



The Eight Fellows:
Current Profile

Mr P. Sujanapal Ph. D.

Dr P. Sujanapal was senior amongst the fellows who had joined the RET project. Prior to his assignment with MSSRF he was a Junior Research Fellow associated with Dr N. Sasidharan, Scientist -E in various floristic projects at Kerala Forest Research Institute. Since 1998, he has been working in the field of plant taxonomy and so far he has worked in 4 research projects that focused on taxonomy of flowering plants. He has now joined CABc as a full time researcher in the area of applied systematic botany after the successful completion of his Ph. D. He was awarded the Degree for his work in plant taxonomy for the study of vascular flora of Parambikulam Wildlife Sanctuary in 2008. He has to his credit more than 20 research papers in national and international journals and two books. He has described 10 new species from the forests of Western Ghats. Dr Sujanapal is a very promising plant taxonomist of south India. Currently he is also involved

as a project consultant for the research wing of Kerala Forest Department and the State Medicinal Plant Board. He has received the Young Scientist Award from CSIR in 2009 for pursuing post doctoral program in Systematic Botany. His post doc work is on wild cloves and rose apples in Western Ghats, India.

Research work of Dr P Sujanapal for his post doctoral study

Since the time of Linnaeus, many species from old world and new world have been assigned to *Eugenia*. Taxonomists used various characters of the inflorescence and flower, particularly the calyx tube and perianth, in their attempts to delimit the species. However, there are many species with intermediate characters and that one or a few character differences should not be used to separate the taxa within the genera *Eugenia* and *Syzygium*. On the basis of the fact that from both the

vegetative and especially reproductive characters, it is rather difficult to conclude that they are different species. All the existing treatment failed to create a convincing classification for these genera. To sort out this ambiguity, the application of more relevant genotypic marker assisted classification systems for the genome analyses is more apt.

This is very relevant not only for systematics and conservation but also for the crop improvement program, as the genera are the wild relatives of valuable horticultural crops like clove, rose apple, etc. For analyzing agricultural, horticultural, plant breeding, nutritional peculiarities of wild and cultivated species of *Syzygium* and *Eugenia*, particularly for the endemic species, a detailed biosystematic investigation is inevitable. DNA based marker technology has been extensively exploited for plant genome analysis in the past decade. Although these molecular markers have complimented the conventional classification strategies, the comparative accounts of both may better reflect on the actual genetic variability. PCR based marker technologies have been successfully employed by many laboratories to assess the genome diversity. Hence, the evaluation of the genetic diversity among the taxonomically important *Syzygium* and *Eugenia* species using ITS marker techniques may bring a better conclusion on taxonomic riddle of these genera.

The study aims at carrying out an integrated approach to elucidate the taxonomic status of the taxa described under *Syzygium* and *Eugenia*.

Work progress: Intensive field surveys had been conducted and first hand knowledge was acquired on distribution, diversity, conservation and taxonomy of cloves and rose apples of southern Western Ghats, especially of the evergreen forests. Rare and endangered species such as *Eugenia argentea*, *Syzygium palghatense*, *S. myhendrae* and *S. rama-varmae* were rediscovered during the floristic exploration in different parts of the Western Ghats. The identity of some of the specimens collected from the protected area could not be fixed. The recollection activities of the remaining species such as *S. beddomei* and *S. rubicundam* from their type localities have been initiated.



Mr M. Remesh Ph. D.

The project on RET plants at MSSRF offered an opportunity to Dr M. Remesh who was then engaged in taxonomic and ethnobotanical research connected with CRIKSC to work in the area of conservation action. His field level experience and interest in ethnobotanical knowledge survey was the key factor in selecting him for the the fellowship. He started his research career at Kerala Forest Research Institute as Research Fellow in a project on 'Revisionary studies on Indian Bamboos'. During this period he had been involved in exploration of bamboo species in different parts of India including Andaman and Nicobar Islands . He was awarded with Ph. D. degree from University of Calicut. He has received SRF award from CSIR New Delhi, Young Scientist award of DST and D. S. Kothari award from UGC for post doctoral fellowship. He has 9 research publications to his credit.

Synopsis of Dr M. Remesh for his post doctoral study

Ethnobotany is the study of plant human interaction in a given environment. It is over hundred years since it began to emerge as an independent discipline. Yet this discipline has still to attract more interest from researchers. Ethnobotanic studies, as it is today, concentrates mostly on the areas inhabited by aboriginal and rural people. The aboriginal people are in transition, as is the rest of the world, as a consequence of the tremendous pace of acculturation and development. The age-old culture and traditions are fast disappearing. To expedite ethnobotanic research among the vanishing cultures and groups, he has undertaken ethnobotanical studies of little known tribal groups of Kerala with special reference to phytochemical and biological studies. The major challenge

of this work was his attempt to compare the traditional knowledge with the efficacy of a chemo-biological background based on scientific knowledge.

Work progress: Extensive field surveys are being conducted in various tribal settlements of Thiruvananthapuram, Palakkad, Malappuram, and Wayanad districts and among nomadic groups. More than 2000 plants of ethnobotanic importance have been collected and described from Palakkad district. Efforts are being made to collect detailed ethnomedical uses of plants. Phytochemical investigations have been initiated on ethnic remedies at the Institute of Forest Genetics and Tree Breeding, Coimbatore.



Ms C. S. Dhanya

Ms Dhanya joined the CAbC, MSSRF in 2004 as a Research Fellow in a project supported by IIN- India of BGCI entitled 'Conserving 10 Rare, Endangered and Threatened (RET) Plant Species for the Livelihood Security of the Tribal and Rural Communities of Wayanad District, Kerala' and gained experience in conservation efforts of rare plant species with the involvement of forest dependent communities. Subsequently, she entered the conservation mission of saving 80 RET plant species, concentrating on the conservation of 10 Endangered Endemic Tree species confined to Southern Western Ghats (Kerala). During this period, she built up a strong base in the research methodologies that are used in the studies of conservation biology of endangered plant species. Her other focused areas of interests are Population Ecology and Pollination Biology of endangered tree species. During her field trips she has trekked to difficult terrains and has considerably honed her skills in field photography.

She is an active member of forum for RET, campaigning for the conservation of endangered tree species of Western Ghats. She is also involved in the preparation of the Management Plan for the newly constituted Malabar Wildlife Sanctuary focusing on the management of endangered trees.

Synopsis of Ms Dhanya's Doctoral study

'Conservation biology of *Eugenia argentea* Beddome (Myrtaceae) an Endangered tree species endemic to southern Western Ghats of India'

Eugenia argentea Beddome (Myrtaceae) is a small tree endemic to southern Western Ghats of Peninsular India. R. H. Beddome described this species for the first time, based on his collections from Wayanad district of Kerala in 1872¹¹. After Beddome's collection, no report of its occurrence came from anywhere. Consequently this species has been included in the Red Data Book of Indian Plants as Endangered or Possibly Extinct. After a lapse of 130 years, in 2002, during the floristic exploration of Wayanad district, M.K. Ratheesh Narayanan, Senior Scientist of CAbC had relocated a small population of this species from the evergreen forests of the western slopes of Wayanad hills, which confirmed its existence in the type locality.

Rediscovery of *Eugenia argentea* from its type locality confirms its existence. However, the real picture of its threat status is unknown. This species with narrow endemic zone of distribution is in imminent danger of extinction, which in turn underlines the urgent need for studying the conservation biology so as to evolve appropriate conservation strategies. Besides, conservation efforts will not be effective unless the factors that limit the taxon's distribution and abundance in its natural range are understood. Therefore, a detailed field study to bring out the factors involved in the threatening process of the species is necessary and timely. The objectives of the study are: (i) to assess the population status of *Eugenia argentea* (ii) to investigate the causative factors responsible for endangerment of *Eugenia argentea* (iii) to study the reproductive biology of *Eugenia argentea* and (iv) to study the artificial regeneration possibilities of *Eugenia argentea*

Work progress: The methodologies required for performing the studies on reproductive biology, population ecology and propagation of the species have been finalized. A number of field surveys have been conducted in the forests of southern Western Ghats having climatic and geographical features similar to that of the type locality of the species. Three additional populations of the species were located in the evergreen/ shola forests in Wayanad and Kozhikode districts of Kerala and the total extent of occurrence of the species has been assessed. Studies on the population structure and observation, focusing on parameters like flowering and fruiting phenology of individual plant as well as the population as a whole are under progress.



Ms Smitha S. Nair

Ms Smitha S. Nair joined CABIC, MSSRF in May 2006 with a keen interest in conservation and academic research. She was a lecturer in the Department of Botany, C. M. S. College, Kottayam, Kerala. She also held the position of a technical trainee in the Rubber Research Institute of India where she got trained in the biochemical and molecular analyses of Rubber germplasm. She is deeply interested in the areas of Conservation Biology and Environmental Biotechnology. She is an active member of Kottayam Nature Society, an NGO working for environmental awareness and pursuing strong efforts in conservation of Vembanad Lake, one of the Ramsar sites of India. She is a member of Indian Association for Angiosperm Taxonomy (IAAT).

She is an active member of forum *for RET*, focusing on the conservation of Myristica swamps, the unique but endangered ecosystem of Western Ghats.

Synopsis of Ms Smitha's Doctoral study

'Systematic Revision and Conservation Biology of Myristicaceae in Kerala'

Myristicaceae is a primitive family of flowering plants exclusively with tree species having a wide pantropical distribution. The family is represented in the Western Ghats with five species and three subspecies under three genera²³. Being the wild relatives of the tree spice *Myristica fragrans* (the mace and nutmeg of commerce), these serve as a valuable genetic resource for crop improvement programmes for this cash crop in India. In the present context of inadequate taxonomic study on these relevant taxa²³, the systematic revision of Myristicaceae in Kerala has been undertaken to reveal the correct taxonomic identity and the habitat specificity of these species which are of much importance in this regard. Moreover, as an important constituent of the evergreen forests and as the flagship species of the highly fragile ecosystem of Myristica swamps, these species have a key role in the phytogeography of Western Ghats. Hence, it is also proposed to study the present population structure, the extent of natural regeneration and other relevant information on the conservation biological aspects of these species so as to address the need of conservation of these endemics.

Work progress: The systematic revision is progressing using the conventional taxonomic tools. The phenological events have been documented through the three-year sequential observations and the vegetative parts, fruits and the male flowers of all the species have been collected and studied. Through extensive field trips conducted in the forest areas of Kerala and by laying down permanent plots in concerned sites, the process of field data collection has been completed for the assessment of extent of natural regeneration and population structure of the species. The germination process has also been studied employing the *in vivo* nursery techniques.



Ms Sujana K. A.

Ms Sujana joined the RET project in May 2006 after a two year period tenure in Kerala Forest Research Institute, where she worked as an assistant in the documentation of ethnic and indigenous knowledge of Palakkad and Malappuram Districts of Kerala. Her contributions with KFRI included strengthening and digitalization of KFRI Herbarium. Her other focused research areas were traditional bee-keeping methods and plant pollinator relationship aspects. The major experiences she brought to MSSRF included forest ecology, field level knowledge of systematic botany, skills in phyto-sociological analysis, vegetative propagation and statistical analysis of ecological data. She has acquired considerable new skills like community mobilization for conservation and project cycle management. Her specialized interest is in the taxonomical, ecological and anatomical research on lianas. She has co-authored 22 research papers covering plant taxonomy, ecology and ethnobiology in various national and international scientific journals.

She is an active member of forum for RET and is a member of the Wetlands International Forum. She is involved in the conservation of flora of Kole wetlands of Kerala, a part of Vembanad Kole Ramsar Site since 1996.

