RESEARCH ARTICLE

DIVERSITY AND CONSERVATION STATUS OF RED-LISTED MEDICINAL PLANTS IN TAMIL NADU

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ABSTRACT

Tamil Nadu has rich repository of medicinal plant wealth and equally threatened with several number of factors. There has been enumerated a total of 119 species Red Listed medicinal plants, from which 27 species have assessed global RL status. Fourteen species have been assigned Critically Endangered (CR) status, 27 species are Endangered (EN), 31 species are Vulnerable (VU) and 10 species are Near Threatened (NT). 18 of these Red Listed medicinal plant species have been recorded in high volume trade in the national level trade study. The present paper analysed the diversity status of endemic medicinal plant diversity, assessment methods, policy terms related to medicinal plant conservation and conservational areas in Tamil Nadu.

Keywords: Endemic medicinal plants, Red Listed, threatened, endangered and conservation.

1. INTRODUCTION

The entire plant kingdom consisting of more than 3.5 lakhs species originated in 35 mega biodiversity centers around the world. Western Ghats falls within the Indian subcontinent, which covers an area of 20000 sq. km. It is notable for its rich bio-diversity and endemism. About 1500 species of medicinal herbs are found here and are used in indigenous systems of medicine such as Siddha and Ayurveda. Plants like lemon grass, patchouli and vetiver species have originated in this area. Tamil Nadu had ranked first position among all the states in the Country with 5,740 species of higher plants out of 18,672 species in India. This includes 533 endemic species, 230 red-listed species, 1559 species of medicinal plants and 260 species of wild relatives of cultivated plant (1).

Over the centuries, people in India have had a fascination and respect for the natural heritage, traditional plant ethics and tried to conserve it in varied ways possible. The Biodiversity Conservation Act 1999 emphasizes the conservation of biodiversity rich areas and their sustainable use especially, in the developing countries. And for a country like India which is diverse with all variety of flora and fauna. Conservation of natural wealth becomes a priority in the urban sprawl. The International Convention on Biological Diversity 1992 obliges all parties, including India to prepare an inventory and monitoring biodiversity and make all attempts to conserve these natural resources. This enormous task is not possible only by ground survey and research. The global Biodiversity Assessment recommends that such assessment requires a detailed knowledge of species distribution in particular landscape. India's biodiversity Act 2002 aims to promote conservation, sustainable use and equitable sharing of benefits of India's biodiversity resources. The medicinal plant diversity of all the states of India is very rich and traditional wisdom. The value of which is more or less to a large extent restricted to experts in the field and to the traditional folks (2).

In the case of medicinal plants, it is known that populations of a particular species from certain localities have been traditionally preferred. There are no systematic studies on medicinal plants with reference to gene based differences in the production of therapeutically active chemical constituents, but there are several indications. For example, a therapeutically useful lectin (a specific class of protein) from the seed of Jack fruit (Artocarpus heterophyllus) showed 2,500 times more activity in a sample from Bangalore, than in a sample from Chennai (3). This is one aspect of chemical diversity, a component of genetic diversity. Studies on chemical diversity, both quantitative and qualitative, on medicinal plants are largely absent and very much needed.

2. STATUS AND THREATS

Somewhat surprisingly given their commercial importance and concerns regarding population declines, information on the status of the species throughout their range was generally limited. Information on declines and rarity appeared to be based largely on expert opinion, sometimes developed through Conservation Assessment and Management Plan (CAMP).
workshops organized by members of the IUCN/SSC Medicinal Plant Specialist Group. Population surveys appeared to be limited to a small number of sites, with little evidence of more widespread surveys to determine the status of the species at either the country or the global level. This situation can be explained in part by the vast size and remoteness of the species' habitats. For example, the appropriately named *Cistanche deserticola* is found in arid areas in China and Mongolia, while *Nardostachys grandiflora*, *Picrorhiza kurrooa* and *Neopicrorhiza scrophulariiflora* occur across large areas of the alpine Himalaya. Based on the information that is available, it appears that all seven species have declined in the wild owing to over-collection to supply domestic and foreign medicinal markets. As a result, all are also considered to be threatened with extinction in at least parts of their range, although only one, the tree species *Pterocarpus santalinus*, has thus far been reviewed and classified as globally threatened (Endangered) in the IUCN Red List. In some cases, *P. santalinus* being one example, the threat of harvest for medicinal use appears to be secondary to that of harvest for other uses, e.g. timber and dyes. In other cases, that of *Rauvolfia serpentina*, an Indian snake root, collection from the wild considered the primary threat; here, the main threat was habitat destruction. The principles and criteria for working on medicinal and aromatic plants have been drafted by the IUCN/MPSG (5) (Table 1).

