	*ciliatus*	*(Nees) Bremek.*	*Endangered*

Icacinaceae	*Nothapodytes*	*nimmoniana*	*(Grah.) Mabb.*	*Vulnerable*
Rubiaceae	*Ochreinauclea*	*missionis*	*(Wall.ex G.don) Ridsdale*	*Vulnerable*
Convolvulaceae	*Operculina*	*turpethum*	*(L.) S. Manso*	*Endangered*
Bignoniaceae	*Oroxylum*	*indicum*	*(L.) Vent.*	*Endangered*
Orchidaceae	*Paphiopedilum*	*druryi*	*(Bedd.) Stein.*	*Critically Endangered*
Lauraceae	*Persea*	*macrantha*	*(Nees) Kost.*	*Vulnerable*
Piperaceae	*Piper*	*barberi*	*Gamble.*	*Critically Endangered*
Piperaceae	*Piper*	*longum*	*L.*	*Near Threatened*
Piperaceae	*Piper*	*mullesua*	*D.don*	*Near Threatened*
Piperaceae	*Piper*	*nigrum*	*L.*	*Least concern*
Lamiaceae	*Plectranthus*	*nilgherricus*	*Benth.*	*Endangered*
Fabaceae	*Pseudarthria*	*viscida*	*Wight & Arn.*	*Vulnerable*
Fabaceae	*Pueraria*	*tuberosa*	*(Roxb. Ex. Willd.) Dc.*	*Vulnerable*
Apocynaceae	*Rauvolfia*	*serpentina*	*(L.) Benth. Ex Kurz*	*Endangered*
Araceae	*Rhaphidophora*	*pertusa*	*Schott*	*Least concern*
Celastraceae	*Salacia*	*oblonga*	*Wall.*	*Vulnerable*
Celastraceae	*Salacia*	*reticulata*	*Wight*	*Data deficient*
Santalaceae	*Santalum*	*album*	*L.*	*Endangered*
Caesalpiniaceae	*Saraca*	*asoca*	*(Roxb.) De Wilde*	*Data deficient*

Oleaceae	*Schrebera*	*swietenioides*	*Roxb.*	*Not Evaluated*
Anacardiaceae	*Semecarpus*	*travancorica*	*Bedd.*	*Endangered*
Smilacaceae	*Smilax*	*zeylanica*	*L.*	*Vulnerable*
Loganiaceae	*Strychnos*	*aenea*	*A.w. Hill.*	*Endangered*
Gentianaceae	*Swertia*	*corymbosa*	*(Griseb.) Wt. Ex Clarke*	*Vulnerable*
Gentianaceae	*Swertia*	*lawii*	*Burkill*	*Endangered*
Symplocaceae	*Symplocos*	*racemosa*	*Roxb.*	*Data deficient*
Myrtaceae	*Syzygium*	*travancoricum*	*Gamble*	*Endangered*
Combretaceae	*Terminalia*	*arjuna*	*(Roxb.) Wight & Arn.*	*Near Threatened*
Menispermaceae	*Tinospora*	*sinensis*	*(Lour.) Merr.*	*Near Threatened*
Euphorbiaceae	*Tragia*	*bicolor*	*Miq.*	*Vulnerable*
Dioscoreaceae	*Trichopus*	*zeylanicus*	*Gaertn.*	*Endangered*
Asclepiadaceae	*Utleria*	*salicifolia*	*Bedd.*	*Critically Endangered*
Valerianaceae	*Valeriana*	*leschenaultii*	*Dc.*	*Critically Endangered*
Dipterocarpaceae	*Vateria*	*indica*	*L.*	*Vulnerable*
Dipterocarpaceae	*Vateria*	*macrocarpa*	*B.l.gupta*	*Critically Endangered*
Myristicaceae	*Knema*	*attenuata*	*(Wall.) Warb.*	*Near Threatened*
Myrsinaceae	*Embelia*	*tsjeriam-cottam*	*A.dc.*	*Vulnerable*
Periplocaceae	*Janakia*	*arayalpathra*	*Joseph & Chandrashekaran*	*Critically Endangered*

Conservation

Having prioritised the conservation required species the next step is certainly to opt for conservation measures to be adopted. Conservation as could be either *ex situ* conservation or *in situ* conservation. Conservation will warrant an exploration into the site conditions, regeneration status, collection of propagation materials like seed and vegetative propagation materials in case of *ex situ* conservation and possible methods of propagation using these materials. Often, it may also require research and development in nursery and plantation techniques. An adequate stock of planting material would be generated for raising conservation plots like germplasm banks, seed orchards, botanic gardens, arboreta, and so on whichever is applicable.

Best possible choice – *Ex-situ* conservation approach

Though *in situ* conservation is the best as afar as the quality and costs are concerned it is difficult for a garden to go and establish *in situ* conservation plots for various reasons. The next option is of course the *ex situ* where we can grow the plant of concern in a simulated or near similar conditions at a location far away from its original site of occurrence. This will require more cost as it needs intense care in every step of the plant growth and development. Essentially the garden provide opportunity to carry out research, and extension works. It is indeed a source of germplasm and propagation material. Thus, when we are interested in conservation there is an opportunity to add a conservation section to the botanic garden. That is what we did and yielded expected results.

Green Ahalia initiatives

In the process of establishing our thematic gardens green Ahalia decided to contribute to conservation of threatened plants and thus we proposed to create an RET garden named **Sanketham**. A suitable site

was identified in the campus which has few standing trees and open spaces as well. A lay out sketch is prepared to accommodate around 40 species and began the works of site preparation ranging pitting etc. A tentative list of rare and threatened plants were prepared by consulting experts and literature on threatened plants from the region.

Pooling plants

The next task is to pool the plants and bring them to Green Ahalia nursery for planting. The species are to be brought from extreme south of Kerala to the north of the state. We have received very positive response from other gardens like JNTBGRI, KFRI, MBGIPS, MSSRF and different private nurseries like the Rayirath Garden and from outside the state like FRLHT. Our team has personally visited the above locations where saplings are available and brought them safely to the campus. In addition, we made surveys to the places of their occurrence and from wild habitats to mention one such instance is the case of *Cycas anaikalensis*. These are planted in appropriately sized pits. Proper tending and regular monitoring for their performance was carried out along with documentation of growth and survival of each plant.

Propagation

Apart from the individual attention to the growth and survival of the species we have also entered into the domain of propagation and nursery development of threatened plants. Vegetative propagation using branch cuttings and suckers were attempted. Thus we could raise multiple numbers of *Adhatoda beddomei, Madhuca insignis, Utleria salicifolia (Decalepis salicifolia), Decalepis hamiltonii* etc. Nursery stock raising through seed route is attempted successfully for Threatened plants like *Oroxylum indicum, Saraca asoca, Santalum album, Cynanchum annularium = Holostemma adakodien* and so on.

Our effort on vegetative propagation is successfully carried out in several species that include *Maduca insignis, Oroxylum indicum,*

Rauvolfia serpentina, Adhatoda beddomei, etc. *Rauvolfia serpentina* had better response in the case of root cutting propagation. These are facilitated using our Mist Chamber. This mist chamber facility is also used for mass propagation of several other species that are in high demand and difficult to reproduce through the seed route. The nursery stock is used for expanding our cultivation and also for exchange and distribution of seedlings for those who are interested in growing them.

QPM

Thankfully, Green Ahalia has received small grants project support from NMPB/ SMPB for raising Quality planting materials (QPM) of few selected species of medicinal plants. These are *Santalum album, Oroxylum indicum, Desmodium gangeticum, Pseudarthria visida, Vitex negundo* etc. Few of these are falling under the threatened plant category. Such externally funded projects certainly have helped us to contribute significantly to the field of plant conservation.

Other conservation initiatives

Other than the RET garden, we have also embarked on creation of germ plasm banks for rare and threatened plants especially through tie-ups with other institutes like KFRI Thrissur and IFGTB Coimbatore.

Germplasm banks

Green Ahalia and IFGTB (Institute of Forest Genetics and Tree Breeding), Coimbatore has joined hands for raising germplasm banks of 13 species mostly of threatened category of medicinal trees and Dasamoola trees. They are planted as special plot and maintained very scientifically and with proper documentation and record keeping. The species covered under this programme are *Premna serratifolia, Gmelaina arborea, Strychnos nux-vomica , Oroxylum indicum, Santalum album, Aegle marmelos Terminalia bellirica, Pterospermum marsupium, Strychnos potatorum, Stereospermum suaveolens and Saraca asoca.* Recently Green Ahalia also entered

into a tie-up with KFRI and planted few more saplings of threatened species in a dedicated plot.