Synopsis of Ms Sujana's Doctoral study

'A study on Taxonomy and Ecology of Woody Climbers of Wayanad plateau of Western Ghats, Kerala'

Woody climbers or lianas are strictly defined as climbing plants that produce true wood (*i.e.*, xylum tissues derived from a vascular cambium) and that germinate on the ground but lose their ability to support themselves as they grow, so they have to rely on external physical support to ascend to the canopy. Lianas impede tree growth and regeneration by competing for growing space and cause mechanical damage and accelerate forest fire. Liana abundance is an indicator of disturbance and also lianas thrive well in flooded areas and nutrient rich soil.

Quantitative inventories on lianas in Indian forests are extremely limited. The ecology of liana in the forests of Western Ghats of Kerala and their distribution and endemism is still poorly known.

Apart from few taxonomic works no information is available on this group of plants, especially in case of narrow endemics regarding their diversity, distribution, phyto-sociology and ecological attributes. Some of the major research questions are: How species rich are 1 ha plots in terms of liana? Do liana species show restriction to specific habitats? Is Wayanad plateau more diverse than other sampled areas in south India? The specific objectives of the study are to: (i) Document the taxonomic diversity of woody climbers in Wayanad district with special emphasis on species endemic to Western Ghats of Kerala; (ii) Investigate ecological functioning of woody climbers and factors that influence the population, abundance and distribution and (iii) Examine adaptive trends in bark and wood anatomy of lianas

Work progress: Several field visits were conducted and 178 woody climbers from different forest types of Wayanad plateau were collected. Observations were made and documented on the morphological peculiarities of bark and colour, nature and colour of exudation, and wood colour. A field identification key using nature of wood and bark was prepared. Phyto-sociological studies of 30 ha permanent plot was completed. Diversity indices such as Fisher's Alpha, Simpson, Shannon, Hill diversity Numbers such as N1 and N2 and Evenness indices were computed to determine species richness and abundance at 30 individual sites (each site of 1 ha. area). Traditional utilization pattern of liana species by local people are being documented. Anatomical studies of 18 woody climbing plants has been initiated.



Mr Satheesh K.

Mr Satheesh K. started his research career as a Research Fellow at CABc, MSSRF in 2006. He is an enthusiastic field biologist and plant taxonomist. He conducted a short term research work in 'Ethno-taxonomic and Ecological Significance of Wild Edible Mushrooms of Wayanad District'. For his RET Fellowship, he associated with the CMPR, Arya Vaidya Sala, Kottakkal for a collaborative research on RET medicinal plants. He has published 5 research papers in various national and international journals and has also co-authored 2 booklets. He has participated in national and international seminars and is an active member of for RET.

Synopsis of Mr Satheesh's Doctoral study

'Conservation and Phytochemical Investigation of the Genus *Gymnema* R. Br. Occurring in Kerala'

The major aims and objectives of the research study are (i) Survey, collection and documentation of *Gymnema* species in Kerala; (ii) Population estimation of different species of the genus *Gymnema*; (iii) Systematic investigation and phenological studies of the genus and construction of a key for the identification of different species; (iv). Study on the biotic association of different species of *Gymnema*; (vi). Phytochemical and chemotaxonomic studies of different species of the genus *Gymnema* occurring in Kerala and estimation of major secondary metabolites and (vii) Reintroduction of selected species in natural habitats and *ex situ* conservation in the Germplasm Bank.

In India, the genus *Gymnema* is represented by 7 species and one variety. The genus comprises 4 species in Kerala, viz. *Gymnema elegans* Wight & Arn., *Gymnema hirsutum* Wight & Arn., *Gymnema khandalense* Sant. and *Gymnema sylvestre* (Retz.) R.Br. ex Schult, barring the last, all are endemic. *Gymnema khandalense* is very rare and endemic to the Western Ghats of Maharashtra and Kerala. This endemic species is assigned the Red List status of Endangered. *G. elegans* is endemic to Peninsular India and the rare *G. hirsutum* is reported only from India. The conservation of these species is very important. *Gymnema sylvestre* is widely used against diabetes²⁴⁻²⁶. The antidiabetic properties of the other three endemic species have not been studied.

The present work will provide a chemo systematic approach to classify the different species based on supplementary evidences of their properties.

The conservation and sustainable utilization of the genus *Gymnema* involves integrated, scientifically oriented study. This involves pertinent aspects of protection, preservation, exploitation, conservation and sustainable utilization of endemic *Gymnemas*. His study will contribute towards this goal.

Work progress: Field exploration in all possible localities of Kerala viz. evergreen forest, semi-evergreen forest and Deciduous forest were carried out for the collection of all the species of *Gymnema* in flowering or fruiting stage. During survey, the quadrat studies were done in different habitats. The study of

the floral characteristics of the genus *Gymnema* is progressing well. Scanning Electron Microscope (SEM) studies were carried out to compare the anatomical characters of different *Gymnema* spp. in Kerala. The study helped in standardization of the vegetative propagation techniques through experiments in *Gymnema khandalense*, a critically endangered species among the groups. The HPLC studies (Phytochemical analysis) of *Gymnema* spp. are in progress.



Ms Surabhi K. S.

Ms Surabhi K. S. took her postgraduate degree in Botany from Mahatma Gandhi University. Before joining the project she worked as a higher secondary school teacher in St. Mary's Higher Secondary school, Kuzhikkattussery. As part of post graduation she had conducted a study on 'Antibacterial Evaluation of *Justicia adhatoda* L. and *Heliotropium indicum* L. and their Preliminary Phytochemistry and Pharmacognosy'. She worked on the restoration of 10 endemic species of plains of Kerala while working in the collaborative institute for the RET Fellowship programme- S.N.M College Maliankara. She has published 2 papers and has also presented posters in the Kerala Science Congress 2008.

Synopsis of Ms Surabhi's Doctoral study

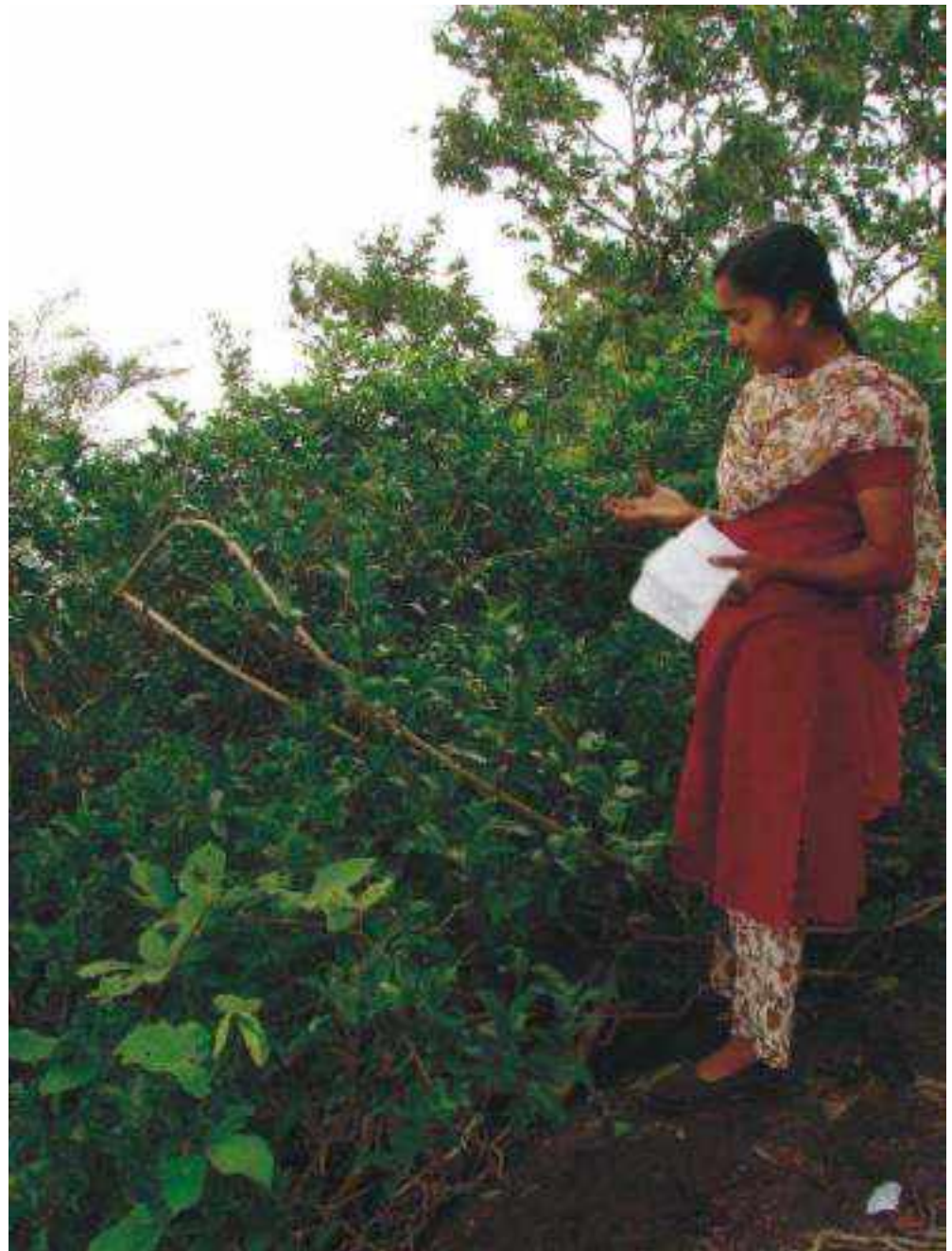
'Ecology, Conservation and Propagation of Critically Endangered *Colubrina travancorica* Bedd. (Rhamnaceae) and *Strophanthus wightianus* Wall. ex Wight (Apocynaceae)'

She focused on the assessment of the current population status of *Colubrina travancorica* Bedd. and *Strophanthus wightianus*, two endemic and critically endangered plant species from the list of the 10 assigned to her. The present study tries to answer whether the mechanism of pollination and seed setting or dispersal would play any role in determining endemism and rarity of that species. The populations of these species are highly restricted to few localities of Pathanamthitta and Ernakulam districts of Kerala, thus, conservation is very important. Hence, various macro and micro propagation techniques are significant and hence proposed. The study helps to assess the problems in germination procedures and to apply several regeneration techniques adaptive to the species. Field trials of the seedlings raised will help in estimating the survival potential. The major objectives of the study are to: (i) Assess the population status and study the pollination biology of the species (ii) Assess the plant associations of the species (iii) Study the phenological peculiarities and intra-specific variations (iv) Standardize the various macro and micro propagation techniques and conservation of the species.

Despite the fact that these species are under critically endangered category, there are no worthwhile studies reported on the ecology, conservation and

propagation aspects. Hence, this study is expected to provide the basic information on all these aspects.

Work progress: The natural populations of *Colubrina travancorica* from Vellikulangara Reserve Forests of Thrissur and *Strophanthus wightianus* from Kathirmudi, Thiruvananthapuram and Vandanam sacred grove of Alappuzha have been located. Vegetative propagation methods for these two species were standardized. Pollination biological studies and population structure analysis are progressing.



Mr Manudev K. M.

Mr Manudev K. M. joined the RET Fellowship programme in 2008, after receiving his M. Sc. degree in Botany from University of Calicut with second rank for the academic year 2006-2008. As part of his post graduation he carried out a study on 'Taxonomy and Morphology of the genus *Oberonia* in Wayanad district'. He has expertise in preparing botanical illustrations and has done illustrations for a text book in botany. He has done more than 100 illustrations for books & publications, which include drawings on new taxa. He has now qualified for the Junior Research Fellowship of University Grants Commission and is looking forward to pursue his doctoral study in the area of taxonomy and conservation biology.

