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RESEARCH ARTICLE

DIVERSITY AND CONSERVATION STATUS OF RED-LISTED MEDICIANL 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 vettiver 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)

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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 case, that of *Rauvolfia serpentina,* an Indian snake root, was 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), scolapomine (datura), emetine (ipecac) cocaine (coco), ephedrine (*Ephedra*), reserpine (*Rauvolfia*), caffeine (tea dust), aconitine (aconite), vaccine (vasaca), santonin (*Artemisia*), lobelin (*Lobelia*) and a large number of others. Glycosides form another important group represented by digoxin (foxglove), stropanthin (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 suceessfully 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 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 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 there from 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 world-wide, 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), Kurumbaram (Villupuram), Courtallum (Tirunelveli), Mundanthurai (Ambasamuthiram), Pechiparai (Kanyakumari), Thaniparai (SriVilliputhur), Thenmalai (Tirpathur) and Topslip (Pollachi) (8).

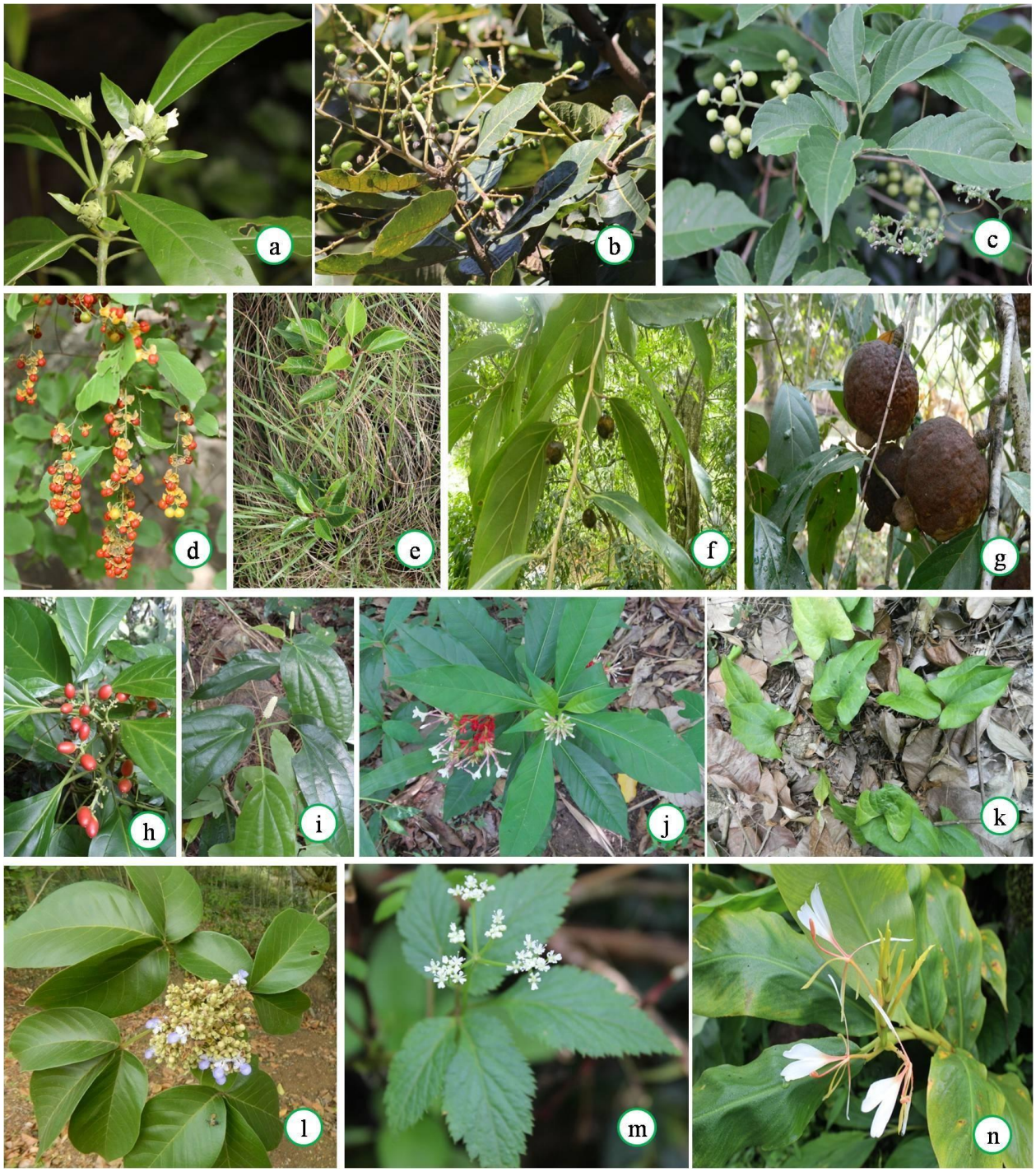
Table 2. Red-listed medicinal plants of Tamil Nadu and its diversity status.