Agroforestry model

Developing an agroforestry model with renowned expert like Dr. Syam Viswanth, Director, KFRI in the field is a significant development in conservation of threatened plants. With KFRI support a Sandal based Agroforestry model is established at Ahalia campus *Santalum album* as main tree crop with Cajanus cajan as primary host and other fruit trees like Mango (*Mangifera indica*), Lemon (*Citrus medica*), Gooseberry (*Emblica officinalis*), Pomegranate (*Punica granatum*), Aegle (*Aegle marmelos*) etc as secondary hosts. The interspatial areas are utilised for cultivating herbaceous medicinal plants like *Withania somnifera*, *Aloe vera, Coleus amboinicus, Andrographis paniculata, Curcuma longa*, etc. This also contributes to the conservation of threatened plants like *Santalum* and *Aegle*. This plot also acts as an extension plot for imparting training to farmers and forest officers interested in agroforestry projects. This plot also provides quality seeds of the few species like Sandal.

Tending

Tending is an important aspect essential to ensure successful culmination of plantation projects and gardening. This ensures proper irrigation, weeding, mulching vacancy filling, manuring etc.

Outreach and awareness

This is an important component of activity in Gardens as it can help popularise the efforts and objectives of the garden for the betterment and acceptance of the community. The outreach activities will cover publicity through posters and publications, social media initiatives, seminars, workshops and trainings. Green Ahalia has been active in all these sectors. It has conducted trainings for the farmers and other stakeholders. Put up exhibition stalls as part of outreach, published handouts, brochures, and information bulletins. Several radio talks

and messages are aired through Ahalia FM radio for reaching out to the community. We have mutual tie-ups with different organisations like OISCA, SMPB etc in these activities. Our websites regularly updates the status and progress of our garden especially about threatened plants and their introduction under the RET page. Other social media tools like FB and WA are also being used for outreach.

Enumeration

For detailed coverage on species in our RET garden please see the section below that provides Botanical name, Family, Local Name, Description, Phenology, Distribution, Threat Status, General Information and so on. We have tried to provide more authentic information based on latest publications and research on the species. Few species are known by more than one name. In such situations we have consciously tried to give the legitimate and authentic name but also covered the most commonly used names as in *Adhatoda vasica, Utleria salicifolia* etc. We also have faced with situation, where phenology which range from one or more months. In such situation we have given a stretched range of flowering or fruiting period. Similarly, we have described the brief and salient features on the morphology and not an expanded taxonomic treatment as seen in floras or monographs. The details provided in each of the species will facilitate better understanding of the species that will be useful in dealing with the species.

ENUMERATION

1. Botanical Name: Acorus calamus L.

Vulnerable

Family: **Araceae**

Local name: M.-Vayambu, E.-Sweet flag, T.-Vasampu, S.-Vacha

Description: Spreading and creeping herbs, aromatic**.** Leaves thick flat

0.5 to 1.5 m long and 1 to 3cm broad and erect with sheathing base over rhizomes. Rooting at each node of rhizomes which are thick and round. Spikes cylindrical at the middle of the leaves. Fruits berries, small green and angular.

Flowering & Fruiting: from April to May

Distribution: Western Ghats

Threat status: **Vulnerable**

General information: Seen in marshy areas. Recently being cultivated as crop in several parts for the medicinal rhizome.

2. Botanical Name: Adhatoda beddomei C. B Cl.

CR-Critically Endangered

Family: **Acanthaceae**

Local name: M.- Chittadalotakam, T.- Aadutota, S.-Vasa

Description: Shrubs with slender branches and swollen nodes. Leaves

opposite elongate, clustered at branch tips, inflorescence terminal with prominent bracts and small white bi-lipped flowers.

Flowering & Fruiting: from December to May

Distribution: Western Ghats, India

Threat status: **Critically Endangered**

General information: Shrubs growing on rocky open areas in clusters. Much valued in Ayurvedic industries for its medicinal property.

3. Botanical Name: Aegle marmelos (L.) Correa

Near Threatened

Family: Rutaceae

Local name: M. Koovalam, T. Koovilam, S. Vilwa, E. Bael tree

Description: Thorny trees with trifoliate leaves aromatic. Flowers white in lax cymes. Fruits usually oval or globose with hard rind and pulpy with many seeds.

Flowering & Fruiting: From March-May

Distribution: Throughout India.

Threat status: **Near threatened.**

General information: Usually seen in temple premises. Not common. The trees are spiritually significant and useful.

4. Botanical Name: Anamirta cocculus (L.) Wt & Arn.

Rare in Palakkad

Family: Menispermaceae

Local Name: Pollakam

Description: Woody climbers, leaves alternate broad ovate tip pointed

lorescence in woody stems large panicles. Flowers, whitish yellow. Fruits ovoid, black. One seeded.

Flowering & Fruiting: August-December.

Distribution: Indo Malayan. Throughout Kerala in tropical forests.

Threat Status: **Rare in Palakkad.**

General Information: Large woody climbers with drooping panicles on old stem.

5. Botanical Name: Aphanamyxis polystachya (wall.) R. Parker

Vulnerable

Family : Meliaceae

Local name: M. Chemmaram, T. Malampuluvan, S. Rohitaka, E. Rohituka tree

Description: Evergreen trees. Leaves imparipinnate, alternate, crowded at the end of branchlets, exstipulate. Flowers white in long axillary, drooping panicles, Fruit a capsule, 3-lobed, yellow or purplish when ripe; seeds 2 or 3, oblong, with a scarlet aril.

Flowering & Fruiting: January-December

Threat Status:-**Vulnerable**

General Information: A tree with purple fruits and scarlet seeds. Bark and seeds are used as medicine in several health problems.

6. Botanical Name: Artocarpus hirsutus Lam

Rare in Palakkad

Family: Moraceae

Local name: M. Ayani, T. Kattuppalaa, S. Lakucha, E. Wild jack

Description: Large trees greyish bark and alternate hairy beneath leaves.

Male spikes long narrow and female ovoid short. Fruits 4 – 6 cm across globose. Minutely thorny and yellow when ripe. Seeds white ovoid.

Flowering & Fruiting: December – March.

Distribution: In southern Western ghats. Mostly in semi evergreen forest and plantations.

Threat Status: **Rare.**

General information: A tree of high timber value with much reduced population. Often cultivated in forest plantations.

7. Botanical Name: Aquilaria malaccensis Lam.

Endangered

Family: Thymeliaceae

Local name: M. Akil/Oothu, T. Agali chandanam, S. Aguru, E. Aloe wood

Description: Trees, deciduous, bark grey, leaves lanceolate margin wavy, acuminate. Flowers creamy yellow. Fruits capsules greyish green seeds. beaked hard black.

Flowering & Fruiting: May - June

Distribution: Indo Malaya, Northeast India. Cultivated elsewhere.

Threat status: **Endangered**

General information: A tree of high value wood. Almost extinct in wild. Usually cultivated in Kerala.

8. Botanical Name: Ayapana triplinervis(Vahl)R. M. King & H. Rob.

Vulnerable

Family: Asteraceae

Local Name: M. Ayyapana, Vishapacha

Description: Undershrubs or large herbs. Stem reddish green. Leaves alternate lanceolate often curved, prominently 3 nerved from base.

Flowering & Fruiting: January - March

Distribution: Tropical America. In India often cultivated.

Threat Status: **Vulnerable**

General Information: A much sought after medicinal plant with several applications. Easy to propagate and cultivate in gardens.

9. Botanical Name: Baccaurea courtallensis (Wt.) Muel. -Arg.

Near Threatened

Family: Euphorbiaceae

Local name: M. Mootilpazham.

Description: Middle sized evergreen trees. Stem bark dark grey. Leaves alternate clustered at branch tips. Flowers minute in reddish spikes on tree trunks, fruits fleshy capsule with 3 seeds pinkish red when ripe.

Flowering & Fruiting: January – June.

Distribution: Endemic to southern Western Ghats.

Threat Status: **Near Threatened**

General information: Tree grows in shady moist slopes as subcanopy trees. Distinctly characteristic with its cauliflorous nature and clustered leaves at branch tips.

10. Botanical Name: Baliospermum montanum (Willd.) Muel. -Arg.

Vulnerable

Family: Euphorbiaceae

Local name: M. Nagadanthi, T. Naakatanthi, S. Danthi.

Description: Shrubs. Stem greyish green. Leaves alternate broad serrate. Flowers greenish yellow in axillary racemes. Fruits obscurely three lobed with 3 seeds.

Flowering & Fruiting: August - March

Distribution: Frequently seen in semievergreen forests.

Threat Status: **Vulnerable**

General information: The shrubs grow as bushes in shady moist areas. Distinctly characteristic with its broad serrate leaves and axillary suberect inflorescence. A very useful medicinal plant.

11. Botanical Name: Calophyllum calaba L. Vulnerable

Family: Clusiaceae

Local name: M. Attupunna, Cherupunna, E. Poonspar of Travancore

Description: Middle sized evergreen trees. Leaves opposite oblong thick dark green. Flowers white in axillary panicles. Fleshy capsule with 3 seeds. Fruits ovoid green turning orange fleshy with pale brown seeds.

Flowering & Fruiting: September - May.

Distribution: Evergreen forests and Sacred groves.