Synopsis of Mr Manudev's Research Study

'An Analysis of the Species Diversity of the Genus *Oberonia* Lindley (Orchidaceae) in Wayanad District, Kerala'

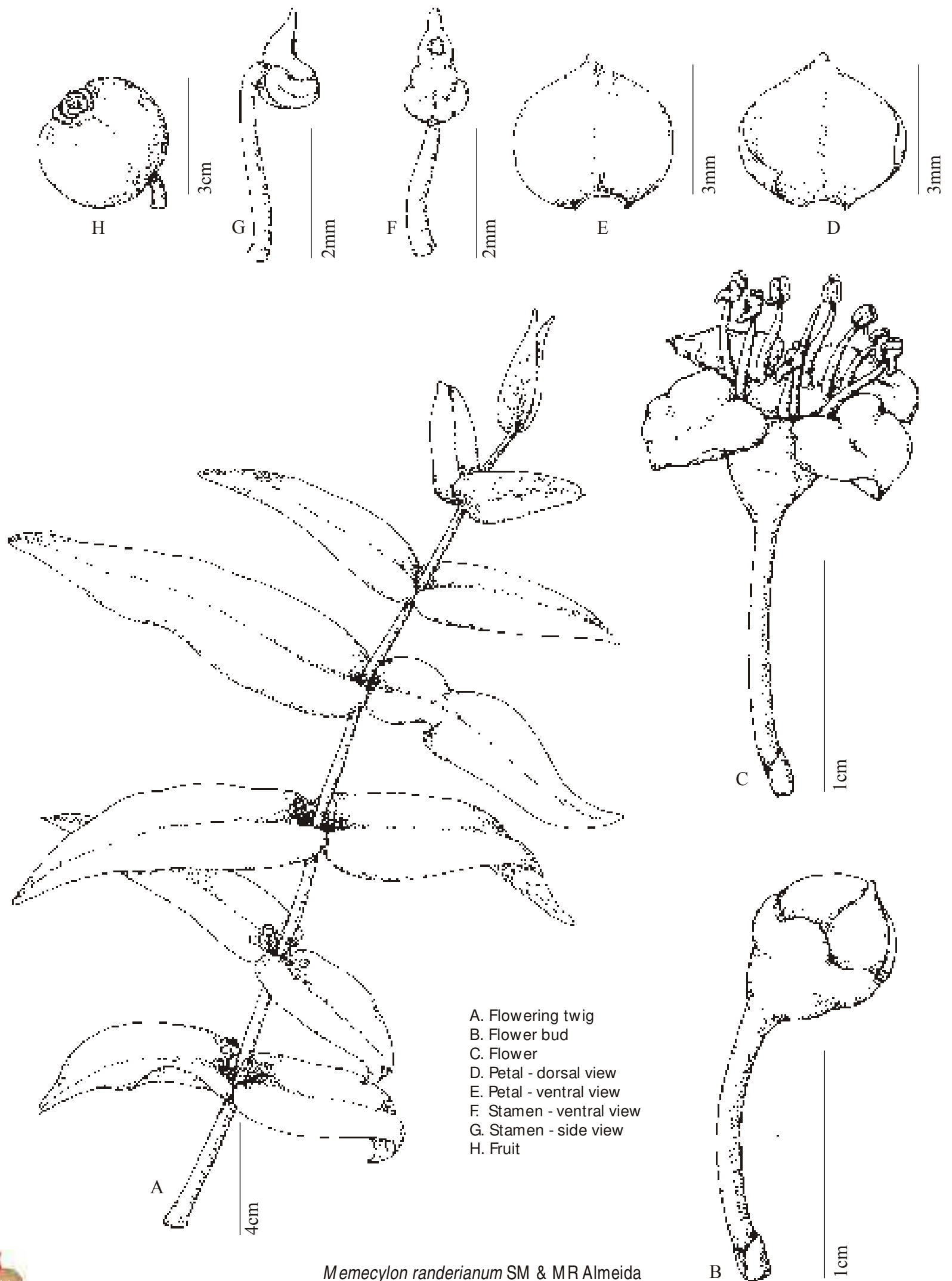
The genus *Oberonia* is an epiphytic orchid, described for the first time by John Lindley²⁷ who dedicated it to Oberon, the mythological king of fairies. The genus comprises about 320 species all over the world which can be distinguished by their laterally compressed leaves and a terminal inflorescence with small flowers. The genus is represented by 57 species in India of which 25 are reported from Kerala. The present study deals with the analysis of the species diversity of the genus *Oberonia* in Wayanad district, Kerala. In the absence of a regional flora of the district, the present study has been undertaken on this taxonomically significant group.

Work progress: A total of 19 species of *Oberonia* was located from the district during the field exploration and 7 of them were reported for the first time from the district in which *O. pyrulifera* is a first report ever from Kerala. Among the 19 species, 10 are endemic to the Western Ghats which are *O. anamalayana*, *O. brachyphylla*, *O. chandrasekharanii*, *O. josephii*, *O. nayarii*, *O. platycaulon*, *O. proudlockii*, *O. sebastiana*, *O. seidentfadeniana*, and *O. wynaadensis*.

Besides the 19 species, two interesting species with unknown affinities were obtained from the present study area. In addition, a comparative analysis of morphology of each species was also done.

All these species have been introduced into the Orchidarium of CABc - MSSRF as a step towards conserving *Oberonia* outside forest habitats.





Memecylon randerianum SM & MR Almeida

Illustration: Manudev



The Eighty Species: Current Profile

Ten Endangered Trees of Western Ghats



IUCN status : Critically Endangered
Name : *Aglaia malabarica* Sasidh.
Family : Meliaceae
Habit : Tree
Habitat : Evergreen forests
No. of seedlings raised: 1435



IUCN status: Endangered
Name: *Atuna travancorica* (Bedd.) Kosterm.
Family : Chrysobalanaceae
Habit : Tree
Habitat : Evergreen forests
No. of seedlings raised: 56



IUCN status: Endangered
Name : *Cynometra beddomei* Prain
Family : Caesalpiniaceae
Habit : Tree
Habitat : Evergreen & Semi evergreen forests
No. of seedlings raised: 456



IUCN status: Endangered
Name : *Cynometra travancorica* Bedd.
Family : Caesalpiniaceae
Habit : Tree
Habitat : Evergreen & Semi evergreen forests
No. of seedlings raised: 1572



IUCN status : Endangered
Name : *Eugenia argentea* Bedd.
Family : Myrtaceae
Habit : Tree
Habitat : Evergreen & Montane hilltop forests
No. of seedlings raised: 12



IUCN status: Endangered
Name : *Hopea ponga* (Dennst.) Mabb.
Family : Dipterocarpaceae
Habit : Tree
Habitat : Evergreen, Semi evergreen & Riparian forests
No. of seedlings raised: 1380



IUCN status: Endangered
Name : *Kingiodendron pinnatum* (Roxb. ex DC.) Harms.
Family : Caesalpiniaceae
Habit : Tree
Habitat : Evergreen & Semi evergreen forests
No. of seedlings raised: 1578



IUCN status: Endangered
Name : *Madhuca bourdillonii* (Gamble) H. J. Lam.
Family : Sapotaceae
Habit : Tree
Habitat : Evergreen & Semi evergreen forests
No. of seedlings raised: 1388



IUCN status: Endangered
Name : *Sageraea grandiflora* Dunn.
Family : Annonaceae
Habit : Tree
Habitat : Lowland Evergreen forests
No. of seedlings raised: 1370



IUCN status: Critically Endangered
Name : *Vateria macrocarpa* Gupta
Family : Dipterocarpaceae
Habit : Tree
Habitat : Evergreen forests
No. of seedlings raised: 19

Ten Endemic Woody Climbing Plants of Western Ghats



Name: *Aspidopterys canarensis* Dalz
Family: Malpighiaceae
Habit: Woody climber
Habitat: Evergreen & Semi evergreen forests
Number of seedlings raised: 735



Name: *Bauhinia phoenicea* Wight & Arn.
Family: Caesalpiniaceae
Habit: Woody climber
Habitat: Evergreen forests
Number of seedlings raised: 1531



Name: *Beaumontia jerdoniana* Wight
Family: Apocynaceae
Habit: Woody climber
Habitat: Evergreen forests
Number of seedlings raised: 1561



Name: *Caesalpinia spicata* Dalz.
Family: Caesalpiniaceae
Habit: Woody climber
Habitat: Evergreen forests
Number of seedlings raised: 1009



Name: *Derris brevipes* (Benth.) Baker
Family: Fabaceae
Habit: Woody climber
Habitat: Semi evergreen forests
Number of seedlings raised: 1338



Name: *Kunsteria keralensis* Mohanan & Nair
Family: Fabaceae
Habit: Woody climber
Habitat: Sacred groves & Evergreen forests
Number of seedlings raised: 1223



Name: *Hippocratea bourdillonii* Gamble
Family: Hippocrateaceae
Habit: Woody climber
Habitat: Evergreen & Semi evergreen forests
Number of seedlings raised: 500



Name: *Quisqualis malabarica* Bedd.
Family: Combretaceae
Habit: Woody climber
Habitat: Semi evergreen forests
Number of seedlings raised: 247



Name: *Salacia beddomei* Gamble
Family: Hippocrateaceae
Habit: Woody climber
Habitat: Evergreen & Semi evergreen forests
Number of seedlings raised: 622



Name: *Spatholobus purpureus* Benth.
Family: Fabaceae
Habit: Woody climber
Habitat: Evergreen & Semi evergreen forests
Number of seedlings raised: 5674

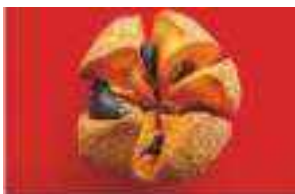
Ten Endemic Medicinal Trees of Kerala



Name : *Cinnamomum malabratrum* (Burm. f.) Blume
Family: Lauraceae
Habit: Tree
Habitat: Evergreen & Semi evergreen forests
Number of seedlings raised: 1743



Name: *Cinnamomum riparium* Gamble
Family: Lauraceae
Habit: Tree
Habitat: Riparian in evergreen forests
Number of seedlings raised: 51



Name: *Dysoxylum malabaricum* Bedd. ex Hiern
Family: Meliaceae
Habit: Tree
Habitat: Evergreen forests
Number of seedlings raised: 1255



Name: *Knema attenuata* (Hook. f. & Thoms.) Warb.
Family: Myristicaceae
Habit: Tree
Habitat: Evergreen & Semi evergreen forests
Number of seedlings raised: 792



Name: *Myristica beddomei* King
Family: Myristicaceae
Habit: Tree
Habitat: Evergreen & Semi evergreen forests
Number of seedlings raised: 841



IUCN status: Endangered
Name: *Myristica magnifica* Bedd.
Family: Myristicaceae
Habit: Tree
Habitat: Swamp forests
Number of seedlings raised: 60



Name: *Myristica malabarica* Lam.
Family: Myristicaceae
Habit: Tree
Habitat: Evergreen & Swamp forests
Number of seedlings raised: 1197



Name: *Palaquium ellipticum* (Dalz.) Baill.
Family: Myristicaceae
Habit: Tree
Habitat: Evergreen forests
Number of seedlings raised: 945



Name: *Phyllanthus indofischeri* Bennet
Family: Euphorbiaceae
Habit: Tree
Habitat: Dry deciduous forests
Number of seedlings raised: 123



Name: *Semecarpus auriculata* Bedd.
Family: Anacardiaceae
Habit: Tree
Habitat: Evergreen forests
Number of seedlings raised: 295