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 arnottiana* 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.) Muell.-Arg.	Euphorbiaceae	VU	Western Ghats
15.	*Buchanania lanzan* Spr.	Anacardiaceae	LC	Western and Eastern Ghats
16.	*Caralluma truncato-coronata* Sedgewick	Apocynaceae	EN	Nilgiri hills
17.	*Calophyllum apetalum* Willd.	Calophyllaceae	VU	Western Ghats
18.	*Canarium strictum* Roxb.	Burseraceae	VU	Western Ghats
19.	*Cayratia pedata* (Lam.) Juss.	Vitaceae	CE	Western Ghats
20.	*Celastrus paniculatus* Willd.	Celastraceae	VU	Western and Eastern Ghats
21.	*Chonemorpha fragrans* (Moon) Alston	Apocynaceae	EN	Western and Eastern Ghats
22.	*Cinnamomum macrocarpum* Hook.	Lauraceae	VU	Western Ghats
23.	*Cinnamomum sulphuratum* Nees	Lauraceae	VU	Western Ghats
24.	*Cinnamomum wightii* C.F.W. Meissn.	Lauraceae	VU	Western Ghats
25.	*Cinnamomum zeylanicum* Bl.	Lauraceae	NE	Western Ghats
26.	*Cleome burmanni* Wight & Arn.	Cleomaceae	DD	Western and Eastern Ghats
27.	*Coscinium fenustratum* (Gaertn.) Coleb.	Menispemaceae	CE	Western Ghats
28.	*Curcuma pseudomontana* Graham	Zingiberaceae	VU	Western Ghats
29.	*Cycas circinalis* L.	Cycadaceae	CE	All over Tamil Nadu

30.	*Cyclea fissicalyx* Dunn	Menispermaceae	EN	Western Ghats
31.	*Dalbergia horrida* (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.	*Embelia ribes Burm*.f.	Myrsiniaceae	LC	Western Ghats
42.	*Embelia tsjeriam-cottam* DC.	Myrsiniaceae	VU	All over Tamil Nadu
43.	*Eulophia cullenii* (Wight) Bl.	Orchidaceae	CE	Western Ghats
44.	*Garcinia indica* (Dup.) Choisy.		VU	Western Ghats
45.	*Garcinia travancorica* Bedd.		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.	*Gymnema montanum* (Roxb.) Hook.	Apocynaceae	EN	Western Ghats
51.	*Hedychium coronarium* Koenig.	Zingiberaceae	LC	Western Ghats
52.	*Hedychium spicatum* Buch.-Ham.	Zigiberaceae	VU	Western Ghats
53.	*Helminthostachys zeylanicus* (L.) Hook.	Pteridaceae	EN	Western Ghats
54.	*Heracleum candolleanum* (Wight & Arn.) Gamble	Apiaceae	VU	Western Ghats
55.	*Heracleum rigens* Wall.	Apiaceae	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.Chandras.) 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.) Macler.	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