Threat Status: **Vulnerable**

General information: Handsome subcanopy trees. Distinctly characteristic with its thick leaves and dense foliage with fleshy fruits in bunches. Used in folk and Siddha medicines.

12. Botanical Name: Canarium strictum Roxb. Endangered

Family: Burseraceae

Local name: M. Sambrani, T. Sambrani

Description: Tall trees with grey bark and ovoid crown. Leaves alternate pinnate. Leaflets serrate Juvenile red turning green. Flowers greenish yellow in lax axillary panicles. Fruits hard drupe bluish purple when ripe with hard stone inside with 3 seeds.

Flowering & Fruiting: February – November.

Distribution: Western ghats and Northeast India.

Threat Status: **Endangered**

General information: Tree grows as canopy trees clearly notable with its straight grey boles with buttress and dense compact crown, juvenile red leaves and hard bluish fruits.

13. Botanical Name: Cayratia pedata (Lam.) A.Juss. ex Gagnep.

Vulnerable

Family: Vitaceae

Local name:. M. Velutha Korivalli

Description: Climbers, young stem hairy angled. Leaves palmate 5 – 9 foliate spreading, serrate. Flowers greenish yellow in umbellate cymes. Fruits fleshy berry with small seeds.

Flowering & Fruiting: June - December.

Distribution: Forest margins and roadsides vegetation.

Threat Status: **Vulnerable**

General information: Herbaceous climbers with large palmate leaves and tendrils. The fruit bunches are characteristic.

14. Botanical Name: Celastrus paniculatus Willd.

Vulnerable

Family: Celastraceae

Local name: M. Cherupunna, T. Vaaluluvai, S. Jyotishmathi

Description: woody lianas. Stem bark reddish brown lenticelled. Leaves alternate ovate obscurely crenate, light green. Flowers white or yellowish white in terminal panicles. Fruits orange yellowish coloured. Seeds red ariled.

Flowering & Fruiting: January – June.

Distribution: Western-ghats and northeast India. Deciduous forest

Threat Status: **Vulnerable**

General information: large climbers reddish brown stem and lenticelled, Flowers in terminal panicles. Seeds orange red arilled. Extensively used in Ayurvedic medicine.

15. Botanical Name: Chionanthus linocieroides(Wt.) Bennet & Raizada

Endangered

Family: Oleaceae

Local Name: M. Mala Elanhi, T. Sorkili

Description: Small or Middle-sized trees. Bark dark reddish brown. Leave opposite oblong margin entire, dark green above. Flowers white in small axillary panicles. Stamens 2, Fruits elliptic ovoid, drupe bluish when ripe.

Phenology: January – May.

Distribution: endemic to Southwestern Ghats. Evergreen shola forests.

Threat Status: **Endemic and Endangered**

General Information: Trees with lanky upturned branches and opposite leaves.

16. Botanical Name: Chukrasia tabularis A. Juss.

Rare in Palakkad

Family: Meliaceae

Local Name: M. Chuvanna Akil

Description: Tall trees with dense crown. Bark dark scaly. Leaves pinnate terminal leaflets larger reddish when young. Flowers in terminal panicles white. Fruits dark brown woody capsule with several winged seeds.

Flowering & Fruiting: May to March.

Distribution: Indo Myanmar. Seen in most districts in the state.

Threat Status: **Rare in Palakkad district**

General Information: Large densely crowned trees used for forest plantations with reddish brown scaly bark. Stout branches and pinnate leaves reddish when young. Highly useful timber tree.

17. Botanical Name: Cinnamomum malabatrum (Burm.f.) Bl.

Vulnerable

Family: Lauraceae

Local Name: M. Vayana

Description: Evergreen trees. Bark mottled reddish dark brown. Leaves opposite thick dark green above, prominently 3-nerved from base. Flowers yellowish in axillary and terminal panicled cymes. Fruit ovoid with a prominent disc at base.

Phenology: March – April.

Distribution: Endemic. Southwestern ghats.

Threat Status: **Vulnerable**

General Information: Much used tree for its leaves which are thick and prominently three nerved. Used in cooking and medicine.

18. Botanical Name: Cinnamomum sulphuratum Nees.

Vulnerable

Family: Lauraceae

Local name: M. Kattukaruva

Description: Trees with dark grey bark and ovoid crown. Leaves opposite simple thick with three prominent nerves. Flowers greenish yellow in lax panicled cymes. Fruits drupe bluish purple when ripe.

Flowering & Fruiting: March - June

Distribution: Endemic to Western ghats.

Threat Status: **Vulnerable**

General information: Tree grows as canopy trees clearly notable with its thick shining three nerved leaves, young leaves reddish. Used in Ayurvedic preparations.

19. Botanical Name: Cinnamomum verum J. Presl.

Endangered

Family: Lauraceae

Local name: M. Edana, Karuva, Vayana.

Description: Tall trees with grey bark and ovoid crown. Leaves alternate pinnate. Leaflets serrate Juvenile red turning green. Flowers greenish yellow in lax axillary panicles. Fruits hard drupe bluish purple when ripe with hard stone inside with 3 seeds.

Flowering & Fruiting: February – November.

Distribution: Western ghats.

Threat Status: **Endangered**

General information: The tree grows as canopy trees clearly notable with its straight grey boles and compact crown, juvenile red leaves and bluish fruits. Leaved used for cooking purpose too.

20. Botanical Name: Coscinium fenestratum (Goertn.) Colebr.

CR-Critically Endangered

Family: Menispermaceae

Local Name: Maramanjal T. Maramanchal, E.Tree turmeric, S.Daruharidra

Description: Lianas; wood yellow, branchlets hoary pubescent. Leaves simple, alternate, deltoid, ovate, apex acuminate, base truncate, margin entire; Inflorescence supra-axillary or cauliflorous. Female flowers mostly from old wood. Sepals 6, Petals 3; ovary densely pilose, staminodes 6. Fruit of 1or 2 drupes, globose, brown villous, seed 1, black, glabrous.

Flowering & Fruiting: August-October

Distribution: Indo-Malaya

Threat Status: **CR- Critically Endangered.**

General Information: Found in Semi-evergreen and evergreen forests. Ex-situ conservation and cultivation of this species has been taken up recently by JNTBGRI, KFRI etc. Used in place of Daru Haridra (Berberis) in Kerala.

21. Botanical Name: Crateva magna (Lour.) DC

Vulnerable

Family: Capparaceae

Local Name: M. Neer Mathalam, Narvala, Nilluvam, S. Varuna

Description: A middle sized lax branched tree with greyish smooth bark.

Leaves trifoliate smooth normally clustered at branch tips. Flowers in umbellate corymbs showy white with prominent stamens. Fruits ovoid hard, rind grey. Seeds many.

Flowering & Fruiting: March - April

Distribution: Indo Malaya and China

Threat Status: **Vulnerable**

General Information: The tree with trifoliate leaves and hard grey mottled fruits are highly used in Ayurvedic medicine industry. The bark is harvested and thus exposed to threat.

22. Botanical Name :Curcuma pseudomontana J.Graham

Vulnerable

Family: Zingiberaceae

Local Name: M. Kattumanjal

Description: Herbs with rhizome bright yellow when cut. Leaves elliptic

broad smooth and softly hairy. Inflorescence on separate spikes pinkish with attractive pink bracts and yellow petals.

Flowering & Fruiting: July - August

Distribution: Along the forest floor and grass lands. Western Ghats.

Threat Status: **Vulnerable**

General Information: Herbs appearing during rainy season with attractive inflorescence.

23. Botanical Name: Cycas annaikalensis Rita Singh & P. Radha

Rare in Palakkad

Family: Cycadaceae

Local Name: Eentha

Description: Single stemmed dwarf palm like unbranched trees. Stem fully covered with leaf scars. Leaves crowded at the stem tips spreading. Long pinnate with shining green leaflets.

Flowering & Fruiting: January - October

Distribution: Endemic to western Ghats. Anaikkal near Malampuzha, Palakkad.

Threat Status: **Endemic and Rare**

General Information: Single stemmed palm like tress with spreading crown of pinnate leaves. Only few individuals left in wild.

24. Botanical Name: Cycas circinnalis Linn.

Endangered

Family: Cycadaceae

Local Name: M. Eenthu, T. Eenthappanai, S. Hinthaala

Description: Palm-like tree 4 -8 meters tall. Cylindrical stem with leaf bases and crown of pinnate leaves which are 1.5 mtr or more long with 80 to 100 pairs of leaflets. Male cones + 35cm long and oval brown, shortly peduncled. Female cone brown tomentose. Seeds ovoid reddish.

Flowering & Fruiting: February – October.

Distribution: Africa, Southeast Asia. In India, Western Ghats, largely in Kerala. Karnataka, Tamilnadu and Odisha.

Threat Status: **Endangered**

General Information: Palm-like tree with a crown of long pinnate leaves and trunk with rings of leaf bases. Fruits are edible and harvested. Leaves for decoration.