The total of 119 species have enumerated as RL status in Tamil Nadu, 27 have a global RL status as these are endemic (or nearly so) the state/region. Fourteen species have been assigned Critically Endangered (CR) status, 27 species are Endangered (EN), 31 species are Vulnerable (VU) and 10 species are Near Threatened (NT). 18 of these Red Listed medicinal plant species have been recorded in high volume trade in the national level trade study (Table 2). Plate 1 showed the photographs of some importance red-listed medicinal plants in Tamil Nadu.

Table 1. ISSC-MAP Principles and Criteria (Working Draft, June 2006)

**SECTION 1: WILD COLLECTION AND CONSERVATION REQUIREMENTS**

**Principle 1. Maintaining Wild MAP Resources**

Wild collection of MAP resources shall be conducted at a scale and rate and in a manner that maintains populations and species over the long term.

1.1 **Conservation status of target MAP species**

The conservation status of target MAP species and populations is assessed and regularly reviewed.

1.2 **Knowledge-based collection practices**

MAP collection and management practices are based on adequate identification, inventory, assessment, and monitoring of the target species and collection impacts.

1.3 **Collection intensity and species regeneration**

The rate (intensity and frequency) of MAP collection does not exceed the target species’ ability to regenerate over the long term.

**Principle 2. Preventing Negative Environmental Impacts**

Negative impacts caused by MAP collection activities on other wild species, the collection area, and neighbouring areas shall be prevented.

2.1 **Sensitive taxa and habitats**

Rare, threatened, and endangered species and habitats that are likely to be affected by MAP collection and management are identified and protected.

2.2 **Habitat (landscape level) management**

Management activities supporting wild MAP collection do not adversely affect ecosystem diversity, processes, and functions.

**SECTION II: LEGAL AND ETHICAL REQUIREMENTS**

**Principle 3. Complying with Laws, Regulations, and Agreements**

MAP collection and management activities shall be carried out under legitimate tenure arrangements, and comply with relevant laws, regulations, and agreements.

3.1 **Tenure, management authority, and use rights**

Collectors and managers have a clear and recognized right and authority to use and manage the target MAP resources.

3.2 **Laws, regulations, and administrative requirements**

Collection and management of MAP resources complies with all international agreements and with national, and local laws, regulations, and administrative requirements,
including those related to protected species and areas.

**Principle 4. Respecting Customary Rights**

Local communities’ and indigenous peoples’ customary rights to use and manage collection areas and wild collected MAP resources shall be recognized and respected.

**4.1 Traditional use, access rights, and cultural heritage**

Local communities and indigenous people with legal or customary tenure or use rights maintain control, to the extent necessary to protect their rights or resources, over MAP collection operations.

**4.2 Benefit sharing**

Agreements with local communities and indigenous people are based on appropriate and adequate knowledge of MAP resource tenure, management requirements, and resource value.

**3. IMPORTANCE OF MEDICINAL PLANTS**

The curative properties of drugs are due to the presence of complex chemical substances of varied composition (present as secondary plant metabolites) in one or more parts of these plants. These plant metabolites in one, according to their composition, are grouped as alkaloids, glycosides, corticosteroids, essential oils, etc. The alkaloids form the largest group, which includes morphine and codein (poppy), strychnine and brucine (nux-vomica), quinine *(Cinchona)*, ergotamine (ergot), hypocyamine (beeladona), scolopamine (datura), emetine (ipecac) cocaine (coco), ephedrine *(Ephedra)*, reserpine *(Rauvolfia)*, caffeine (tea dust), aconitine (aconite), vaccine (vasaca), santonin *(Artemesia)*, lobelin *(Lobelia)* and a large number of others. Glycosides form another important group represented by digoxin (foxglove), strophanthin (strophanthus), glycyrrhizin (liquorice), barbolin (aloe), sennocides (senna), etc. Corticosteroids have come into prominence recently and diosgenin (Dioscorea), solasodin *(Solanum sp.*), etc. now command a large world demand. Some essential oils such as those of valeriana and peppermint also possess medicating properties and are used in pharmaceutical industry.