Ten Endemic Plants of Nilgiri Region



IUCN Status: Vulnerable
Name: *Casearia wynadensis* Bedd.
Family: Flacourtiaceae
Habit: Tree
Habitat: Moist & Dry deciduous forests
No. of seedlings raised: 209



IUCN Status: Lower Risk/ Near Threatened
Name: *Goniotalamus wynaadensis* (Bedd.) Bedd.
Family: Annonaceae
Habit: Shrub
Habitat: Evergreen forests
No. of seedlings raised: 58



Name: *Hedyotis wynaadensis* (Gamble) Rao & Hemadri
Family: Rubiaceae
Habit: Shrub
Habitat: Montane forests
No. of seedlings raised: 23



Name: *Ixora sivarajiana* Pradeep
Family: Rubiaceae
Habit: Tree
Habitat: Montane forests
No. of seedlings raised: 243



Name: *Jerdonia indica* Wight
Family: Gesneriaceae
Habit: Herb
Habitat: Evergreen forests
No. of seedlings raised: 379



Name: *Medinilla malabarica* Bedd.
Family: Melastomataceae
Habit: Epiphytic shrub
Habitat: Evergreen & Shola forests
No. of seedlings raised: 54



IUCN Status: Critically Endangered
Name: *Meteoromyrtus wynaadensis* (Bedd.) Gamble
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 9



Name: *Osbeckia wynaadensis* Clarke
Family: Melastomataceae
Habit: Shrub
Habitat: Marshy areas
No. of seedlings raised: 230



Name: *Phaeanthus malabaricus* Bedd.
Family: Annonaceae
Habit: Shrub
Habitat: Evergreen forests
No. of seedlings raised: 55



Name: *Symplocos wynadense* (O. Ktze.) Nootb.
Family: Symplocaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 412

Ten Endemic and Rare *Syzygium* Species of Western Ghats



Name: *Syzygium densiflorum* Wall. ex Wight & Arn.
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen & Shola forests
No. of seedlings raised: 73



Name: *Syzygium salicifolium* (Wight) Graham
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 83



Name: *Syzygium laetum* (Buch.-Ham.) Gandhi
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 67



Name: *Syzygium malabaricum* (Bedd.) Gamble
Family: Myrtaceae
Habit: Tree
Habitat: Semi evergreen forests
No. of seedlings raised: 114



Name: *Syzygium mundagam* (Bourd.) Chithra
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 350



Name: *Syzygium munronii* (Wight) Chandrab.
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 220



Name: *Syzygium occidentalis* (Bourd.) Gandhi
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen & Riparian forests
No. of seedlings raised: 2650



Name: *Syzygium palghatense* Gamble
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 353



Name: *Syzygium rama-varmae* (Bourd.) Chithra
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 33



Name: *Syzygium stocksii* (Duthie) Gamble
Family: Myrtaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 2350

Ten Endemic and Rare Plants of Western Ghats



IUCN Status: Rare
Name: *Capparis rheedei* DC.
Family: Capparaceae
Habit: Shrub
Habitat: Semi evergreen & Evergreen forests
No. of seedlings raised: 346



IUCN Status: Endangered
Name: *Decalepis hamiltonii* Wight & Arn.
Family: Periplocaceae
Habit: Climber
Habitat: Rock crevices in Moist deciduous forests
No. of seedlings raised: 1045



IUCN Status: Endangered
Name: *Dysoxylum beddomei* Hiern
Family: Meliaceae
Habit: Tree
Habitat: Evergreen & Semi evergreen forests
No. of seedlings raised: 53



Name: *Gymnema khandalense* Sant.
Family: Asclepiaceae
Habit: Climber
Habitat: Semi evergreen forests
No. of seedlings raised: 73



Name: *Humboldtia brunonis* Wall.
Family: Caesalpiniaceae
Habit: Small tree
Habitat: Evergreen forests 600-1200m
No. of seedlings raised: 553



Name: *Hydnocarpus macrocarpa* (Bedd.) Warb.
Family: Flacourtiaceae
Habit: Tree
Habitat: Semi evergreen forests
No. of seedlings raised: 366



Name: *Poeciloneuron indicum* Bedd.
Family: Bonnetiaceae
Habit: Tree
Habitat: Evergreen & Semi evergreen forests
No. of seedlings raised: 1600



Name: *Pterospermum reticulatum* Wight & Arn.
Family: Sterculiaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 333



Name: *Salacia macrosperma* Wight
Family: Hippocrataceae
Habit: Woody climber
Habitat: Semi evergreen forests
No. of seedlings raised: 113



IUCN Status: Critically Endangered
Name: *Utleria salicifolia* Bedd. ex Hook. f.
Family: Periplocaceae
Habit: Shrub
Habitat: Rock crevices of Semi evergreen forests
No. of seedlings raised: 13

Ten Endemic Monocotyledons of Western Ghats



Name: *Anaphyllum wightii* Schott.
Family: Araceae
Habit: Rhizomatous herb
Habitat: Evergreen & Semi evergreen forests
No. of seedlings raised: 38



IUCN Status: Vulnerable
Name: *Arenga wightii* Griff.
Family: Arecaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 78



Name: *Calamus hookerianus* Becc.
Family: Arecaceae
Habit: Climbing palm
Habitat: Evergreen & Semi evergreen forests
No. of seedlings raised: 88



Name: *Calamus travancoricus* Becc.
ex Becc. & Hook. f.
Family: Arecaceae
Habit: Climbing palm
Habitat: Evergreen forests
No. of seedlings raised: 58



Name: *Calamus vattayila* Renuka
Family: Arecaceae
Habit: Climbing palm
Habitat: Evergreen forests
No. of seedlings raised: 303



Name: *Curcuma vamana* Sabu & Mangaly
Family: Zingiberaceae
Habit: Rhizomatous Herb
Habitat: Evergreen & Semi evergreen forests
No. of seedlings raised: 8



Name: *Munrochloa ritchiei* (Munro)
M. Kumar & Remesh
Family: Poaceae
Habit: Bamboo
Habitat: Moist deciduous forest
No. of seedlings raised: 189



IUCN Status: Threatened
Name: *Ochlandra beddomei* Gamble
Family: Poaceae
Habit: Reed
Habitat: Stream-banks
No. of seedlings raised: 84



Name: *Oxytenanthera bourdillonii* Gamble
Family: Poaceae
Habit: Bamboo
Habitat: Evergreen & Shola forests
No. of seedlings raised: 6



Name: *Pinanga dicksonii* (Roxb.) Blume
Family: Arecaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 374

Ten Endemic and Rare Plants of Plains of Kerala



Name: *Blepharistemma serratum* (Dennst.)
Suresh
Family: Rhizophoraceae
Habit: Tree
Habitat: Moist deciduous forests
No. of seedlings raised: 16



Name: *Calophyllum calaba* L.
Family: Clusiaceae
Habit: Tree
Habitat: Evergreen forests & Sacred groves
No. of seedlings raised: 106



Name: *Colubrina travancorica* Becc.
Family: Rhamnaceae
Habit: Shrub
Habitat: Moist deciduous forests
No. of seedlings raised: 79



Name: *Litsea coriacea*
(Heyne ex Meisner) Hook. f.
Family: Lauraceae
Habit: Tree
Habitat: Semi evergreen forests
No. of seedlings raised: 1011



Name: *Memecylon randerianum* SM &
MR Almeida
Family: Melastomataceae
Habit: Shrub
Habitat: Semi evergreen forests
No. of seedlings raised: 634



Name: *Ochna gamblei* King ex Brandis
Family: Ochnaceae
Habit: Tree
Habitat: Dry rocky areas
No. of seedlings raised: 202



Name: *Solenocarpus indicus* Wight & Arn.
Family: Anacardiaceae
Habit: Tree
Habitat: Evergreen forests
No. of seedlings raised: 62



Name: *Strophanthus wightianus* Wall.
ex Wight
Family: Apocynaceae
Habit: Climbing shrub
Habitat: Scrub jungles & Sacred groves
No. of seedlings raised: 609



IUCN Status: Critically endangered
Name: *Syzygium travancoricum* Gamble
Family: Myrtaceae
Habit: Tree
Habitat: Semi evergreen forests
No. of seedlings raised: 1385



Name: *Vateria indica* L.
Family: Dipterocarpaceae
Habit: Tree
Habitat: Evergreen & Semi evergreen forests
No. of seedlings raised: 1369



Cynometra beddomei Prain



THE EXPERTS AND
ORGANIZATIONS INVOLVED

Mr M. K. Ratheesh Narayanan

Senior Scientist, CAbC-M S Swaminathan Research Foundation

Mr Ratheesh Narayanan is a Senior Scientist at CAbC and co-ordinates the RET Plants exploration and conservation programme. He supported the Project Fellows placed in CAbC with his expertise in plant taxonomy and *ex situ* conservation skills and strategies. He has been with MSSRF since 1999 when he joined as a junior scientist. He worked along with Dr N. Anil Kumar in the survey and study of the floristic composition of Wayanad and the distributional status of the endemic flowering plants. He is also leading the study and documentation of wild and marginally cultivated species and traditional varieties of food and nutritional value. His study on the gender dimensions of wild food management in Wayanad district gave a clear picture about the spectrum of food diversity of the forest communities who are dependent on it for their food and nutritional security.

He is the recipient of the Swadeshi Young Scientist Award 2003, constituted by the Swadeshi Science Foundation, India and P. R. Yadav Young Scientist Award, 2005 created by the Indian Association for Angiosperm Taxonomy. He has published 14 scientific papers and 3 popular articles.

Till date, he has guided 10 M.Sc. dissertations. He is also actively engaged in strengthening the *for-RET* group.

A glimpse of his doctoral study

Mr Ratheesh has now completed the Floristic Study of Wayanad district by giving special emphasis to the RET plants. The study resulted in identification of 2034 species belonging to 903 genera in 171 families. This is a record number for a district in Kerala and represents nearly half of the flora of the State and more than 10 % of the flora of India.

Out of the 2034 species, 596 taxa are endemic to India, among these, 491 are endemic to Western Ghats and 338 are exclusive to southern part of Western Ghats. Fifteen species are found to be present only in Wayanad region of Western Ghats.

The analysis of species for their rarity and threats based on the available data^{1,2,4,13} shows, out of the total 2034 taxa collected from the district, 138 are coming under different threat categories. Among these species 41% represented the Rare (R), 18 % Vulnerable (VU), 19 % Endangered (EN), 8 % Lower Risk Near Threatened

(LRNT), 7 % Critically Endangered (CR), 3% Possibly Extinct (PE) categories and 4 % represented the locally threatened group. Of the total 138 threatened species of the study area, 125 are Western Ghats endemics, which means that 91% of the total threatened species in the district are endemics.

Moreover, by reporting the presence of 16 genera out of 60 Western Ghats-endemics and especially the occurrence of 3 out of the 6 endemic tree genera, the study highlights the significance of Wayanad region for endemism.

His study shows that the family Orchidaceae with 74 species ranks first in having maximum number of endemic species in the region. The genus *Impatiense* has maximum number of endemic species (18), followed by *Strobilanthes*, *Syzygium*, *Oberonia*, *Habenaria* and *Bulbophyllum* with ten or more endemic species of which *Bulbophyllum* shows 100 percentage endemism.

His study is a valuable contribution to the floristic research in Kerala as well as to the conservation efforts in Wayanad.