25 & 26. Botanical Name: Cycas beddomei and Cycas seshachalamensis

are other endemic and rare cycads which also face threats. These species are also look similar in appearance. However, differ in leaf size and leaflet arrangements.

27. Botanical Name: Cynanchum annularium (Roxb.) Liede & Khanum. = Syn. Holostemma ada-kodian Schult.

Endangered

Family: Apocynaceae

Local Name: M. Adapathiyan, T. Paalaikkeerai, S. Jeevanthi

Description: Twiners with reddish brown stem. Opposite leaves, base

cordate. Margin often red tinged. Flowers in axillary few flowered cymes. Petals thick purple spotted yellowish white. Corona prominent. Gynostegium stout column. Fruit bulged follicle with many flat seeds crowned with silky corona.

Flowering & Fruiting: September - November

Distribution: South Asia. Assam, Meghalaya and all over Kerala.

Threat Status: **Endangered**

General Information: Twining climbers Leaves opposite and flowers with purple spotted petals and stout column of gynostegium. Follicles bulgy having flat seeds tipped with silky corona. The plant is also spiritually important for Yagam etc.

28. Botanical Name: Decalepis hamiltonii Wight & Arn.

Endangered

Family: Periplocaceae

Local Name: M. Makali kizhangu. Bombay nannari, T. Magali kizhangu

Description: Liana/ woody climbers, bark reddish brown. Roots aromatic

Stems laticiferous. Leaves shining green, orbicular. Inflorescence cymose umbellate. Flowers greenish yellow with reddish throat. Fruits paired bulbous follicles. Flat seeded corona silky hairy.

Flowering & Fruiting: May – August

Distribution: It is a perennial shrub grown in rocky steeps of dry deciduous forests.

Threat Status: **Endangered**

General Information: Woody climbers, with twining branches and pale green leaves and woody stout divergent follicles and many seeded silky corona of hairs. Roots tuberous fragrant. Used for pickles etc.

29. Botanical Name: Dipterocarpus indicus Bedd.

Vulnerable

Family: Dipterocarpaceae

Local Name: M. Kalpayin, Vella Ayini

Description: Lofty straight boled trees with prominently parallel secondary broad leaves crenate margin. Flowers white in panicled racemes. Fruits ovoid reddish brown with two large wings.

Flowering & Fruiting: February - July

Distribution: Western Ghats

Threat Status: **Vulnerable**

General Information: Lofty trees with straight boles and resinous. Fruits with two large wings.

30. Botanical Name: Dysoxylum malabaricum Bedd. ex C. DC

Endangered

Family: Meliaceae

Local Name: M. Vella Akil, E. White aloe wood, S. Sweta Aguru

Description: Tall trees with greyish yellow bark. Leaves mostly clustered at branch tips, pinnate with swollen rachis base. Flowers greenish yellow fragrant, 4-merous. with prominent staminal tube. Fruits yellow, single on branches, woody, seeds 3 to 4 reddish yellow.

Flowering & Fruiting: February – June.

Distribution: Southwestern Ghats.

Threat Status: **Endangered**

General Information: Tall trees with fragrant flowers, reddish yellow seeds and hard fruits.

31. Botanical Name: Elaeocarpus sphaericus (Gaetn.) Heer

Endangered

Family: Elaeocarpaceae

Local Name: M. Rudraksham, E. Utrasumbead tree, T. Ruttiratcham, S. Rudraksha

Description: Trees with smooth grey bark. Leaves elongate crenate yellowish red when senescent. Flowers white in axillary racemes or in leafless area below the leafy zone in branches. Petals fimbriate fruits hard drupes purple when ripe. Nut with wrinkled hard cover and usually 5 black seeds.

Flowering & Fruiting: May to November

Distribution: Southeast Asia. In India northeast and foothills of central Himalaya.

Threat Status: **Endangered**

General Information: A pretty evergreen tree with occasional yellowish senescent leaves and purple fruits with hard wrinkled brown stone. A spiritually significant tree.

32. Botanical Name: Embelia ribes Burm.f

Vulnerable

Family: Primulaceae

Local Name: M. Vizhaal, E. Embelia, T. Vaayu-vidanga, S. Vidanga

Description: Woody climbers bark brownish with lenticels and with profuse drooping lateral branches alternate leaves and terminal inflorescence on each brachlets. Flowers small greenish yellow. Fruits turning bluish purple when ripe.

Phenology: March to November.

Distribution: Indo Maleysian. Mostly in wester ghats and northeast Indian - Forest margins.

Threat Status: **Vulnerable**

General Information: Climbers with lenticellate branches mostly drooping fruits bluish purple in terminal panicles.

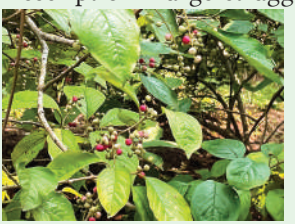
33. Botanical Name: Embelia tsjeriam-cottam(Roem. & Schult.) A.DC

Vulnerable

Family: Primulaceae

Local Name: M. Vizhal, Ammimuriyan, T. Vaivilangam, S. Bidanga, Vidanga.

Description: Large straggling shrubs with brownish bark. Leaves alternate obscurely dentate. Inflorescence panicled racemes of white flowers. Fruits profuse, reddish when ripe. Slightly beaked 1 seeded.



Flowering & Fruiting: March to December.

Distribution: India, Myanmar. Moist deciduous forests.

Threat Status: **Vulnerable**

General Information: A dense straggling shrub with lenticelled branches and profuse flower and fruit. Fruits small globose beaked. Fruits harvested for Ayurveda industry.

34. Botanical Name: Gardenia gummifera L. f. Vulnerable

Family: Rubiaceae

Local Name: M.Somanadikaayam, E. Cumbi-gum tree, T. Kampilippisin, S. Nadeehingu

Description: Small trees or shrubs. Branchlets greenish with a bright yellow, fragrant resinous exudate. Leaves with prominent lateral nerves with a gland at the axil of each nerve. Flowers white turning yellow. Fruits a many seeded berry.

Flowering & Fruiting: December – May.

Distribution: South India.

Threat Status: **Vulnerable**

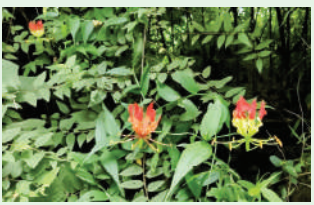
General Information: Shrubs or small trees with shining yellow gum at leaf tips is characteristic. This is a popular medicinal plant.

35. Botanical Name: Gloriosa superba L. Vulnerable

Family: Liliaceae

Local Name: M. Menthonni, E. Malabar glory lilly, T.- Kalappaikkilangu, S. Langali

Description: Green stemmed climbers with coiled tendril like bearing leaf tips. Tuberous. Flowers single or clustered showy, petals red and yellow. Stamens spreading, carpels green prominent. Fruits green.



Flowering & Fruiting: July – December.

Distribution: South Asia. Africa. In India throughout. Along forest margins, scrublands.

Threat Status: **Vulnerable**

General Information: slender climbers with coiled leaftips and yellow red flowers with upturned wavy petals. The tubers are collected and traded for medicinal purpose

36. Botanical Name: Hedychium coronarium J. Koenig

Near Threatened

Family: Zingiberaceae

Local Name: M. Saugandhikam, E. Butterfly lily, T. Seemai Kitchili.

Description: Rhizomatus herbs with clustered stems and dense leaves.

Flowers in terminal spikes, white showy, fragrant. Fruits beaked.

Flowering & Fruiting: July – December.

Distribution: Southeast Asia. Most part of India. Usually along forest margins, roadsides, and gardens.

Threat Status: **Near Threatened**

General Information: A very handsome herb with attractive white fragrant flowers and rhizomes.

37. Botanical Name: Hildegardia populifolia (DC.) Schot.& Endl.

Endangered

Family: Malvaceae

Local Name: Malai Poovarasu, Poplar sterculia

Description: Middle sized tree with greenish smooth bark. Leaves

broad cordate, 5 to 7 lobed, tip tapering. Inflorescence axillary panicles. Flowers scarlet red having 5 nearly free sepals. Fruits of 5 follicles 2 seeded.

Flowering & Fruiting: June to February

Distribution: Endemic distributed only in certain parts of Eastern Ghats of Tamil Nadu and Andhra Pradesh.

Threat Status: **Endangered**

General Information: This is a smooth green barked deciduous tree with long petioled lobed leaves. Flowers purple in panicles. Fruits spreading follicles having two seed each.

38. Botanical Name: Hydnocarpus macrocarpa (Bedd.) Warb.

Endangered

Family: Flacourtiaceae

Local Name: M. Marotti, E. Chaulmugra tree, T. Maravetti , S. Tuvaraka

Description: Evergreen Trees with narrow crown, bark grey, branchlets slender drooping. Leaves oblong lanceolate. Flowers white fascicled. Fruits lager globose dark brown with hard rind. Seeds many.