During the last two decades, the pharmaceutical industry has made massive investments on pharmacological, clinical and chemical researches all over the world in an effort to discover and still more potent plant drugs; in fact, a few new drug plant have successfully passed the tests of commercial screening. However, benefits of this labour would reach the masses when the corresponding support for agricultural studies for commercial cultivation is provided. Infact, agricultural studies on medicinal plants, by its very nature, demand an equally large investment and higher priority. India, in particular, has a big scope for the development of the phytopharmaceutical and phytochemical industry.

**4. RED LIST ASSESSMENT AND MANAGEMENT PLANNING FOR MEDICINAL PLANTS**

Members of the MPSG South Asia regional sub-group continue to make this region an active centre of medicinal plant conservation status assessment, applying the IUCN Red List criteria and methods for conservation management planning (the CAMP process) developed by the SSC Conservation Breeding Specialist Group (CBSG). The formal terms of reference for Red List Authorities may require some flexibility in their application to medicinal plants, given the diversity of taxa included in this group, and the overlapping taxonomic and regional Red List authority of other Specialist Groups. At present, it need to focus efforts on collaborating with Red List authorities for taxonomic groups that include threatened or potentially threatened species of medicinal plants, ensuring that any activities involving Red List assessments of medicinal plants (such as Conservation Assessment and Management Planning – CAMP workshops) are applying the current IUCN Red List Categories appropriately (version 3.1, 2001, http://www.iucn.org/themes/ssc/redlists/RLcats2001booklet.html), reporting the assessment results adequately to the SSC Red List Programme, and creating training opportunities to increase Red List capacity for researchers working on medicinal plants.

**5. TERMS OF REFERENCE FOR RED LIST AUTHORITIES**

The Red List Authority takes responsibility for ensuring that taxa specified in the appointment contract are evaluated against the IUCN Red List Categories. The Red List Authority (RLA) will ensure that each taxon within its mandate that has already been evaluated against the Categories is re-evaluated at least every 10 years, and if possible every 5 years. The Red List Authority will also seek to expand the number of taxa evaluated against the Categories in particular in response to the priorities identified in collaboration with the SSC Red List Programme. Each Red List Authority will appoint a Red List focal point person for the Authority to liaise with the Red List Programme Officer. A Red List Authority can comprise as many people as required (but a minimum of two is necessary). How
each RLA is constructed and how it operates is entirely at the discretion of each group but the terms of reference outlined above need to be borne in mind.

Each RLA focal point person will be responsible for verifying Red List assessments through:

1. ensuring that at least two named evaluators agree the status of each taxon assessed;
2. ensuring that the evaluators are competent in the relevant fields;
3. ensuring that the evaluators are familiar with and up-to-date with the Red List Categories and Criteria, and their application;
4. requiring evaluators to take full account of present and past literature (published and grey) and other reliable sources of information, relating to the taxon;
5. assisting evaluators to seek and locate the best available background data relating to the threats likely to affect the taxon;
6. requiring the evaluators to consult internally within the Red List Authority, and externally with appropriate specialists and other interest groups;
7. ensuring that for each evaluation, the evaluators provide supporting information in line with the documentation requirements, as set out in the Annex 2 to these terms of reference;
8. ensuring that for each evaluation, the evaluators adhere to the taxonomic standards, as set out in Annex 3 to these terms of reference;
9. in the case of a petition against the listing of any taxon for which the Authority is responsible, following the process for handling petitions as set out in Annex 4 to these terms of reference, and abide by any decisions of the arbitrating Red List Standards Working Group; and
10. submitting the results of new assessments including changes in categorisation to the IUCN Red List Officer in the format required and within schedules set for annual and occasional updates of the IUCN Red List of Threatened Species.

6. BIOLOGICAL DIVERSITY ACT, 2002

The Government has enacted the Biological Diversity Act in 2002 and notified the Biological Diversity Rules in 2004, with the aim of conserving and sustainably using biological diversity, and regulating the biological resources (including the medicinal plants) and associated traditional knowledge of the country with the purpose of securing equitable sharing of benefits arising out of these resources and associated knowledge. About 29 species of medicinal plants have so far been identified and notified by the Director General of Foreign Trade, Ministry of Commerce, New Delhi. Export of these 29 plants, plant portions and their derivatives and extracts as such obtained from the wild except the formulations made therefrom is prohibited as these species required protection against over-exploitation.