Dr N. Sasidharan

Senior Scientist, Kerala Forest Research Institute, Peechi

Dr N. Sasidharan, Head of the Non-Wood Forest Produce (NWFP) Division, KFRI was the research guide for the Research Fellow Dr Sujanapal. Dr Sasidharan is a well-known scientist who has a deep understanding of the floristic composition and taxonomy of flowering plants of India. He has been engaged in studies on the forest flora since 1977, with a special focus on the Protected Areas. He has described several new species, new record of occurrence and has also rediscovered most of the RET species reported from Kerala. Another thrust area of his research is on quantitative inventory and sustainable extraction of NWFP. He has also worked on the biological properties of medicinal plants and their propagation methods. He has 120 research publications and 6 books to his credit. He has widely travelled in India and abroad for research activities, and attended several national and international seminars, symposia and workshops.

Partner Organization

The Kerala Forest Research Institute (KFRI) is one of the six Institutions under the Kerala State Council for Science Technology and Environment (KSCSTE) of the Government of Kerala, established in 1975. KFRI has created a niche among the leading forest research organizations in tropics. The Institute undertakes multi-disciplinary research on all aspects of tropical forestry including wood science and technology, wildlife biology and socio-economics under the research divisions. KFRI has a sub-centre at Nilambur and field station at Veluppadam for carrying out nursery and plantation trials, germplasm collection, etc. KFRI has the largest collection of bamboo and rattan species in India for research and conservation purpose, it also has a Teak Museum at Nilambur, which is the only of its kind, devoted to a single tree species in the world. The institution fulfills a number of economic, social and environmental objectives set by the Government by undertaking research in areas like forestry, biodiversity etc., that are vital to the development of the Kerala State.

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Dr Indira Balachandran

Director, Centre for Medicinal Plants Research (CMPR), Arya Vaidya Sala, Kottakkal

Dr Indira Balachandran, the Director of Centre for Medicinal Plants Research had been associated with the RET project right from the beginning. Her area of research is medicinal plant taxonomy dealing with the scientific identification, standardization and conservation of medicinal plants used in Ayurveda and other traditional systems of medicine. Her involvement has particularly helped in identifying the research study concept for the Research Fellow, Mr Satheesh.

Dr Indira's book titled 'Ayurvedic Drugs and their Plant Sources' published by Oxford & IBH, New Delhi in 1994, serves as a reference material to Ayurvedic students, doctors and medicinal plant researchers within India and abroad. Dr Indira Balachandran has participated and presented papers in many national and international conferences.

She served as a Visiting Professor at the Toyama Medical and Pharmaceutical University, Japan in 1999. As Project

Director of the CMPR, she heads many projects funded by Government and other agencies. She has 54 research papers, 40 popular articles and 1 book to her credit.

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Dr P. S. Udayan

Senior Scientist, Centre for Medicinal Plants Research (CMPR), Arya Vaidya Sala, Kottakkal

Dr P. S. Udayan who has 17 years of research experience in the field of plant taxonomy and medicinal plants was also directly involved with the RET project. He worked earlier for the Tamil Nadu Forest Department in Nilgiris district as a botanist for nearly seven years. Subsequently for the next seven years he was at the Foundation for Revitalisation of Local Health Traditions (FRLHT) in Bangalore and conducted several botanical surveys in Kerala, Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra under *in situ* and *ex situ* conservation programmes of medicinal plants. He has wide field experience and knowledge on flora, especially of Western Ghats.

Partner Organization

The Centre for Medicinal Plants Research, established by Arya Vaidya Sala, Kottakkal with the financial assistance from Sir Dorabji Tata Trust, Mumbai, is functioning as a pioneer institute in the area of research,

education, conservation and popularization of medicinal plants. Under the *Ex situ* Conservation Network Programme of the Department of Biotechnology, Govt. of India, the Centre has established a Germplasm Bank for Ayurvedic medicinal plants at Kottakkal. A field Gene Bank of 150 rare, endangered and threatened medicinal plants collected from south Indian forests, a Seed Bank, an *in vitro* Gene Bank, Raw Drug Museum, Herbarium and Image Library are maintained at the Centre. The tissue culture facility undertakes micro-propagation and large scale production of selected medicinal plants. Regular extension activities are organized at different levels to popularize medicinal plants cultivation. The main objective of the Pharmacognosy Division is to evolve standards for the plants / plant parts that are used in Ayurveda, using anatomical and phytochemical parameters.

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Dr C. N. Sunil

Selection Grade Lecturer, Sree Narayana Mangalam College, Maliankara

Dr C. N. Sunil is a lecturer in Botany at S.N.M. College, which is one of the partner organizations in the RET project. His field of specialization is plant systematics and floristics. He has over 12 years of research experience in angiosperm taxonomy and has published over ten research papers and a book. He is a member of the Indian Association for Angiosperm Taxonomy (IAAT) and the Malabar Natural History Society (MNHS). Dr Sunil was awarded the Young Scientist Award for the best paper presented at the annual conference of IAAT in 2001.

Partner Organization

SNM College Maliankara is an Arts & Science college affiliated to Mahathma Gandhi University, Kottayam, Kerala. The Department of Botany is distinguished with an impressive collection of herbarium of about 4000 species. This

includes a wide variety of plants like mangrove species, medicinal plants, endemic and endangered plants etc. Type specimens of four Angiosperms form an exceptional section of this rare collection. The Department also owns a museum that matches the herbarium collection in quality and variety. The Department focuses on the conservation of biodiversity and workshops and seminars are regularly organized on topics of ecology and conservation strategies.

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Prof K. S. Manilal

Chairman, Centre for Research in Indigenous Knowledge Science & Culture, Kozhikode

Prof K. S. Manilal, Emeritus Scientist of the Calicut University is the partner in association with the RET project. Prof Manilal is a veteran scientist who has devoted over 35 years of his life to research, translation and annotation work of the Latin botanical treatise Hortus Malabaricus. He is the founder-president of the Indian Association for Angiosperm Taxonomy (IAAT) and was the chief editor of its journal *Rheedea*. He was the recipient of the Dr E. K. Janaki Ammal Award for Taxonomy (2003) from the Ministry of Environment and Forests. Originally a floral morphologist, Prof. Manilal turned his interest to angiosperm taxonomy and encouraged many students to work on taxonomy particularly of Orchids. He has authored over 150 research papers and ten books including the 12 volume translation of Van Rheedee's 17th century classic Hortus Malabaricus.

Partner Organization

Centre for Research in Indigenous Knowledge Science & Culture (CRIKSC) is a society dedicated for research in India's ancient and rich indigenous knowledge, brilliant scientific heritage,

the past and present glorious cultural and biological diversity. CRIKSC aims to study all the traditional and related modern disciplines of knowledge including science, social sciences, and languages of the people of Kerala and other regions of India. The objectives of CRIKSC are: to undertake and promote studies and research on Indian traditional knowledge, science and culture; to explore, document and utilize the natural resources for the benefit of the State of Kerala / India/ mankind; to create awareness among the academicians, policy makers and various other sections of the society by publishing books, journal, magazines and documents of various forms and organizing seminars, symposia, workshops, exhibitions, training programmes, lectures, extension services etc.; to assist the indigenous people in conserving and maximizing the advantage of their indigenous knowledge; to establish a museum and library for the documentation of indigenous knowledge, science and culture; to help establish Natural History Museums and Biological Gardens or other repositories for *ex situ* conservation of germplasm.

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THE LEARNING & SUGGESTIONS

The 80 RET conservation programme in a span of three years has provided a good opportunity in terms of an excellent learning phase. It is realized that comparatively a longer period of time is required in the initial phase of action-research based RET conservation programmes for the familiarization and identification of species as well as for locating their natural populations in the forest areas, which are the prerequisites for any conservation initiative.

In case of species with an insufficient research record, especially for large tree species, the process of phenology documentation may consume a minimum of two years. For species characterized by long gap in phenological events, enough specimens may not be available in time, causing a delay in the correct taxonomic identification and the subsequent research work.

Large scale multiplication of some RET species is difficult within a short span of three years due to various reasons. Natural phenological characteristics such as mast-fruiting, phenological fluctuations due to seasonal variations, poor seed setting in spite of profuse flowering, high percentage of seed sterility, short term seed viability of evergreen species, high rate of predation or pest attack, unscientific practice of harvesting immature fruits in demand of certain commercially valuable forest commodities, the delay and difficulty in standardizing propagation methods for the least known forest species etc. are identified as the major restrictive factors for rapid mass multiplication of seedlings. The inaccessibility of the natural populations due to difficult terrain, wildlife threat, remoteness of the area and the coincidence of unfavourable weather conditions in the peak periods of phenological calendar can also be crucial limiting factors in RET conservation studies.

Research supported conservation efforts are effective and essential for understanding the specific micro-climatic requirements of the species and hence for the successful implementation of *ex situ* as well as *in situ* conservation measures. Obviously, as evident from this initiative too, multi-institutional linkage as well as people's participation should be the key strategies for all conservation endeavours to bring out success stories. However, a time frame of minimum ten years is required to make visible the impact of the programme through the successful establishment of seedlings in restoration plots.

Suggestions

- 1 Policy level changes should be introduced to promote the use of RET tree species in afforestation programmes instead of exotic or native common species.
- 2 The direct managers of the forest- the forest personnel (especially that of the Forester, Forest Guard and Forest Watcher grades) and the forest dependent communities - should be made aware about the importance of RET species conservation. This will be helpful to prevent the destruction of these native species by forest management activities like weeding and fire-line works.
- 3 The Forest Department can take up efforts for the familiarization of RET flowering plants among the general public, as a measure to encourage *ex situ* conservation.
- 4 Since the proper identification of a species is an essential step in conservation efforts, initiatives are needed towards a conservation oriented revival of classical plant taxonomy.
- 5 An in-depth species-specific study of the eight high priority species presented in the success stories (Page no. 17-24) is suggested to generate a replicable model for other RET species.



THE PROJECT NEXT

RESCUE OF RET-TREES OF WESTERN GHATS

Inspired by the successful completion of the SDTT supported project, a new Conservation Fellowship Programme has been designed and proposed as a step to scale up the results achieved. The major objective of the proposed project is to promote *in situ* and *ex situ* conservation of a select number of another 80 high priority RET tree species of southern Western Ghats, India through an integrated study of the ecology and biology of the target species (Table 9). As in the previous programme, eight research fellowships have been proposed in this action research project too. All the selected species are ecologically or economically the keystone species of our country. The project is also aimed at encouraging a 'tree care culture' through education programmes and awareness campaigns among the various stakeholder groups. The strategy identified for the implementation of this programme is the integration of 'research' and 'local actions' so as to achieve the long term conservation of 80 RET tree species and to inculcate a tree growing/caring culture among the general society. The study is expected to reveal the phenology, present population structure, existing threat factors, suitable propagation measures, related ethnic knowledge and the ecological role of the target species. As there are no primary data available so far, in any of these subject areas on the selected species, these results would serve as a first hand record on the same and would help in the future studies.

The project has high relevance in the context of facing the challenges of climate change and the enduring crisis of species extinction. The most recent publication of the IUCN Red List of Threatened Species has reported that 39% of the listed species are threatened with extinction. Over 50 % of earth's species are confined to the tropical forests, where poverty and population put enormous pressure on the natural resources. It is estimated that most of these species would become extinct within next few years until and unless effective conservation measures are taken. Thus, there is urgent need to take up action research to contribute to the conservation of global biodiversity.

The rationale of choosing only tree species is that they are highly important as dominating species of major vegetation types and also as climax community that determines the forest configuration. The significant role of forest trees in carbon sequestration is also well documented. But being a primitive life-form in the evolutionary context of flowering plants, trees are highly vulnerable to climate change. Moreover, the high susceptibility of tree forms to endangerment due to various factors like habitat fragmentation, poor germination, high mortality rate in the seedling to sapling stage, obligate dependence to certain biotic and abiotic factors for regeneration, and low resistance of propagules to microbial as well as pest infestations were also revealed by the previous 80 Species Conservation Programme. Further, over-exploitation of trees for both timber and non-timber forest produce is also reported as a major threat to tree species of Western Ghats. Besides, the high rate of endemism of tree species of Western Ghats also demands urgent conservation efforts.