Flowering & Fruiting: March – May.

Distribution: Southwestern Ghats.

Threat Status: **Endangered**

General Information: The tree has greyish bark, drooping branches, dark brown many seeded fruits, prominently seen.

39. Botanical Name: Hydnocarpus pentandra (Buch.-Ham.) Oken

Vulnerable

Family: Flacourtiaceae

Local Name: M. Marotti E. Chaulmugra tree, T. Maravetti, S. Tuvaraka

Description: Tall deciduous trees, bark fluted pale grey. Leaves alternate elongate elliptic. Flowers solitary in clusters greenish yellow. Fruits brown, with thick rind and many seeds.

Flowering & Fruiting: December – May.

Distribution: Endemic to Western ghats. Deciduous and evergreen forests.

Threat Status: **Vulnerable**

General Information: A handsome tree with nearly dropping branches. Fruits brown with thick rind and wrinkled. The fruits yield oil used in medicine and cosmetics.

40. Botanical Name: Lagerstroemia microcarpa Wt.

Endangered

Family: Lythraceae

Local Name: M. Venthekku

Description: Deciduous trees with pale brown bark peeling off in long flakes. Branchlets angular. Leaves opposite. Flowers white in panicles. Petals clawed, stamens many. Fruits woody capsules. Seeds many narrowly winged.

Flowering & Fruiting: June to February

Distribution: Western ghats in drier areas.

Threat Status: **Endangered**

General Information: A very useful timber yielding species. Getting rarer.

41. Botanical Name: Limonia acidissima L.

Vulnerable

Family: Rutaceae

Local Name: M. Vilarmaram, E. Monkey fruit, T. Vilaankay maram, S. Kapittha

Description: Middle sized thorny trees with clustered imparipinnate leaves having 5-7 leaflets that are gland dotted. Flowers reddish in small cymes. Fruits grey hard rinded and many seeded.

Flowering & Fruiting: December - June

Distribution: Indo – Maleysian. In tropical forests.

Threat Status: **Vulnerable**

General Information: Thorny Trees with pinnate leaves with gland dotted and crenate margin with hardgrey, globose pulpy fruits.

42. Botanical Name: Madhuca insignis (Radlk.) H.J.Lam.

Endangered

Family: Sapotaceae

Description: Middle sized trees, bark dark grey, leaves narrow elongate, spirally around the branches. Young leaves red tinged. Flowers clustered, creamy white/yellow. Fruits spindle shaped brown one seeded. Seeds shining brown.

Flowering & Fruiting: November – April.

Distribution: Endemic to coastal Karnataka. Usually along riverbanks.

Threat Status: **Endangered**

General Information: Middle sized evergreen trees with narrow leaves. Flowers in clusters creamy with many stamens. Seeds shiny brown tapering at both ends. Yields edible oil and heavily extracted.

43. Botanical Name: Madhuca longifolia (Koenig) Macbr

Near Threatened

Family: Sapotaceae

Local Name: M. Ilippa, E. South Indian Mahua, T. Iluppai, S. Madhooka

Description: Large deciduous trees, bark brownish grey fissured pealing into flakes, with white latex. Leaves long petioled broad obovate clustered at branch tips. Flowers creamy fragrant. Fruits ellipsoid brown hairy beaked with 1 to 3 black shiny seeds.

Flowering & Fruiting: December – July

Distribution: India, Srilanka and Myanmar. Warmer parts of India and Tropical Himalaya. Central Kerala in riparian areas.

Threat Status: **Near Threatened**

General Information: Large trees with milky latex. Leaves broad obovate clustered at tips. Fruits clustered at axils ellipsoid with black shining seeds.

44. Botanical Name: Michelia champaca L.

Near Threatened

Family: Magnoliaceae

Local Name: M. Chempakam, E. Golden Champa, T. Sempakam, S. Champaka

Description: Tall trees bark grey. Branchlets greenish, lenticelled. Leaves alternate ovate lanceolate broad tapering to tip. Margin wavy. Flowers solitary yellow or orange yellow strongly fragrant. Stamens on central column perianth petaloid usually 9. Fruit aggregate elongate with several carpels green with white dots. Seeds hard red arilled.

Flowering & Fruiting: February – August.

Distribution: South Asia. Tropical and subtropical forest. Often planted. In dense forests of Kerala.

Threat Status: **Near threatened**

General Information: Tall evergreen trees with ovate leaves lenticel doted branchlets. Flowers very fragrant yellowish. Fruit an elongate aggregate of follicles having red arilled seeds. Used in perfumery

45. Botanical Name: Moringa concanensis Nimmo ex Dalz. & Gibson

CR-Critically Endangered

Family: Moringaceae

Local Name: M. Muringa, E. Horse-radish tree, T. Murunkai, S. Sigru

Description: Middle sized deciduous trees with soft whitish wood and brittle branches. The tree exudes a reddish-brown gum. Leaves large compound with numerous leaflets. Flowers white irregular in large panicles. Fruits a long slender trigonous pod. Seeds obscurely triangles hard with white wings.

Flowering & Fruiting: February – August.

Distribution: In India Peninsular region. Tamil Nadu, Andhra Pradesh and Maharashtra.

Threat Status: **Critically Endangered**

General Information: Middle sized trees with large decompound leaves, white flowers in terminal panicles and long linear capsular fruits and white winged seeds. A super food. All parts used as food or medicine.

46. Botanical Name: Naringi crenulata (Roxb.) Nicolson = Limonia crenulata Roxb.

Rare in Palakkad

Family Rutaceae.

Local Name: Katu narakam, Maha Villwam. T. Magavilvam.

Description: Thorny trees with sharp thorns. Leaves pinnate, rachis winged, leaflets 3-7 margin crenate, gland dotted. Flowers white in axillary short racemes. Fruits globose, bluish black when ripe 1 - 4 seeded.

Flowering & Fruiting: June – December.

Distribution: Indo Malayan. Tropical deciduous forest. In most districts.

Threat Status: **Rare**

General Information: Thorny trees with sharp thorns. Leaves pinnate with winged rachis crenate and gland dotted. Fruits globose bluish black.

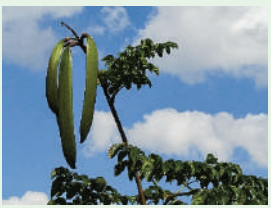
47. Botanical Name: Oroxylum indicum (L.) Benth ex Kurz.

Endangered

Family: Bignoniaceae

Local Name: M. Palaka Payyani, T. Peru Vagai, Pei maram, S. Syonaka, E.Indian trumpet flower

Description: Deciduous sparingly branched trees, barks greyish brown. large decompound leaves clustered at the branch tips. flowers in large erect terminal racemes. Greenish yellow with purple stripes irregular. Trumpet shaped. Fruits very long sword like black when ripe. Seeds many flat white winged.



Flowering & Fruiting: September - July

Distribution: South Asia. Throughout warmer parts of India.

Threat Status: **Endangered**

General Information: Middle sized trees with terminal clusters of large leaves. Flowers in terminal erect racemes. Fruits sword like black capsule with numerous flat thin white winged seeds. Endangered due to bark extraction. An important ingredient of Dasamoolam

48. Botanical Name: Persea macrantha (Nees) Kosterm.

Vulnerable

Family: Lauraceae

Local Name: M. Kulamavu, T. Kulamavu,

Description: Ever green trees with greenish branchlets. Leaves petioled simple usually clustered at branch tips. Glaucous beneath. Inflorescence terminal or axillary panicles. Flowers pale yellow. Fruits globose berries blackish.

Flowering & Fruiting: December – June

Distribution: India Sri Lanka. Mostly in Western ghats.

Threat Status: **Vulnerable**

General Information: Large evergreen trees bark thick and fleshy. Bark hugely extracted for Agarbathi industry thus pushing them to danger.

49. Botanical Name: Piper longum L.

Near Threatened

Family: Piperaceae

Local Name: M. Tippali, E. Indian long pepper, T. Pippili, S. Pippali

Description: Scandent or trailing herbs. Rooting at nodes in contact with soil. Leaves alternate nearly heart shaped with 5 – 7 prominent lateral nerves. Flowers in slender spikes.

Fruiting spikes short green turning blackish.

Flowering & Fruiting: September to June.

Distribution: Indo – Malayan, Western ghats and Northeast India.

Threat Status: **Near Threatened**

General Information: Creeping or scandent slender climber, leaves with 5 -7 lateral nerves arising from base. Spikes slender short turning black. Fruit spikes and roots exploited for medicine.

50. Botanical Name: Pseudarthria viscida (L.) Wt. & Arn.

Vulnerable

Family: Fabaceae

Local Name: M. Moovila, T. Muyyaakuponna, S. Saalaparni

Description: Under shrubs with angular hairy stems, leaves trifoliate swollen at base. Terminal leaflet rhomboid. Flowers pink clustered in terminal racemes. Pods flat hairy. Seeds kidney shaped brown shiny.

Flowering & Fruiting: September – April.