76.	*Nilgirianthus ciliatus* (Nees) Bremek.	Acanthaceae	EN	Western Ghats
77.	*Ochreinauclea missionis* (Wall. ex D.Don) Ridsdale	Rubiaceae	VU	Western Ghats
78.	*Oroxylum 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.	*Piper nigrum* L.	Piperaceae	VU	Western and Eastern Ghats
84.	*Plectranthus nilgherricus* Benth.	Lamiaceae	VU	Western Ghats
85.	*Pseudarthria viscida* Wight & Arn.	Fabaceae	LC	Western and Eastern Ghats
86.	*Pterocarpus santalinus* L.f.	Fabaceae	EN	Eastern Ghats
87.	*Pterospermum xylocarpum* (Gaertn.) Sant. & Wagh.	Tiliaceae	LC	Western Ghats
88.	*Pueraria tuberosa* (Roxb. Ex Willd.) DC.	Fabaceae	LC	Western and Eastern Ghats
89.	*Rauvolfia serpentina* (L.) Benth.	Apocynaceae	EN	Western Ghats
90.	*Rhaphidophora pertusa* Schott.	Araceae	EN	Western and Eastern Ghats
91.	*Santalum album* L.	Santalaceae	EN	Western and Eastern Ghats
92.	*Sapindus emarginatus* Vahl.	Sapindaceae	LC	All over Tamil Nadu
93.	*Saraca asoca* (Roxb.) Wild.	Caesalpiniaceae	EN	Western Ghats
94.	*Schrebera swietenioides* Roxb.	Meliaceae	VU	Western Ghats
95.	*Semecarpus travancorica* Bedd.	Anacardiaceae	EN	Western Ghats
96.	*Smilax wightii* L.	Smilaxaceae	DD	Western Ghats
97.	*Smilax zeylanica* L.	Smilaxaceae	VU	Western Ghats
98.	*Strychnos minor* Dennst.	Loganiaceae	DD	Western Ghats
99.	*Strychnos nux-vomica*	Loganiaceae	LC	All over Tamil Nadu
100.	*Strychnos potatorum*	Loganiaceae	LC	All over Tamil Nadu
101.	*Swertia angustifolia* Ham.	Gentianaceae	EN	Western and Eastern Ghats
102.	*Swertia corymbosa* (Griseb.) Wight ex Clarke	Gentianaceae	VU	Western Ghats
103.	*Swertia lawii* Burkill	Gentianaceae	EN	Western Ghats
104.	*Symplocos cochinchinensis* S.Moore	Symplocaceae	LC	Western Ghats
105.	*Symplocos racemosa* Roxb.	Symplocaceae	VU	Western Ghats
106.	*Syzygium travancoricum* Gamble	Myrtaceae	CE	Western Ghats
107.	*Terminalia arjuna* (Roxb.) Wight & Arn.	Combretaceae	LC	All over Tamil Nadu
108.	*Tinospora sinensis* (Lour.) Merr.	Menispermaceae	VU	Western and Eastern Ghats
109.	*Tragia bicolor* Miq.	Euphorbiaceae	VU	Western Ghats
110	*Trichopus zeylanicus*	Dioscoreaceae	EN	Western Gahts
111.	*Trichosanthes anamalayensis* Bedd.	Cucurbitaceae	CE	Western Ghats
112.	*Trichosanthes cucumerina* L.	Cucurbitaceae	DD	Western Ghats
113.	*Urginea indica* (Roxb.) Kunth.	Liliaceae	VU	All over Tamil Nadu
114.	*Utleria salicifolia* Bedd.	Apocynaceae	CE	Western Ghats
115	*Vanasushava pedata* Mukh. & Const.	Apiaceae	EN	Western Ghats
115.	*Vateria indica* L.		LC	Western Ghats
116.	*Vateria macrocarpa* B.L. Gupta		CE	Western Ghats
117.	*Vernonia anthelmintica* (L.) Willd.	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

Plate 1. Red-listed medicinal plants of Tamil Nadu



a. Adhatoda beddomei; b. *Buchanania lanzan*; c. *Cayratia pedata*; d. *Celastrus paniculatus*; e. *Decalepis arayalpathra*; f. *Hydnocarpus alpina*; g. *Hydnocarpus macrocarpus*; h. *Nothapodytes nimmoniana*; i. *Piper longum*; j. *Rauvolfia serpentina*; k. *Trichopus zeylanicus*; l. *Vitex trifolia*; m. *Vanasushava pedata*; n. *Hedychium spicatum*

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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