7. BIODIVERSITY ASSESSMENT URGENT FOR MEDICINAL PLANTS

The number of medicinal plants in India, both indigenous and introduced has been estimated between 3,000 to 3,500 species of higher plants. The Glossary of Indian Medicinal Plants has listed around 3,000 plants (5). About 8,500 plants have been reported to be used in ethnomedicine and folk medicine (6). The number of plants listed in Ayurvedic Materia Medica is 560. The Unani system of medicine describes 440 plants out of which 360 are common to other systems of medicine practiced in the country. The number of plants having confirmed therapeutic properties or yielding a clinically useful chemical compound thus, lies 700 species (7).

Tamil Nadu is a hub of the wild-collected medicinal industries in India, but key species have declined due to over-collection to supply domestic and export trade. Researchers from TRAFFIC and IUCN, the International Union for Conservation of Nature, examined the trade in seven medicinal plants species with very different life histories, uses and trade patterns, to give a broad overview of Asia's medicinal plant trade. India emerged as a major destination for trade in all but three of the seven species studied in Tamil Nadu such as Dioscorea deltoidea, Pterocarpus santalinus and Rauvolfia serpentina (Plate 1.j).

But all seven species are declining through over-harvesting, although not necessarily of the plants themselves. All the species are protected under national legislation and international trade controls—the latter through listing in CITES, which requires international trade to be maintained within sustainable levels, but despite these measures, wild populations continue to decline. Medicinal Plant Specialist Group (MPSG) is a global network of specialists contributing within our own institutions and in our own regions, as well as worldwide, to the conservation and sustainable use of medicinal plants. The MPSG was founded in 1994 to increase global awareness of conservation threats to medicinal plants, and to promote sustainable use and conservation action.
8. PROTECTED AREAS FOR CONSERVATION

The protected areas of Tamil Nadu extend to 3305 km$^2$ constituting 2.54% of the geographic area and 15% of the recorded forest area. Tamil Nadu ranks 14th among all the States and Union Territories of India in terms of protected area. There are 8 wildlife sanctuaries over 2,82,685.57 ha and 12 bird sanctuaries over 17,074.59 ha, 5 National Parks over 30784.23 ha, 3 Tiger Reserves, 4 Elephant Reserves and 3 Biosphere Reserves for in situ conservation of wild fauna and flora. There is one Conservation Reserve in Tamil Nadu.

MPCAs are reserve forest sites of high bio diversity value and known for their medicinal plant diversity. In these areas, presence of endangered species are identified and conserved. MPCAs are “no harvest area” mainly intended to be “in situ” gene bank. They serve as research sites and source of planting materials. There are eleven MPCAs in Tamil Nadu such as Alagarkoil (Dindigul division), Kodaikanal (Kodaikanal division), Kolli hills (Namakkal division), Kodikarai (Nagapattinam division), Kurumaram (Villupuram), Courtallum (Tirunelveli), Mundanthurai (Ambasamuthiram), Pechiparai (Kanyakumari), Thaniparai (SriVilliputhur), Thenmalai (Tirpathur) and Topslip (Pollachi) (8).

Table 2. Red-listed medicinal plants of Tamil Nadu and its diversity status.