Distribution: Afro- Asian, dry zones in southern state in dry scrub jungles.

Threat Status: **Vulnerable**

General Information: Undershrubs with sticky leaves and fruits having glandular hairs. Wood highly traded for medicinal purpose

51. Botanical Name: Pterocarpus santalinus L.f.

Endangered

Family: Fabaceae

Local Name: M. Raktha Chandanam

Description: Middle sized trees with compact crown, Bark dark brown appearing in rectangular plates. Leaves pinnate. Usually 3-foliate or 3-5-foliate ovoid flowers yellow in panicled racemes. Fruits flat roundish winged. Usually, one seeded rarely 2 reddish brown.

Flowering & Fruiting: April – September.

Distribution: Endemic to Eastern ghats in Cudappah region. Cultivated elsewhere.

Threat Status: **Endemic and Endangered**

General Information: Tree with crocodile back like bark that yields red exudate when cut. 3 thick pinnate leaves. Profuse yellow flowers and roundish winged fruits.

52. Botanical Name: Rauvolfia serpentina (L.) Benth ex Kurz

Endangered

Family: Apocynaceae

Local Name: M. Sarpagandhi, E. Serpentina root, T. Sarpagandhi, S. Sarpagandha

Description: Dwarf shrubs/ undershrubs stem woody at base. Leaves elongate pointed at both ends clustered at tips. Inflorescence terminal umbellate cymes. Purplish pink/ pale white. Fruiting peduncles red, fruits shining black seeds yellow discoid.

Flowering & Fruiting: March to December.

Distribution: In tropical forests as undergrowth.

Threat Status: **Endangered**

General Information: Mostly unbranched undershrubs with clustered leaves at tips. Inflorescence pinkish, turning red with black fruits.

53. Botanical Name: Salacia oblonga Wall ex Wt. & Arn.

Vulnerable

Family: Celastraceae

Local Name: M & T. Ponkoranti

Description: Large climbers, branch lenticellate dark brown, leaves subopposite or opposite oblong, thick, flowers clustered greenish yellow. Fruits ovoid green turning red fleshy.

Flowering & Fruiting: March - May.

Distribution: Southern India. Tropical forests.

Threat Status: **Vulnerable**

General Information: Climbers with fleshy orange fruits.

54. Botanical Name: Salacia reticulata Wt.

Vulnerable

Family: Celastraceae

Local Name: M. Kornadi, Ponkorandi, Ekanayakam S. saptarangi.

Description: Scandent shrubs. Branches dark brown lenticellate. Leaves lanceolate shining green above. Flowers greenish yellow in axillary clusters. Fruits elliptic beaked.

Flowering & Fruiting: February to August.

Distribution: South India and Srilanka.

Threat Status: **Vulnerable**

General Information: Scandent shrubs that getting rarer. Used in Ayurveda and highly exploited.

55. Botanical Name: Santalum album L.

Endangered

Family: Santalaceae

Local Name: M. Chandanam, E. White sandal tree, T. Chandanam, S. Chandanam

Description: Middle sized trees with greyish brown fissured bark. Semi parasitic in juvenile stage and require host plant. Leaves opposite flowers in terminal or axillary panicles, purple. Fruits oval green turning black one seeded. Seeds white.

Flowering & Fruiting: September to November

Distribution: South India, Malaysia and Indonesia.

Threat Status: **Endangered**

General Information: The heartwood especially at the root stem transition zone is strongly Aromatic. The tree is indiscriminately over exploited for the costly sandal wood industry. The fruits are eaten by birds.

56. Botanical Name: Sapindus emarginatus Vahl.

Rare in Palakkad

Family: Sapindaceae

Local Name: M. Soapin kaya

Description: Trees with spreading crown bark brown scaly. Leaves strongly pulvinate. Pinnate. Leaflets stout thick strongly veined. Flowers in panicles pale yellowish. Fruits bulged 1 to 3 lobed yellow when ripe wrinkled. Seeds hard black.

Flowering & Fruiting: December – April.

Distribution: South Asia. Largely in Southern India.

Threat Status: **Rare**

General Information: The soap nut tree is characterised by its thick leaves and hard fruits. Seeds hard and black. Fruits used as detergent and largely harvested impacting the regeneration.

57. Botanical Name: Saraca asoca (Roxb.) de Wilde

Endangered

Family: Caesalpiniaceae

Local Name: M. Asokam, E. Asoka tree, T. Asogam, S. Asoka

Description: Medium sized tree with dense crown and foliage. Bark dark brown. Laves pinnate pulvinate. Juvenile leaves reddish or brownish. Drooping. Flowers in axillary panicles of showy orange red flowers. Stamens prominent. Fruit a hard pod brown when ripe

Flowering & Fruiting: February - August

Distribution: Indo - Malayan. Western ghats, East and northeast India. Moist tropical forests.

Threat Status: **Endangered**

General Information: An ornamental tree for its foliage and flowers. Bark over exploited for Ayurvedic medicine and thus population decimated in nature. Easy to regenerate with seeds. But most seeds get infested by pests.

58. Botanical Name: Sarcostemma viminale (L.)R. Br. = S. acidum Roxb.

Vulnerable

Family: Asclepiadaceae

Local Name: M. Somalatha, E. Moon plant, T. Somam, S.-Soma

Description: Slender climbers with cylindric green stem jointed. Appearing mostly leafless. Flowers at nodes clustered umbels greenish white fragrant. Fruits slender follicles tapering at both ends. Seeds flat with crown of coma.

Flowering & Fruiting: August - May

Distribution: Indo Myanmar. Tropical dry forests, Western Ghats.

Threat Status: **Vulnerable**

General Information: Slender thread like green stems, clustered umbellate flowers. It's not only medicinal but also culturally important. Habitat destruction and exploitation reduces population.

59. Botanical Name: Strychnos nux-vomica L.

Rare in Palakkad

Family: Loganiaceae

Local Name: M. Kanjiram, E. Poison nut

Description: Trees with bark dark grey and canopy dense. Leaves opposite dark green above having 3 to 5 nerves from base. Flowers greenish white in short cymes. Fruits hard globose green turning yellow. Seeds flat discoid shining grey when dry.

Flowering & Fruiting: March to December.

Distribution: Indo Malayan. Distributed in tropical forests.

Threat Status: **Rare**

General Information: Trees with characteristic leaves and fruits with hard rind and discoid seeds. A plant with very poisonous seeds. A high demand species with ayurvedic pharmaceuticals.

60. Botanical Name: Syzygium travancoricum Gamble

Endangered

Family: Myrtaceae

Local Name: M. Vatham Kolli maram, Poriyal.

Description: Large trees. Bark greyish brown, young branchlets four angled. Leaves opposite nerves prominent looping. Flowers white fragrant in cymes appearing in panicles. Stamens prominent, fruits pinkish purple when ripe one seeded.

Flowering & Fruiting: March – June

Distribution: Southwestern ghats. Swampy areas in tropical forests.

Threat Status: **Endangered**

General Information: Trees with young branches angled. An endemic species which is highly threatened.

61. Botanical Name: Tinospora sinensis (Lour.) Merr.

Vulnerable

Family: Menispermaceae

Local Name: M. Kattu amruthu, E. Gulancha tinospora, T. Amurutavalli, S. Gudoochi

Description: Extensive climbers. Stems warty. Hairy young stems and leaves. Leave orbicular cordate. Flowers in slender racemes. Fruits orange red when ripe.

Flowering & Fruiting: December – May.

Distribution: Southwest Asia, China etc. South and Northeast India.

Threat Status: **Vulnerable**

General Information: Looks similar to Tinospora cordifolia but more-hairy when young and more warty. Threatened due to extensive collection for medicinal purpose and habitat loss.

62. Botanical Name: Trichopus zeylanicus Gaertn.

CR-Critically Endangered

Family: Dioscoreaceae

Local Name: M.- Aarogya pachha, Sasthankizhngu

Description: Herbs, rhizomes slender, leaves sub-cordate, elongate triangular long petioled. Flowers clustered at leaf base brown. Fruits slender stalked three angled. Seeds 6.

Flowering & Fruiting: November – March.

Distribution: Southwestern Ghats, endemic. Tropical evergreen forests.

Threat Status: **Critically Endangered**

General Information: This gregarious herb is found in forest floor with suberect leaves. Fruits brown. The plant is very popular as medicinal herb and is over exploited. Habitat destruction also decimates its population.

63. Botanical Name: Utleria salicifolia Bedd./ Decalepis salicifolius (Bedd. ex. Hook.f.) Venter

CR-Critically Endangered

Family: Asclepiadaceae

Local Name: M.- Mahali Kizhangu

Description: Under-shrubs. Sparingly branched, laticiferous leaves mostly clustered on stem tips. Petioles reddish. Leaves elongate narrow, margin wavy. Flowers greenish white in axillary dichotomous cymes. Fruits divergent capsules. Seeds with white hairs at the tip.