For promoting a 'tree care culture' among the general public, awareness campaigns and education programmes (workshops, seminars and training programmes designed in the first phase will be utilized. Various education materials will be prepared for dissemination, giving thrust to the importance of trees on human life especially to tackle the adverse impacts of global warming and climate change. Through these programmes, students, foresters, nature lovers and people who use plants in traditional ways such as the forest dependent communities and others will be brought into the fold of conservation.

Table 9: The Next Set of RET-Tree Species

	Scientific name	Threat Status
1	<i>Acrocarpus fraxinifolius</i> Wight & Arn.	Locally Rare
2	<i>Alangium salvifolium</i> (L. f.) Wang.	Locally Threatened
3	<i>Antiaris toxicaria</i> Lesch.	Locally Rare
4	<i>Aphanamixis polystachya</i> (Wall.) Parker	Locally Threatened
5	<i>Aporosa cardiosperma</i> (Gaertn.) Merr.	Locally threatened
6	<i>Artocarpus hirsutus</i> Lam.	Locally Threatened
7	<i>Baccaurea courtallensis</i> (Wight) Muell.-Arg.	Locally Rare
8	<i>Bombax scopulorum</i> Dunn in Gamble	Locally Rare
9	<i>Butea monosperma</i> (Lam.) Taub.	Locally Threatened
10	<i>Calophyllum austroindicum</i> Koster. Ex S tevens	Locally Rare
11	<i>Canarium strictum</i> Roxb.	Locally Threatened
12	<i>Caryota urens</i> L.	Locally Threatened
13	<i>Chrysophyllum roxburghii</i> G. Don	Locally Rare
14	<i>Chukrasia tabularis</i> A. Juss.	Lower Risk/(IUCN 2008)
15	<i>Commiphora caudata</i> (Wight & Arn.) Engl.	Locally Threatened
16	<i>Corypha umbraculifera</i> L.	Data Deficit (IUCN 2008)
17	<i>Cullenia exarillata</i> Robyns	Locally Rare
18	<i>Dillenia indica</i> L.	Locally Rare
19	<i>Diospyros assimilis</i> Bedd.	Locally Rare
20	<i>Diospyros barberi</i> Ramas.	Vulnerable (IUCN 2008)
21	<i>Diospyros bourdillonii</i> Brandis	Locally Rare
22	<i>Diospyros candolleana</i> Wight	Locally Rare
23	<i>Diospyros cordifolia</i> Roxb.	Locally Rare
24	<i>Diospyros courtallumensis</i> Bahadur & Gaur	Locally Rare
25	<i>Diospyros crumenata</i> Thw.	Locally Rare
26	<i>Diospyros ebenum</i> Koenig	Data Deficit (IUCN 2008)
27	<i>Diospyros foliosa</i> Wall. ex A. DC.	Locally Rare
28	<i>Diospyros ghatensis</i> Ramesh & Franceschi	Locally Rare
29	<i>Diospyros hirsuta</i> L.f.	Locally Rare
30	<i>Diospyros neilgherrensis</i> (Wight) Kosterm.	Locally Rare
31	<i>Diospyros nilagirica</i> Bedd.	Locally Rare
32	<i>Diospyros ovalifolia</i> Wight	Locally Rare
33	<i>Diospyros paniculata</i> Dalz.	Locally Rare
34	<i>Diospyros pruriens</i> Dalz.	Locally Rare
35	<i>Diospyros racemosa</i> Roxb.	Locally Rare
36	<i>Diospyros saldanhae</i> Kosterm.	Locally Rare
37	<i>Diospyros sulcata</i> Bourd.	Locally Rare
38	<i>Diospyros sylvatica</i> Roxb.	Locally Rare
39	<i>Dipterocarpus indicus</i> Bedd.	Endangered (IUCN 2008)
40	<i>Elaeocarpus munronii</i> (Wight) Mast.	Lower Risk/NT (IUCN 2008)

	Scientific name	Threat Status
41	<i>Elaeocarpus tuberculatus</i> Roxb.	Locally Rare
42	<i>Elaeocarpus variabilis</i> Zmarzty	Locally Rare
43	<i>Flacourtia montana</i> Graham	Locally Rare
44	<i>Garcinia cowa</i> Roxb. ex DC.	Locally Rare
45	<i>Garcinia imberti</i> Bourd.	Endangered (IUCN 2008)
46	<i>Garcinia morella</i> (Gaertn.) Desv.	Locally Rare
47	<i>Garcinia rubro-echinata</i> Kosterm.	Vulnerable (IUCN 2008)
48	<i>Garcinia spicata</i> (Wight & Arn.) Hook. f.	Locally Rare
49	<i>Garcinia travancorica</i> Bedd.	Vulnerable (IUCN 2008)
50	<i>Garcinia wightii</i> Anders.	Vulnerable (IUCN 2008)
51	<i>Gluta travancorica</i> Bedd.	Low Risk, NT (IUCN 2008)
52	<i>Gymnacranthera canarica</i> (Bed. ex King) Warb.	Vulnerable
53	<i>Hopea erosa</i> (Bedd.) van Sloot.	CR (IUCN,2008)
54	<i>Hopea glabra</i> Wight & Arn.	Endangered (IUCN 2008)
55	<i>Hopea parviflora</i> Bedd.	Endangered (IUCN 2008)
56	<i>Hopea racophloea</i> Dyer	Endangered (IUCN 2008)
57	<i>Humboldtia vahliana</i> Wight	Locally Rare
58	<i>Hydnocarpus alpina</i> Wight	Locally Rare
59	<i>Limonia acidissima</i> L.	Locally Rare
60	<i>Mallotus atrovirens</i> Muell.-Arg.	Vulnerable (IUCN 2008)
61	<i>Mallotus stenanthus</i> Muell.-Arg.	Locally Rare
62	<i>Mastixia arborea</i> (Wight) Bedd.	Low Risk/(IUCN 2008)
63	<i>Mesua ferrea</i> L.	Locally Threatened
64	<i>Mesua thwaitesii</i> Planch. & Triana	Locally restricted
65	<i>Nothapodytes nimmoniana</i> (Graham) Mabb.	Locally Threatened
66	<i>Ochreinauclea missionis</i> (Wall. ex G. Don) Ridsd.	Vulnerable (IUCN 2008)
67	<i>Oreocnide integrifolia</i> (Gaud.) Miq.	Locally Rare
68	<i>Oroxylum indicum</i> (L.) Benth. ex Kurz	Locally Threatened
69	<i>Persea macrantha</i> (Nees) Kosterm.	Locally Threatened
70	<i>Pterocarpus marsupium</i> Roxb.	Locally Threatened
71	<i>Pterospermum rubiginosum</i> Heyne. ex Wight & Arn.	Locally threatened
72	<i>Spondias pinnata</i> (L. f.) Kurz	Locally threatened
73	<i>Strychnos nux-vomica</i> L.	Locally Threatened
74	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Locally Threatened
75	<i>Terminalia chebula</i> Retz.	Locally Threatened
76	<i>Terminalia cuneata</i> Roth	Locally Rare
77	<i>Terminalia travancorensis</i> Wight & Arn.	Locally Rare
78	<i>Vitex leucoxydon</i> L.f.	Locally Rare
79	<i>Vitex peduncularis</i> Wall. ex Schauer	Locally Rare
80	<i>Vitex pinnata</i> L.	Locally Rare



THE TRAINING PROGRAMMES & PUBLICATIONS

Orientation/ Training Programmes for the Research Fellows

Subject	Resource person	Venue	Date	Fellows attended
Practical Plant Taxonomy and Conservation Methods	Dr C.Renuka, Dr N. Sasidharan, Dr E. M. Muraleedharan, Dr K.C. Chacko, Dr T. Surendran, Dr K. Swarupanandan Dr Sivaram, Dr M. Babu (KFRI) and Dr C. Sathish Kumar (TBGRI)	KFRI, Peechi	29 May - 2 June 2006	All
Phytosociology	Dr A. R. R.Menon, KFRI, Thrissur	CAbC, Kalpetta	28 -30 Nov 2006	All
Vegetative Propagation Methods	Dr V. K. Raju, RARS, Ambalavayal, Wayanad	RARS, Ambalavayal	24-25 Dec 2006	CAbC Fellows
Pollination Biology	Dr K. R. Shivanna, ATREE, Bangalore	CAbC, Kalpetta	22-23 Jan 2007	All
Pollination Ecology	Prof Amots Dafni Institute of Evolution, University of Haifa, Israel	Kalakad Mundanthurai Tiger Reserve, India	6-13 Feb 2007	C. S. Dhanya
Botanical Illustration	K. P. Pradeep Kumar, Head, Division of Art and Photography TBGRI, Palode. Ajaya Kumar, Head, Division of Art and Photography, University of Calicut. V. B.Sajeev, Freelance photographer and artist, Ecosolutions, Ernakulam.	Department of Botany, University of Calicut	13-15 Mar 2008	Sujana K. A.
Project Cycle Management	P. K. Kurien, Planet Kerala, Thiruvananthapuram	CAbC, MSSRF	15-18 Nov 2008	Sujana K. A.
Statistical Analysis using Microsoft Excel	Post Graduate Department of Statistics Madras Christian College	Madras Christian College Chennai	29 March 2009	Sujana K. A. & Manudev K. M.

Workshops and Seminars attended

Workshops/Seminars	Fellows attended
Seminar on 'Flowering Plant Diversity' held at Sree Narayana Mangalam college, Maliankara, Ernakulam district (27-29 September 2006)	M. Remesh, K. S. Surabhi, P. Sujanalal & K. Satheesh
National Conference on 'Intangible National Heritage and Museums' organized by Regional Museum of Natural History and Directorate of Tourism at Kozhikode (18-20 April 2007)	M. Remesh & K. Satheesh
National Workshop on 'Prioritization and Characterization of Fast Growing Native Tree Resources' organized by MoEF, Govt of India at Institute of Forest Genetics and Tree Breeding, Coimbatore (8-9 August 2007)	M. Remesh
Seminar on 'Conservation and Management of Natural Resources for Environmental Protection of the Coastal Zone of Kerala' (28 August 2007)	M. Remesh
National Seminar on 'Medicinal Plants: Strategies for Conservation' at Arya Vaidya Sala, Kottakkal (4 December 2007)	Sujana K. A., K. Satheesh, C. S. Dhanya, Smitha S. Nair & K. S. Surabhi
International Seminar on 'Multidisciplinary Approaches in Angiosperm Systematics' organized by Indian Association for Angiosperm Taxonomy at Kalyani University, Kalyani (11- 13 October 2008)	Smitha S. Nair
Workshop on 'Preparation of the Management Plan for the proposed Malabar Wildlife Sanctuary, Kozhikode' organized by Department of Forests and Wildlife, Government of Kerala (27 May 2009)	C. S. Dhanya
One-day workshop on 'Management of Kole Wetlands' organized by Kerala State Biodiversity Board at Ramanilayam, Thrissur (18 June 2009)	Sujana K. A.