| S. No. | Name of the medicinal plant species | Family       | IUCN category | Distribution                        |
|--------|------------------------------------|--------------|---------------|-------------------------------------|
| 1.     | Acorus calamus L.                  | Araceae      | VU            | Western Ghats                      |
| 2.     | Justicia beddomei C.B.Clarke       | Acanthaceae  | CE            | Western Ghats                      |
| 3.     | Aegle marmelos (L.) Corr.          | Rutaceae     | VU            | All over Tamil Nadu                |
| 4.     | Aerva wightii Hook.f.              | Amaranthaceae| EX            | Tirunelveli district               |
| 5.     | Alpinia galanga L.                 | Zingiberaceae| DD            | Western Ghats                      |
| 6.     | Ampelocissus araneosa (Dalz. & Craib.) Planch. | Vitaceae | VU            | Western Ghats                      |
| 7.     | Ampelocissus arnotitiana Planch.   | Vitaceae     | EN            | Western Ghats                      |
| 8.     | Andrographis paniculata Wall ex Nees | Acanthaceae  | LC            | All over Tamil Nadu                |
| 9.     | Aphanamixis polystachya (Wall.) Parker | Meliaceae | VU            | Western Ghats                      |
| 10.    | Aristolochia tagala Cham.          | Aristolochiaceae | VU        | Western and Eastern Ghats          |
| 11.    | Artocarpus hirsutus Lam.           | Moraceae     | VU            | Western and Eastern Ghats          |
| 12.    | Asparagus rottleri Barker          | Asparagaceae | EX            | Western Ghats                      |
| 13.    | Balanites aegyptiaca (L.) Delile | Balanitaceae | LC            | All over Tamil Nadu                |
| 14.    | Baliospermum montanum (Willd.)     | Euphorbiaceae| VU            | Western Ghats                      |
| 15.    | Coscinium fenustratum (Gaertn.)    | Menispemaceae| CE            | Western Ghats                      |
| 16.    | Curcuma pseudomontana Graham       | Zingiberaceae| VU            | Western Ghats                      |
| 17.    | Cycas circinalis L.                | Cycadaceae   | CE            | All over Tamil Nadu                |
| No. | Scientific Name                                      | Family            | Status | Distribution                           |
|-----|-----------------------------------------------------|-------------------|--------|----------------------------------------|
| 30  | *Cyclea fissicalyx* Dunn                           | Menispermaceae    | EN     | Western Ghats                          |
| 31  | *Dalbergia hortida* (Dennst.) Mabb.                | Fabaceae          | DD     | Western Ghats                          |
| 32  | *Decalepis hamiltonii* Wight & Arn.               | Apocynaceae       | EN     | All over Tamil Nadu                    |
| 33  | *Dioscorea deltoidea* Wall. ex Kunth.              | Dioscoreaceae     | CE     | Western Ghats                          |
| 34  | *Diospyros candolleana* Wight                     | Ebenaceae         | VU     | Western Ghats                          |
| 35  | *Diospyros paniculata* Dalz.                      | Ebenaceae         | VU     | Western Ghats                          |
| 36  | *Dipterocarpus indicus* Bedd.                     | Dipterocarpaceae  | EN     | Western Ghats                          |
| 37  | *Drosera indica* L.                               | Droseraceae       | VU     | All over Tamil Nadu                    |
| 38  | *Drosera peltata* Willd.                          | Droseraceae       | VU     | Western Ghats                          |
| 39  | *Dysoxylum malabaricum* Bedd.                     | Meliaceae         | EN     | Western Ghats                          |
| 40  | *Elaeocarpus serratus* L.                         | Elaeocarpaceae    | LC     | Western Ghats                          |
| 41  | *Emelbia ribs* Burm.f.                            | Myrsiniaceae      | LC     | Western Ghats                          |
| 42  | *Emelbia tsjeriam-cottam* DC.                     | Myrsiniaceae      | VU     | All over Tamil Nadu                    |
| 43  | *Eulophia cullenii* (Wight) Bl.                   | Orchidaceae       | CE     | Western Ghats                          |
| 44  | *Garcinia indica* (Dup.) Choisy.                  | Rubiaceae         | VU     | Western Ghats                          |
| 45  | *Garcinia travancorica* Bedd.                     | Rubiaceae         | CE     | Western Ghats                          |
| 46  | *Gardenia gummifera* L.f.                         | Rubiaceae         | LC     | All over Tamil Nadu                    |