Flowering & Fruiting: November – March

Distribution: Endemic to Southwestern Ghats mostly on rocky habitats and cliffs.

Threat Status: **Critically Endangered**

General Information. Interesting shrubs endemic. Stem slender with aromatic roots. Used in medicine and for culinary purpose. Critically endangered. Follicles often red tinged.

64. Botanical Name: Vateria indica L.

Vulnerable

Family: Dipterocarpaceae

Local Name: M. Vellakunthirikkam, Payin, T. Vellai Kunthirikam, Vellai Kungillyam S. Dhupa, Ajakarna

Description: Large trees. Bark whitish Grey. Leaves petiolated with prominent swollen leaf base. flowers white in panicles large. Fruits brown when ripe angled.

Flowering & Fruiting: January to July.

Distribution: Endemic to Western Ghats throughout coastal forests

Threat Status: **Vulnerable**

General Information. Middle sized straight bold trees with white bark. Leaves red when new. Resin exudate extracted extensively. Timber too useful and over exploited.

Table: Rare Plants for Palakkad District in Our Collection

	BOTANICAL NAME	FAMILY	COMMON NAME	STATUS
65	Careya arborea	Lecythidaceae	Pezhu	Least concern
66	Dillenia pentagyna	Dilleniaceae	Kattu Punnakka	Least concern
67	Grewia tiliifolia	Tiliaceae	Chadachi	Least concern
68	Hibiscus tiliceum	Malvaceae	Aatuparuthi, Puzha paruthi	Rare
69	Pterygota alata	Sterculiaceae	Anathondi	Rare
70	Sterculia foetida	Sterculiaceae	Kavalam	Least concern
71	Actiniopteris radiata	Pteridaceae		Rare
72	Psilotum nudum	Psilotaceae		Rare

73	Scaveola cericae	Goodiniaceae	Bhadraksh-am	Rare
74	Euphorbia vajravelui	Euphorbiaceae		Endan-gered
75	Sesamum prostratum	Pedaliaceae		Endemic
76	Angiopteris evecta	Marattiaceae		Rare
77	Bentingkia condapana	Arecaceae		Rare
78	Zingiber sabuanum	Zingiberaceae.		Endemic
79	Helminthostachys zeylanicus	Ophioglossa-ceae		Rare

Palakkad district:

Palakkad is one of the 14 districts of Kerala state which is lying closer to the state of Tamil Nadu. The largest district(4482sq.km) with a population of 3119,027, is known for its unique features of geography, flora and vegetation, culture and historical aspects. Largely this is a hilly district with north south orientation and with a vast plain separating the hills known as the famous Palakkad gap. The gap which is around 34 km wide influences the climate and life of people, landscape, and vegetation. The district known for largest number of irrigation dams and water bodies that also include rivers and rivulets. The main dams are Malampuzha dam, Parambikulam dam, Pothundi dam, Managalam dam, Chulliyar dam, Walayar dam, Kuthipuzha dam etc. These are not only known for irrigation but also as centres of tourism. With gardens and amenities associated with each of them. Apart from these dams there innumerable ponds and lakes attached to temples and villages. The latest in lakes are the ones at Ahalia campus. These also help in ensuring water conservation, and adding to aquatic plant conservation preserving moisture levels of the land, and maintaining the water table. It also adds to aquaculture largely of fish for the people.

The plain has also given lots of agricultural option to the district to the level that it is popular in Kerala as the Granary of the state. It indeed is an agrarian district with agriculture as the main source of economy.

The main hill ranges are Attapadi, Nelliyampathy, Prambikulam, Dhoni, Walayar, etc These locations are known as tourist spots in the district and attracts large number of tourists. The hills have several peaks with an altitude of over 900m. Hills like Nelliyampathi has Tea estates, Cardamom plantations, Coffee estates etc making their resource value much higher with sustainability in hand.

The district having a forest cover to the tune of 46.94% harbouring rich flora which are managed by forest divisions like Palakkad, Nemmara, Attapadi etc. The important Protected areas include Parmabikulam Wildlife Sanctuary, Silent valley National Park, Choolanur Peafoul Sanctuary, etc and a social forestry division and several forest ranges.

This large and rural district of Palakkad which is considered comparatively backward is also in the threshold of development with several projects on the anvil. There are several road projects which is new ones or widening of existing roads that causes destruction to the vegetation. Likewise, pipeline projects and transmission projects. Further the district has industrial townships like Kanjikode, and other industrial corridor and so on. There are also upcoming urban zones and several building projects. The land use change certainly affects the flora and vegetation.

It is well known that the district has now been exposed to the threat perspective that are well recognised. Further, the climate change too has a perceptible impact. This need to be further documented and studied.

There is a ray of hope with our customs and traditions. Our traditional way of offering protection through Sacred Groves and Temple trees (like *Saraca asoca, Aegle marmelose*) are significant. Of

late we are also seeing a spurt in establishing star forests Navagraha plants etc in temple premises which could also result in conservation.

Thus, the district has a wide geographical feature, a large number of Water bodies, rich biodiversity, tourism activity, threat perspective, prevalence, protected areas, and so on that offer scope for deeper research and studies. Thankfully there is several research programmes to understand the flora and vegetation that have been bringing out detailed perspectives on the biodiversity. As an output of such studies several new species are being brought out regularly from the district.

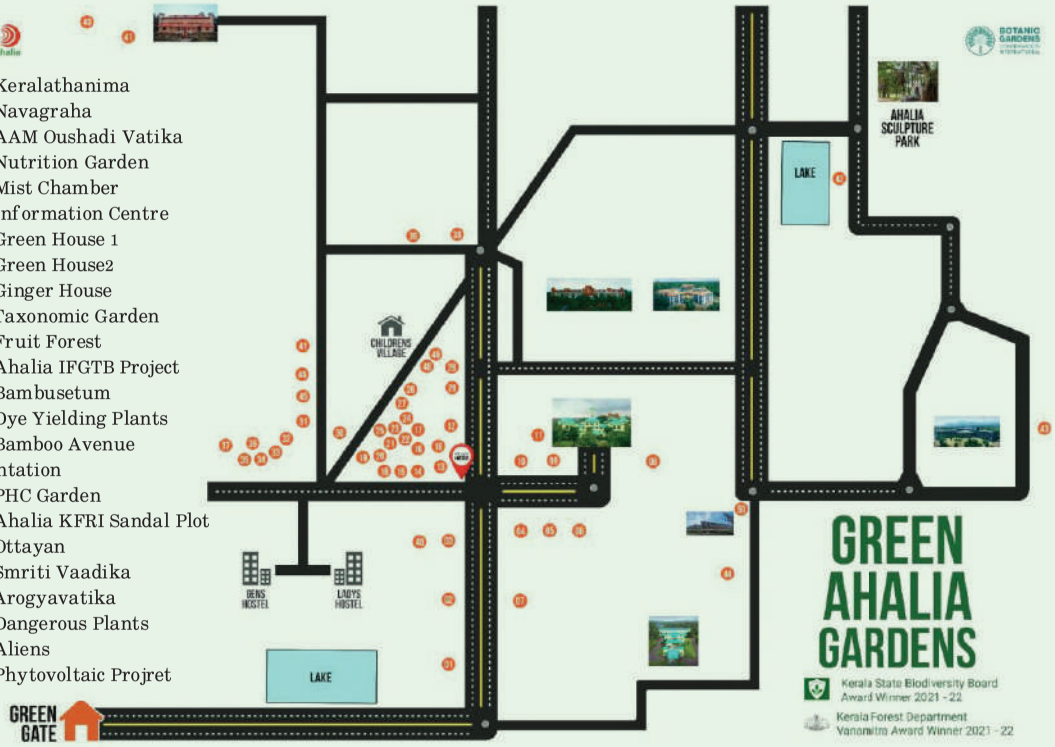
New species of plants from Palakkad (Selected few)

Sl	Name
1	Polycarpaea ebracteata S. Arya, V.S.A. Kumar, V. Suresh & Alen Alex.
2	Polycarpaea psammophila V. Suresh, V.S.A. Kumar, S. Arya, & Alen Alex.
3	Polycarpaea barbellata V.S.A. Kumar, S. Arya, V. Suresh & Alen Alex.
4	Glycosmis nelliyampathiensis Jabeena & Maya.
5	Casearia seethalakshmiae V. Suresh & Ambika.
6	Elaeocarpus gadgilii A M Maya, V. Suresh K M P Kumar.
7	Tripogon sugathakumariae Jabeena, sunil & Maya
8	Oldenlandia vasudevanii Soumya and Maya
9	Oldenlandia dineshii sojan and v Suresh
10	Sonerila nairii Soumya and Maya
11	Sonerila victoriae Soumya and Maya
12	Eriocaulon nepalensis var. luzulifolium Soumya & Maya
13	Pilea Suresh V & Sojan.
14	Polycarpaea palakkadensis Kumar, Sindhu Arya & Suresh
15	Allmannia multiflora Kumar, Suresh , Sindu Arya & Lamonico
16	*Chlorophytum palaghatense* K. M. P. Kumar and Adsul (Kumar, *et al.*, 2014a)