Publications

Brochures/Booklets/Stickers/ Labels

- 1 A brochure on the RET Conservation Programme defining the objectives, activities and expected outcomes (1000 copies) in 2006.
- 2 A programme brochure highlighting the role of RET tree species conservation towards a 'low carbon economy' on the occasion of World Environment Day 2008 (100 copies)
- 3 A handbook in local language (Malayalam) on the target species (in progress)
- 4 A book on plant profile of 80 RET species (in progress)

Scientific papers/posters

- 1 Kumar, M. and Remesh, M. 2008. *Munrochloa* a new genus (Poaceae: Bambusoideae) with a new combination from India. *J. Bot. Res. Insti. Texas*. 2(1): 373-378.
- 2 Remesh, M. and Kumar, M. Medicinal Bamboos of Kerala, India. Paper communicated for publication in *Journal of American Bamboo Society*.
- 3 Muktesh Kumar and Remesh, M. Diversity, Endemism and Conservation of Native Bamboos of India: An appraisal. Paper communicated for publication in *Indian Journal of Forestry*.
- Sasidharan, N. and P. Sujanapal. 2007. A new species of *Humboldtia* Vahl (Fabaceae-Caesalpinioideae) from southern Western Ghats, India. *Rheedea* 17(1&2): 21-23
- 5 K. Satheesh, P. S. Udayan and Indira Balachandran, Notes on ten Rare, Endemic and Threatened plants of Western Ghats of conservation concern. IAAT at Sivaji University, Kohlapur, Maharashtra during 19 - 21 November 2007 (Poster presentation).
- 6 K. Satheesh, P. S. Udayan, N. Anil Kumar and Indira Balachandran. 2008. A new location for *Gymnema khandalense* Santapau a rare and little known endemic Red Listed medicinal plant from Vavala forest, near Chimmony Dam, (Western Ghats), Thrissur district of Kerala state, India. *Journal of Non-Timber Forest Products* 15(4): 251-254
- 7 K. Satheesh, P. S. Udayan, N. Anil Kumar and Indira Balachandran. 2008. A new report for *Hydnocarpus macrocarpa* (bedd.) warb. - a narrow endemic, endangered and red listed plant from 5th mail, near Neriya Mangalam forest of Ernakulam district, Kerala. *My Forest* 44(2): 119- 122
- Prasanthkumar M.G. and P. Sujanapal. 2008. Conservation status and distribution range of *Ixora johnsoni* Hook.f. (Rubiaceae). *Current Science* 95(8): 1004-1005
- 8 Smitha S. Nair, Jomy Augustine and N. Anil Kumar. 2008. Distribution, Socio-economic Significance and Uses of Wild Nutmeg (*Myristica beddomei* King ssp. *ustulata* de Wilde) in the High Ranges of Kerala, India. Souvenir and Abstracts of International Seminar on 'Multidisciplinary Approaches in Angiosperm Systematics', University of Kalyani, Kalyani. p.130
- 9 Sujanapal, P. and N. Sasidharan. 2009. Diversity and ethnobotanical uses of pteridophytes in Parambikulam Wildlife Sanctuary, Kerala, South India. *Jour. Econ. Tax. Bot.* 33(1): 135-142.
- 10 Sujanapal. P. and N. Sasidharan. A new wild Ginger (*Zingiber anamalayanum* - Zingiberaceae) from India. *Nordic Journal of Botany* (Accepted)
- 11 Sujanapal, P., M. K. Ratheesh Narayanan, N. Sasidharan, N. Anilkumar and M. Sivadasan. *Miliusa wayanadica* (Annonaceae), a new species from Western Ghats, India. *Jour. Bot. Res. Insti. Texas* (Sida) (Accepted)
- 12 K. Satheesh, P. S. Udayan, N. Anil Kumar and Indira Balachandran, The current knowledge and status of *Utleria salicifolia* Bedd. ex Hook .f. a critically endangered species from Western Ghats of Kerala and Tamilnadu. *Zoos' Print Journal* (accepted).
- 13 Sujana, K. A., M. K. Ratheesh Narayanan and N. Anil Kumar, Bio- economic potential of Leguminous Lianas of Wayanad Plateau of Western Ghats. *Indian Forester* (submitted)
- 14 Manudev, K. M., M. K. Ratheesh Narayanan, Sibichen M. Thomas and N. Anil Kumar. An analysis of the diversity of genus *Oberonia* Lindley (Orchidaceae) in Wayanad District, Kerala. International Symposium on Angiosperm Systematics & Phylogeny; Retrospects & Prospects, 12-14 November 2009 (Submitted)
- 15 Sujana, K. A., Lidith, N. M., Sivan, V. V. and N. Anil Kumar. On the occurrence of little known taxa in Kanhangad forest range of Kasaragod District, Kerala, South India. International Symposium on Angiosperm Systematics & Phylogeny; Retrospects & Prospects, 12-14 November 2009 (submitted)
- 16 Sujana, K. A., M. K. Ratheesh Narayanan and N. Anil Kumar. Diversity and distribution of lianas in Wayanad plateau of Kerala, Western Ghats. International Symposium on Angiosperm Systematics & Phylogeny; Retrospects & Prospects, 12-14 November 2009 (submitted)
- 17 C. S. Dhanya and N. Anil Kumar. Successful rescue of four Endangered tree species of Western Ghats. International Symposium on Angiosperm Systematics & Phylogeny; Retrospects & Prospects, 12-14 November 2009 (submitted)



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- 3 www.kyotoprotocol.com
- 4 Nayar, M. P 1996. *Hot Spots of Endemic Plants of India, Nepal and Bhutan*. Tropical Botanic Garden and Research Institute, Trivandrum.
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ABBREVIATIONS

ATREE	Ashoka Trust for Research in Ecology and the Environment
AVSS	Arya Vaidya Sala Kottakkal
BCC	Biodiversity Conservation Corps
BGCI	Botanic Garden Conservation International
BSI	Botanical Survey of India
CAbC	Community Agrobiodiversity Centre
CFR-MCC	Centre for Floristic Research Madras Christian College
CMPR	Centre for Medicinal Plants Research
CNH	Central National Herbarium
CRIKSC	Centre for Research in Indigenous Knowledge, Science and Culture
CSIR	Council of Scientific and Industrial Research
CUSAT	Cochin University of Science And Technology
DFO	Divisional Forest Officer
DST	Department of Science and Technology
FRLHT	Foundation for Revitalization of Local Health Traditions
HIFP	Herbarium of Institut Francais de Pondichery
HPLC	High Pressure Liquid Chromatography
IAAT	Indian Association for Angiosperm Taxonomy
IFGTB	Institute of Forest Genetics and Tree Breeding
IIN	Invest In Nature
ITS markers	Internal Transcribed Spacer markers
IUCN	International Union for Conservation of Nature
KFD	Kerala Forest Department
KFRI	Kerala Forest Research Institute
KSCSTE	Kerala State Council for Science, Technology and Environment
MCC	Madras Christian College
MNHS	Malabar Natural History Society
MSSRF	M S Swaminathan Research Foundation
NBSAP	National Biodiversity Strategies and Action Plans
NGC	National Green Corps
NGO	Non Governmental Organization
NWFP	Non Wood Forest Produce
OISCA	Organization for Industrial Spiritual and Cultural Advancement
PCR	Polymerase Chain Reaction
RARS	Regional Agriculture Research Station
RET	Rare, Endemic and Threatened
RPCA	Rare Plant Conservation Area
SDTT	Sir Dorabji Tata Trust
SEM	Scanning Electron Microscopy
SRF	Senior Research Fellowship
TBGRI	Tropical Botanic Garden and Research Institute
UGC	University Grants Commission
UNEP	United Nations Environment Programme
VHSS	Vocational Higher Secondary School
VSS	Vana Samrakshana Samithi

Annexure I. Major uses reported for the target species

Name (scientific and vernacular/ trade)	Uses reported
<i>Aglaia malabarica</i> Sasidh. Chuvanna cheeralam, Chuvannakil	Aril edible; wood for rough construction and making incense sticks, as adulterant for sandal wood ¹⁵ ; ornamental potential
<i>Anaphyllum wightii</i> Schott. Keerichena, Sulli	To treat piles and snake bites; ornamental potential
<i>Arenga wightii</i> Griff. Njetti Pana, Kattu thengu	Leaves for thatching; toddy tapped from infructescence; tender shoot edible; pith of the stem for treatment of jaundice; tomentum of peduncle for wound healing
<i>Aspidopteris canarensis</i> Dalz. Kannaram valii	Ornamental potential ²
<i>Atuna travancorica</i> (Bedd.) Kosterm. Kallankai maram	Hard wood resistant to marine borers and hence used in ship building; seeds yield fatty oil ²
<i>Bauhinia phoenicea</i> Wight & Arn. Vallimandaram, Thukarakalli	Stem-bark as fibre source; ornamental potential
<i>Beaumontia jerdoniana</i> Wight Swethapushpi	Ornamental potential
<i>Blepharistemma serratum</i> (Dennst.) Suresh Nirkurunda	Leaves medicinal; fruits used for trapping fish.
<i>Caesalpinia spicata</i> Dalz. Poomulluvalli	Ornamental potential; for fencing
<i>Calamus hookerianus</i> Becc. Kallan chooral, Pindi chural	Fruit edible; stem for basketry and artifacts
<i>Calamus travancoricus</i> Bedd. ex Becc. & Hook. f. Arichural, Cheruchooral Kattu Chooral, Vallichooral	Tender shoot and fruit edible; root paste used to treat headache; stem for basketry and artifacts
<i>Calamus vattayila</i> Renuka Ottoman, Vattayilayan	Stem for basketry and artifacts
<i>Calophyllum calaba</i> L. Aattupunna, Manjapunna, Valuzhavam, herrupunna	Seed oil for lighting lamps
<i>Capparis rheedei</i> DC. Kakkamullu	Ornamental potential; leaves and flowers to treat ulcers of bowels and mouth ¹⁵
<i>Casearia wynaadensis</i> Bedd. Karikunnan	Timber for fire-wood and making agricultural implements
<i>Cinnamomum malabatum</i> (Burm. f.) Bl. Karuppa, Ilavangam	To treat stomach pain, wounds, fever, intestinal worms, headache and menstrual problems; immature fruits as raw material in paint industry
<i>Cinnamomum riparium</i> Gamble Attuvayana	To treat stomach pain, wounds, fever, intestinal worms, headache and menstrual problems; leaves as fumigant
<i>Colubrina travancorica</i> Bedd.	Root, bark and leaves are purgative
<i>Curcuma vamana</i> Sabu & Mangaly Kattu Manjal, Kuruttu manjal, Kurumanjal	Rhizome to treat skin diseases
<i>Cynometra beddomei</i> Prain Cherukoori	Timber value ²
<i>Cynometra travancorica</i> Bedd. Koori	Wood for construction; ornamental potential
<i>Decalepis hamiltonii</i> Wight & Arn. Mahanikizhangu	Tuberous root to make refreshing drinks, to cure indigestion, dysentery, cough, bronchitis, leucorrhoea, uterine hemorrhage, skin diseases, fever, thirst, vomiting, poisoning, chronic rheumatism, anaemia, debility, dysuria and blood diseases; root as a source of the raw drug 'Sariba' ¹⁵
<i>Derris brevipes</i> (Benth.) Baker Pannivalli	Ornamental potential; root-paste as rodenticide; stem-bark as fibre source
<i>Dysoxylum beddomei</i> Hiern Akil	Wood for furniture ¹⁵
<i>Dysoxylum malabaricum</i> Bedd. ex Hiern Vellakil, Akil, Purippa	Bark to treat arthritis, anorexia, cardiac debility, inflammation, leprosy and rheumatism, for expelling intestinal worms; wood oil to treat ear and eye diseases ³³
<i>Goniothalamus wynaadensis</i> (Bedd.) Bedd. Aanapanal	Bark-fibre for making ropes