| 47  | *Gloriosa superba* L.                             | Liliaceae         | LC     | All over Tamil Nadu                    |
| 48  | *Glycosmis macrocarpa* Wight                      | Rutaceae          | LC     | Western Ghats                          |
| 49  | *Gnetum ula* Brong.                               | Gnetaceae         | VU     | Western and Eastern Ghats              |
| 50  | *Gynemma montanum* (Roxb.) Hook.                  | Apocynaceae       | EN     | Western Ghats                          |
| 51  | *Hedychium coronarium* Koenig.                    | Zingiberaceae     | LC     | Western Ghats                          |
| 52  | *Hedychium spicatum* Buch.-Ham.                    | Zingiberaceae     | VU     | Western Ghats                          |
| 53  | *Helminthostachys zeylanicus* (L.) Hook.           | Pteridaceae       | EN     | Western Ghats                          |
| 54  | *Heracleum candolleanum* (Wight & Arn.) Gamble.   | Apioaceae         | VU     | Western Ghats                          |
| 55  | *Heracleum rigens* Wall.                          | Apioaceae         | DD     | Western and Eastern Ghats              |
| 56  | *Holostemma ada-kodien* Schult.                   | Apocynaceae       | VU     | Western Ghats                          |
| 57  | *Humboldtia vahliana* Wight                       | Caesalpiniaceae   | EN     | Western Ghats                          |
| 58  | *Hydnocarpus alpina* Wight                        | Achariaceae       | EN     | Western Ghats                          |
| 59  | *Hydnocarpus kurzii* (King) Warb.                 | Achariaceae       | EN     | Western Ghats                          |
| 60  | *Hydnocarpus macrocarpa* (Bedd.) Warb.            | Achariaceae       | VU     | Western Ghats                          |
| 61  | *Iphigenia indica*                                | Liliaceae         | VU     | Western and Eastern Ghats              |
| 62  | *Ipomoea turpethum* (L.) R.Br.                    | Convolvulaceae    | VU     | All over Tamil Nadu                    |
| 63  | *Decalepis arayalpathra* (J.Joseph & V.Chandrass.) Venter | Apocynaceae | CE     | Western Ghats                          |
| 64  | *Kaempferia galanga* L.                           | Zingiberaceae     | CE     | Western Ghats                          |
| 65  | *Kingiodendron pinnatum* (Roxb. Ex DC.) Harms.    | Mimosaceae        | EN     | Western Ghats                          |
| 66  | *Knema attenuata* (Wall.) Warb.                   | Myristicaceae     | LC     | Western Ghats                          |
| 67  | *Luffa tuberosa* (Klein) Roem.                    | Cucurbitaceae     | DD     | Ramanathapuram and Madurai districts   |
| 68  | *Madhuca longifolia* (Koen.) Macer.               | Sapotaceae        | EN     | Western Ghats                          |
| 69  | *Nothapodytes nimmoniana* (J.Graham) Mabb.        | Myrsiniaceae      | VU     | Western Ghats                          |
| 70  | *Michelia champaca* L.                            | Magnoliaceae      | VU     | Western Ghats                          |
| 71  | *Michelia nilagirica* Zenk.                       | Magnoliaceae      | VU     | Western Ghats                          |
| 72  | *Moringa concanensis* Nimmo ex Dalz. & Gibson     | Moringaceae       | VU     | Western Ghats                          |
| 73  | *Myristica dactyloides* Gaertn.                   | Myristicaceae     | VU     | Western Ghats                          |
| 74  | *Myristica malabarica* Lam.                       | Myristicaceae     | VU     | Western Ghats                          |
| 75  | *Nervilia aragoana* Gaud.                         | Orchidaceae       | EN     | Western Ghats                          |
| No. | Scientific Name                                      | Family        | Status | Distribution          |
|-----|-----------------------------------------------------|---------------|--------|-----------------------|
| 76. | *Nilgirianthus ciliatus* (Nees)                     | Acanthaceae   | EN     | Western Ghats         |
|     | Bremek.                                             |               |        |                       |
| 77. | *Ochreinauclea missionis* (Wall. ex D.Don) Ridsdale | Rubiaceae     | VU     | Western Ghats         |
|     |                                                     |               |        |                       |
| 78. | *Oroxyllum indicum* (L.) Vent.                     | Bignoniaceae  | VU     | Western Ghats         |
| 79. | *Persea macrantha* (Nees) Kost.                    | Lauraceae     | EN     | Western and Eastern Ghats |
| 80. | *Piper barberi* Gamble                             | Piperaceae    | CE     | Western Ghats         |