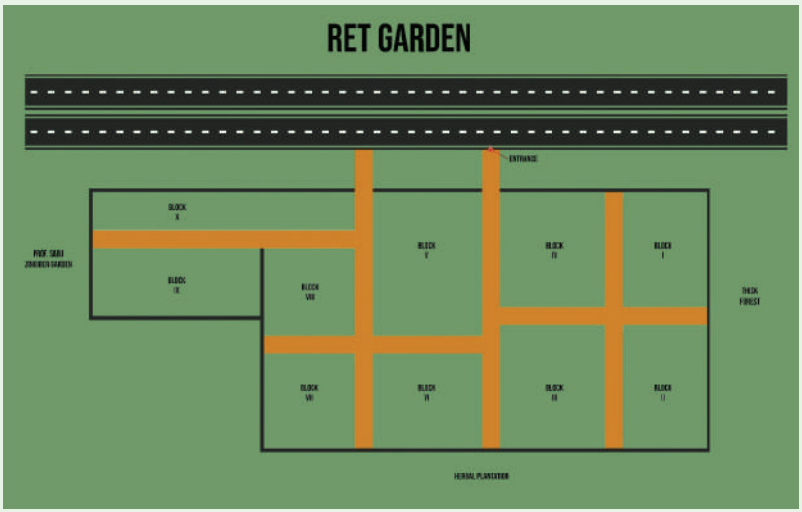
17	*Smithia venkobarowii* var. *glabra* Balan and Pradeep (Balan and Pradeep, 2014)
18	*Gentiana kurumbae* Anilkumar and Udayan (Anilkumar *et al*., 2015)
19	*Impatiens neo-modesta* Hareesh, K. M. P. Kumar and Sreekumar
20	*Impatiens sahyadrica* V. B. Sreek., Hareesh, Dantas and Sujanapal
21	*Impatiens sasidharanii*K. M. P. Kumar, Omalsree, Hareesh and V.B.Sreek.
22	*Impatiens sasidharanii* var. *hirsuta* K. M. P. Kumar, Omalsree, Hareesh and V.B.Sreek.
23	*Ophiorrhiza sahyadriensis* Hareesh, V. B. Sreek and K. M. P. Kumar
24	*Sonerila balasubramaniamii* Murugesan (Murugesan *et al*., 2015)
25	*Tripogon bimucronatus* Thoiba and Sunil
26	*Exacum keralense Geethakum.* K.M.P.Kumar, Pandur. & Deepu
27	*Fimbristylis tuckeri* Viji, Pandur. and Deepu
28	*Habenaria sahyadrica* K. M. P. Kumar, T. K. Nirmesh, V. B. Sreek. and Kumar
29	*Impatiens glabrata* K.M.P.Kumar, Hareesh *et* Bhaskar
30	*Justicia gambleana* K. M. P. Kumar, Robi and Hareesh
31	*Zingiber sabuanum* K. M. P. Kumar and A. Joe
32	*Arundinella muthikulamensis* Sunil, K.M.P.KumarandV.P. Thomas
33	*Isachne manilaliana* Sunil, K.M.P. Kumar and Thomas
34	*Leucas dhonimalayensis* Sunojk. and K.P. Vimal
35	*Oberonia muthikulamensis* K. Prasad, K.M.P. Kumar and P. Sudheshna
36	*Utricularia sunilii* Naveen Kum. and K. M. P. Kumar
37	*Begonia bachulkarii* Aitawade, Joseph John and S. R. Yadav
38	*Hedyotis indirae* K.M.P. Kumar and P.T. Aiswarya
39	*Themeda palakkadensis* Chorghe, K. Prasad and Lakshmin
40	*Peucedanum pradeepianum* K.M.P.Kumar, Hareesh & Balach.

41	*Eugenia pokkudani* A.M. Maya, K.M. Prabhukumar & V. Suresh
42	*Syzygium palghatense Gamble*
43	Kanjaram palghatense K. Ramamurthy
44	Porpax chandrasekharanii bharghavan and Mohanan
45	Rotala malamuzhensis Vasudevan nair
46	Oryza malampuzhaensis Krishn. Chandrasekhar
47	Silentvalleya nairii Vajravelu and Bharghava
48	Eulophia hirsuta joseph and Vajravelu
49	Hedyotis silentvalleyensis vajravelu, Rathakrishnan and Bharghavan
50	Curcuma vamana Sabu and Mangaly
51	Cycas anaikalensis Rita Singh & Radha

01.Sanketam RET Garden
02. Zingiber Garden
03. Rasayana Garden
04. Covid Garden
05. Substitute and Adulterants Garden
06. Ayurveda Syllabus Garden
07. SMPB Cultivation Project Area
08. Spiritual Garden
09. Anjaneya Garden
10. Nalpamaram
11. Temporary Nursery
12. Palmetum
13. Star Forest
14. Orchid House
15. Fern and Foliage House
16. Cacti and Succulent House
17. Gymnosperm Garden
18. Rasi Vanam
19. Hibiscus Garden
20. Aquatic Garden
21. Dasapushpam
22. Dasamoolam
23. Thrikadu
24. Thriphala
25. Butterfly Garden
26. Aromatic Garden
27. Tulasithadam
28. Keralathanima
29. Navagraha
30. AAM Oushadi Vatika
31. Nutrition Garden
32. Mist Chamber
33. Information Centre
34. Green House 1
35. Green House2
36. Ginger House
37. Taxonomic Garden
38. Fruit Forest
39. Ahalia IFGTB Project
40. Bambusetum
41. Dye Yielding Plants
42. Bamboo Avenue Plantation
43. PHC Garden
44. Ahalia KFRI Sandal Plot
45. Ottayan
46. Smriti Vaadika
47. Arogyavatika
48. Dangerous Plants
49. Aliens
50. Phytovoltaic Projret



Green Ahalia thematic Gardens sketch map



Way forward

Green Ahalia has evolving strategy to expand our conservation efforts. It covers not only inhouse planting and growing threatened plants but also production of Planting materials of such species for promotion of their cultivation elsewhere and introducing them to natural habitats so that a viable population of species concerned exists in its natural zone of distribution and in other gardens in the network. We have affiliation with BGCI and is part of the garden network.

Further reading

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Our partners – source of seedlings and propagation materials for Green Ahalia Garden.

Kerala Forest Research Institute (KFRI), Peechi, Thrissur, Kerala.

Malabar Botanic Garden and Institute of Plant Sciences (MBGIPS), Kozhikode

Javaharlal Nehru Tropical Botanic Garden & Research Institute (JNTBGRI), Palode, Thiruvananthapuram.

M. S. Swaminathan Research Foundation (MSSRF), Community Agrobiodiversity Centre, Puthoorvayal, P.O. Meppadi, Wayanad.

URAVU Indigenous Science & Technology Study Centre (URAVU), Thrikkaipetta P.O. Wayanad, Kerala,

Social Forestry Division, SFD, Palakkad, Kerala.

Indian Institute of Horticulture Research (IIHR), Hessaraghatta Lake Post, Bengaluru

The University of Trans-Disciplinary Health Sciences and Technology (TDU), FRLHT, Jarakabande Kaval, Post Attur via Yelahanka, Bengaluru

Rayirath garden, Pattikad, Thrissur, Kerala.

Benhar Herbal Garden, Mannuthy, Thrissur.

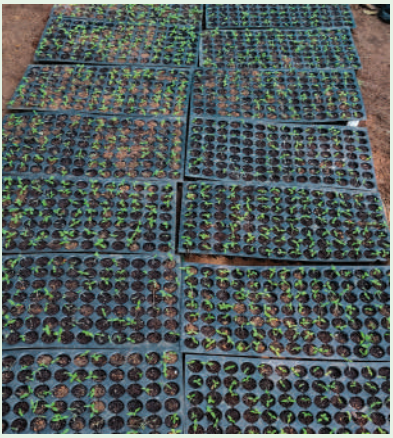
Ayyapa Nursery, Mannuthy, Thrissur, Kerala.

Kerala Agricultural University (KAU) Nursery, Mannuthy, Thrissur.

Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore.

Mohana Orchids, Vadanapalli, Thrissur.

Plate: Glimpses of plant propagation, nursery and field cultivation at Green Ahalia



Seed sowing and Germination In trays

Oroxylum germination in bed and transplanted seedlings

Sandal germination in trays

Seedlings of Cynanchum (Holostemma)

Seedlings ready In shaded nursery beds

in open nursery beds

Mist chamber view

Branch cuttings sprouting inside

Tamarix sprouting

Madhuca insignis sprouting

Field cultivation:

Sandal based Agroforestry with intercropping

Germplasm Cultivation.

RET Garden Sanketham views

Sanketham inner views

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Critically endangered

Endangered

Vulnerable

Near Threatened

Endemic

Rare