Name (scientific and vernacular/ trade)	Uses reported
<i>Hopea ponga</i> (Dennst.) Mabb. Naduvalippongu, Kambakam, Irumbakam, Pongu	Wood for construction and making cart wheels.
<i>Hippocratea bourdillonii</i> Gamble Aattupullani valli	Stem-bark as fibre source
<i>Humboldtia brunonis</i> Wall. Kattasokam, Kadu asoka	Bark as a substitute for <i>Saraca asoca</i> ; wood for rackets ¹⁵
<i>Hydnocarpus macrocarpa</i> (Bedd.) Warb. Malamkumatti, Malamarotti, Vellananku	Oil to treat lepromatous leprosy and skin lesions ¹⁵
<i>Ixora sivarajiana</i> Pradeep Kattu thechi	Ornamental potential
<i>Jerdonia indica</i> Wight	Ornamental potential
<i>Kingiodendron pinnatum</i> (Roxb. ex DC.) Harms. Ennappayin, Kulavu, Kiyavu, Malabar Mahogany	Wood for making beams, furniture ceiling, boards, and floorings ² ; resin for making varnishes; oleoresin to treat gonorrhoea, rheumatism and as a dressing for sores on elephants
<i>Knema attenuata</i> (Hook. f. & Thoms.) Warb. Chorappatri, Chorappali, Chorappayin	Wood for furniture; fruits in paint industry; sapling-stems for making wooden hangers
<i>Kunstleria keralensis</i> Mohanan & Nair Mutharivalli, Kariveppilavalli	Stem-bark as fibre source
<i>Litsea coriacea</i> (Heyne ex Meisner) Hook. f. Maravettithali, Pannithali, Vettithali	Wood for fuel and making agricultural implements
<i>Madhuca bourdillonii</i> (Gamble) H. J. Lam. Thandidiyan, Ponavu	Timber value
<i>Medinilla malabarica</i> Bedd.	Ornamental potential
<i>Memecylon randerianum</i> SM & MR Almeida Kaikkathetti, Kashara, Kazhavu, Koovachekki	Ornamental potential; fruits for fish stupefaction; root has ecobolic properties; flowers and twigs to treat skin diseases
<i>Myristica beddomei</i> King Pathri-poovu, Pasupathi, Adakkappayin.	Aril to treat diarrhea, cough, bronchitis, fever, burning sensation, inflammation of joints, skin disorders, wounds, sleeplessness, indigestion, liver disorders and worms ³²
<i>Myristica magnifica</i> Bedd. Kothappayin, Kothappanu	Aril for dyeing
<i>Myristica malabarica</i> Lam. Panampalka, Ponnampoo, Ponnampayin	Seeds and their aril to treat vitiated conditions of <i>vata</i> , cough, bronchitis, fever and burning sensation; seed kernels for protecting oils and fats; seeds and aril used as condiment ³²
<i>Ochlandra beddomei</i> Gamble Paloda, Ameioda, Eatta	Pseudostem for making arrows and fish traps; leaves for thatching
<i>Ochna gamblei</i> King ex Brandis Kuka-moi (Telugu)	Ornamental potential
<i>Osbeckia wynaadensis</i> Clarke Vayal athirani	Ornamental potential
<i>Oxytenanthera bourdillonii</i> Gamble Araympoo, Vellimula, Kamen	Shoot edible; pseudostem for basketry and artifacts
<i>Oxytenanthera ritchiei</i> (Munro) Blatt. & McCann Erankol, Korna	Pseudostem for basketry and artifacts
<i>Palaquium ellipticum</i> (Dalz.) Baill. Pali, Iluppakkai, Choppala, Pachendi	Gum for coating ropes, soled shoes and ground sheets; seed-oil in soap manufacture; seed edible; latex to treat skin diseases
<i>Phaeanthus malabaricus</i> Bedd. Kunukipanal	Ornamental potential
<i>Phyllanthus indofischeri</i> Bennet. Karaneli	Fruit edible and medicinal
<i>Pinanga dicksonii</i> (Roxb.) Blume Kattupackumaram, Kattukamuku	Wood as supporting poles; fruit as masticator
<i>Poeciloneuron indicum</i> Bedd. Poothamkolli, Vayila vazha, Vayanavu	Root as an oral contraceptive; wood for making agricultural implements, rice-pounder, walking sticks, electric transmission poles, railway-sleepers and paving blocks ¹⁵
<i>Pterospermum reticulatum</i> Wight & Arn. Malayuram, Malavuram, Malaviriam	Wood for making houses, boats, matchboxes and splints ²⁹ ; ornamental potential
<i>Quisqualis malabarica</i> Bedd. Sandhyarani	Ornamental potential

Name (scientific and vernacular/ trade)	Uses reported
<i>Sageraea grandiflora</i> Dunn Pothandi, Manjaara	Wood for making furniture and fishing boats
<i>Salacia beddomei</i> Gamble Korantivalli	Fruit edible and anti-diabetic ³⁰
<i>Salacia macrosperma</i> Wight Anakoranti	Root-bark anti-diabetic, fruit edible
<i>Semecarpus auriculata</i> Bedd. Vellacheru, Charu	Fruits as a substitute for that of <i>Semecarpus anacardium</i>
<i>Solenocarpus indicus</i> Wight & Arn. Kattambazham, Molagarisi	Fruit laxative
<i>Spatholobus purpureus</i> Benth. ex Baker Vallichamatha	Stem-bark as fibre source
<i>Strophanthus wightianus</i> Wall. ex Wight Kambetti	Ornamental potential
<i>Symplocos wynadense</i> (O. Ktze.) Nooteb. Pachotti, Podipari	Ornamental potential
<i>Syzygium palghatense</i> Gamble Sevappunjal	Fruit edible
<i>Syzygium densiflorum</i> Wall. ex Wight & Arn. Ayuri, Kuruthamaram, Kurunjal, Pillanjal	Fruit edible
<i>Syzygium salicifolium</i> (Wight) Graham Vallamanchi	Fruit edible
<i>Syzygium laetum</i> (Buch.-Ham.) Gandhi Kollinjal, Kattuchamba, Manjachamba	Fruit edible
<i>Syzygium malabaricum</i> (Bedd.) Gamble Kattuchamba	Fruit edible
<i>Syzygium mundagam</i> (Bourd.) Chithra Mundagam, Kattuchampa	Fruit edible
<i>Syzygium munronii</i> (Wight) Chandrab. Malamchamba	Fruit edible
<i>Syzygium occidentale</i> (Bourd.) Gandhi Karinjara, Attuchampa	Fruit edible
<i>Syzygium stocksii</i> (Duthie) Gamble Vallamanchi	Fruit edible
<i>Syzygium rama-varmae</i> (Bourd.) Chithra Kattuchampa	Fruit edible
<i>Syzygium travancoricum</i> Gamble Poriyal, Vathamkollimaram	Fruit edible; bark medicinal
<i>Utleria salicifolia</i> Bedd. ex Hook. f. Mahali kizhangu	Tuber for treating intestinal ailments and bleeding due to ulcers ¹⁵
<i>Vateria indica</i> L. Pandam, Vellappayin, Vellathelly, Vellakundirikkam	Wood for making boats; resins for making incense sticks and varnish ³¹
<i>Vateria macrocarpa</i> Gupta Valiya vellappayin, Perumpayin, White dammar	Gum resin for making varnish; wood for plywood and pulp industry

Annexure II. Details of conservation sites

1. List of forest areas selected for reintroduction of RET species

- 1 RET Plants Conservation Garden (10 ha) at Kunnambetta Forest, South Wayanad Forest Division
- 2 RET & Medicinal Plants Park at Muthanga, Wayanad Wildlife Sanctuary, Wayanad
- 3 *In situ* Conservation Zone for RET plant species at Peruvannamuzhi Forest Range, Kozhikode Forest Division
- 4 Rare Plants Conservation Area (RPCA, 10 ha) at Perya, North Wayanad Forest Division
- 5 *In situ* Conservation Zone for RET plant species at Kakkavayal Forest, Kozhikode Forest Division

2. Schools identified for *Vallikkudil* (Vine Hut) programme in Wayanad

- | | |
|---------------------------------------|--|
| 1 G. H. S. Vythiri | 6 A. U. P. S. Thekkumthara |
| 2 G. H. S. S. Koleri | 7 S. A. L. P. Thariode |
| 3 G. U. P. S. Kottathara | 8 H. M. G. U. P. S. Thettamala, Mananthavadi |
| 4 A. N. M. U. P. S. Mylambadi | 9 G. H. S. Aratuthara |
| 5 Jawahar Navodaya Vidyalaya, Wayanad | 10 St. Antony's U. P. S. Kottathara |

3. List of 20 tree groves

- | | |
|---|---|
| 1 Vimal Kumar, Geethanjali, Muttill, Kalpetta, Mob.09495642828 | 11 K. V. Divakaran, Chithra, Pozhuthana |
| 2 K. Raveendran, Pranavam Home Stays, Mob. 9847806968 | 12 T. N. Venugopal, Vineeth House, Kalpetta, Mob. 9387210639, 04936- 202519 |
| 3 K. S. Ramesh, SHOBHAI, Puzhamudi, Kalpetta, Ph: 04936-202519 | 13 M. A. Sujatha, Anugraha, Madakimala P.O., Kalpetta, Mob. 9447895303 |
| 4 K. P. Sreedharan, Sangeeth House, Kalpetta, Ph: 04936 202471 | 14 M. Nandakumar, Pushpalayam, Madakimala, P. O. Karimkutti, Kalpetta, Ph: 04936 284330 |
| 5 M. Ravi, Poonchola Estate, Vythiri, | 15 Murali T. V., Rotary Club, Kalpetta, Mob. 9447635802, Ph: 04936 202050 |
| 6 Jayan Kalpetta, JAITHRA, Kalpetta, Ph: 04936 202050 | 16 Adv. Joshi Syriac, Kalpetta, Mob. 09447491636 |
| 7 Vijayapadman, Vijayamahal, Kalpetta North, Kainatty | 17 Ratnakaran, Ratnakar, Kalpetta North, Kainatty |
| 8 Dr K. P. Elias, Dental surgeon, Chirsty Dental Clinic, Kalpetta | 18 K. P. Balan Nair, Puzhamudi, Kalpetta |
| 9 Manoj Kottarathil, By-pass Road, Kalpetta | 19 M. K. Ramadas, Mannarote house, Naiketty P. O., Sulthan Bathery, Mob. 9847939952 |
| 10 Pramod Andrews, Andrews Villa, Thinapuram, Meppadi P. O., Ph: 04936 280709 | 20 M. P. Sreyams Kumar MLA, Puliymala Estate, Kalpetta North, Kainatty |

4. Non Governmental Organisations

- 1 RASTA, Wayanad
- 2 Vasudha, Wayanad
- 3 Swanthnam Nature Club, Koilandi, Kozhikode
- 4 Navasakthi Trust, Karunagapalli, Kollam

5. R & D Institutes, Universities and Colleges

- 1 Kerala Forest Research Institute
Peechi P. O. Thrissur - 680657
Ph. 04872699037
- 2 State Medicinal Plant Board
Shornur Road Thiruvambadi, Thrissur
- 3 Department of Botany
Union Christian College, Aluva
- 4 Department of Botany
St. Joseph College, Devagiri, Kozhikode
- 5 Kerala Forest Research Institute
Field station, Palapilly, Thrissur
- 6 Department of Botany
University of Calicut, Malappuram
- 7 Department of Botany
Fathima Matha College, Kollam
- 8 Marymatha College
Manathavadi

6. Religious Institutes

- 1 Kootakavu, Bhagavathi Temple



Misty mountains.....

Missing species.....



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Sri Jairam Ramesh, the then Minister of State for Commerce & Industry (the current Minister of State for Environment and Forests), Govt. of India planting a tree sapling of the wild spice *Myristica beddomei* at CAB Campus on 21 Nov 2008