| 81. | *Piper longum* L.                                  | Piperaceae    | LC     | Western and Eastern Ghats |
| 82. | *Piper mullesua* D.Don                             | Piperaceae    | VU     | Western Ghats         |
| 83. | *Plectoranthus nilgherricus* Benth.                | Lamiaceae     | VU     | Western Ghats         |
| 84. | *Pseudarthria viscida* Wight & Arn.                | Fabaceae      | LC     | Western and Eastern Ghats |
| 85. | *Pterocarpus santalinus* L.f.                      | Tiliaceae     | EN     | Eastern Ghats         |
| 86. | *Pterospermum xilocarpum* (Gaertn.) Sant. & Wagh.  | Tiliaceae     | LC     | Western Ghats         |
| 87. | *Pueraria tuberosa* (Roxb. Ex Willd.) DC.          | Fabaceae      | LC     | Western and Eastern Ghats |
| 88. | *Rauwolfia serpentina* (L.) Benth.                 | Apocynaceae   | EN     | Western Ghats         |
| 89. | *Rhaphidophora pertusa* Schott.                    | Araceae       | EN     | Western and Eastern Ghats |
| 90. | *Santalum album* L.                                | Santalaceae   | EN     | Western and Eastern Ghats |
| 91. | *Sapindus emarginatus* Vahl.                       | Sapindaceae   | LC     | All over Tamil Nadu    |
| 92. | *Saraca asoca* (Roxb.) Wild.                       | Caesalpiniaceae | EN   | Western Ghats         |
| 93. | *Schrebera swietenioides* Roxb.                    | Meliaceae     | VU     | Western Ghats         |
| 94. | *Semecarpus travancorica* Bedd.                    | Anacardiaceae | EN     | Western Ghats         |
| 95. | *Smilax wightii* L.                                | Smilaxaceae   | DD     | Western Ghats         |
| 96. | *Smilax zeylanica* L.                              | Smilaxaceae   | VU     | Western Ghats         |
| 97. | *Strychnos minor* Dennst.                          | Loganiaceae   | DD     | Western Ghats         |
| 98. | *Strychnos nux-vomica*                             | Loganiaceae   | LC     | All over Tamil Nadu    |
| 99. | *Strychnos potatorum*                              | Loganiaceae   | LC     | All over Tamil Nadu    |
| 100.| *Swertia angustifolia* Ham.                         | Gentianaceae  | EN     | Western and Eastern Ghats |
| 101.| *Swertia corymbosa* (Griseb.) Wight ex Clarke      | Gentianaceae  | VU     | Western Ghats         |
| 102.| *Swertia lawii* Burkill                           | Gentianaceae  | EN     | Western Ghats         |
| 103.| *Symplocos racemos* Roxb.                          | Symplocaceae  | VU     | Western Ghats         |
| 104.| *Symplocos cochinchinensis* S.Moore                | Symplocaceae  | LC     | Western Ghats         |
| 105.| *Syzygium travancoricum* Gamble                    | Myrtaceae     | CE     | Western Ghats         |
| 106.| *Terminalia arjuna* (Roxb.) Wight & Arn.           | Combretaceae  | LC     | All over Tamil Nadu    |
| 107.| *Tinospora sinensis* (Lour.) Merr.                 | Menispermaceae | VU   | Western and Eastern Ghats |
| 108.| *Tragia bicolor* Miq.                              | Euphorbiaceae | VU     | Western Ghats         |
| 109.| *Trichopus zeylanicus*                             | Dioscoreaceae | EN     | Western Gahts         |
| 110.| *Trichosanthes anamalayensis* Bedd.                | Cucurbitaceae | CE     | Western Ghats         |
| 111.| *Trichosanthes cucumerina* L.                      | Cucurbitaceae | DD     | Western Ghats         |
| 112.| *Vernonia anthelmintica* (L.) Wild.                 | Apocynaceae   | CE     | Western Ghats         |
| 113.| *Vitis trifolia* L.f.                              | Verbenaceae   | LC     | All over Tamil Nadu    |
| 114.| *Vasconcellea pedata* Mukh. & Const.               | Apiaceae      | EN     | Western Ghats         |
| 115.| *Vateria indica* L.                                | Liliaceae     | LC     | Western Ghats         |
| 116.| *Vateria macrocarpa* B.L. Gupta                    | Liliaceae     | LC     | Western Ghats         |
| 117.| *Vernonia anthelmintica* (L.) Wild.                 | Asteraceae    | LC     | All over Tamil Nadu    |
| 118.| *Vitex trifolia* L.f.                              | Verbenaceae   | LC     | All over Tamil Nadu    |
| 119.| *Woodfordia fruticosa* (L.) Kurz.                  | Lythraceae    | LC     | Western Ghats         |
9. CONCLUSION

Conservation is the planned management of natural resources, to retain the natural balance, diversity and evolutionary change in the environment. It is a protective measure taken to prevent the loss of genetic diversity of a species, to save a species from becoming extinct, and to protect an ecosystem from damage so as to promote its sustained utilisation.
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