

IUCN Red Listed Medicinal Plants of Siddha

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ABSTRACT

Introduction: Siddha system which aims at both curative and preventive aspects is a holistic treatment methodology using herbals, metals, minerals and animal products. Medicinal plant conservation is one of global concerns because the consequence is loss of many species useful in the primary healthcare of mankind. These natural resources are dwindling, as nearly 80 to 85% of raw drugs are sourced from the wild. International Union for Conservation of Nature (IUCN) is the global authority on the status of the natural world and the measures needed to safeguard it. IUCN congresses have produced several key international environmental agreements like the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species (CITES) etc. It is noted that raw drugs for making a good number of Siddha formulations are derived from plants falling under IUCN's rare, endangered and threatened (RET) category. The current study is aimed at exploring the RET status of medicinal plants used in Siddha. **Method:** The data of medicinal plants used in various Siddha formulations and as single drugs were collected and the IUCN status of the plants was checked in the Red list. **Result:** Siddha medicinal plants like *Aconitum heterophyllum*, *Aquilaria malaccensis*, *Adhatoda beddomei*, *Nardostachys jatamansi* are some of the examples of critically endangered species of plants facing threat due to continuous exploitation from wild. *CiroparaNivaranit Tailam*, *InciCuranam*, *NantiMeluku*, *PuraMattirai*, *Maka ElatikKulikai*, *Vallarai Ney*, *Cintil Ney*, *ArakkutTailam*, *Cantana Ilakam*, *Murukkan Vitai Mattirai*, *KaucikarKulampu* etc are some of the highly demand Siddha formulations containing RET medicinal plants. **Conclusion:** Overexploitation, habitat degradation and unsustainable harvesting practices poses urgent need for alternative strategies for whole AYUSH industry.

KEY WORDS

AYUSH, Convention on biological diversity, Endangered species, Siddha formulations

1. Introduction

Traditional knowledge is based on thousands of years of experiences which is developed and preserved by local and indigenous communities for centuries as a strategy for their survival and got modified, improved and adapted owing to the contemporary demands of the ever changing society and still continues to develop.

Considered as the mother medicine of ancient Tamilians, Siddha, is one of the ancient traditional medical system in South India. The word Siddha means established truth,^[1,2]The Siddha system is a treasure house of secret science, embodying the results of the ardent pursuit thereof by the ancient Siddhars which dates back to 12,000 years BC.^[3] The drugs used by the Siddhars could be classified into three

groups: herbal products (Mooligai/Thavaram), inorganic substances (Thathu), and animal products (Jeevam or Sangamam. In herbal drugs, the Siddhars not only used herbs, but also herbs that grow in high altitudes of Himalayas along with tropical herbs. It is noteworthy that Siddhar Korakkar was the first to introduce Cannabis as a medicine; he used it as a powerful painkiller.^[4] A varied number of medications in both single and compound formulations makes use of diverse number of medicinal plants having diverse habitats and distribution patterns.

1.1 Threats to medicinal plants

Medicinal plants form the source of valuable crude drugs globally. Nearly 80 % of people in developing countries are totally dependent on herbal drugs for their primary healthcare, and 25 % of prescribed medicines in developed countries are derived from wild plant species. ^[4] With the increasing demand for herbal drugs, natural health products, and secondary metabolites of medicinal plants, the use of medicinal plants is growing rapidly throughout the world. ^[1, 5] A highly conservative estimate states that the current loss of plant species is between 100 and 1000 times higher than the expected natural extinction rate and that the earth is losing at least one potential major drug every two years.^[6] According to the International Union for Conservation of Nature and the World Wildlife Fund, there are between 50,000 and 80,000 flowering plant species used for medicinal purposes worldwide. Among these, about 15,000 species are threatened with extinction from overharvesting and habitat destruction ^[7] and 20 % of their wild resources have already been nearly exhausted with the increasing human population and plant consumption. ^[8] Although this threat has been known for decades, the accelerated loss of species and habitat destruction worldwide has increased the risk of extinction of medicinal plants, especially in India, Nepal, China. ^[9, 10]

1.2. Indian Scenario

India is one of the mega diversity rich area and its varied agro-climatic conditions are conducive for the growth of variety of medicinal plants. Nearly 8000 species of medicinal plants are distributed in 386 families and 2200 genera of flowering plants which are the main source of raw drugs. An analysis of habitats of medicinal plants indicates that majority of them are flowering plants comprising of 33% trees followed by herbs, shrubs, climbers and lower groups of plants like ferns, algae and fungi. It appears that bulk of plant material is obtained from the roots, whole plant, fruits, seeds and bark which are vital for the survival and regeneration of medicinal plants in nature. Herbal potential in India facilitated rapid growth of phyto-pharmaceuticals, perfumery and allied industries. Destructive harvesting has brought about depletion and scarcity of medicinal plants. The habitat loss by export of medicinal plants collected from wild sources finally lead to severe and irreplaceable loss of genetic stock of many of these species. For medicinal plants with limited abundance and slow growth, destructive harvesting generally results in resource exhaustion and even species extinction. ^[11, 12]

IUCN updated the Red List in June 2015, and added forty- four Indian medicinal plants in the list. In the update, eighteen plants are categorized as vulnerable, sixteen as endangered and ten as critically endangered species. Critically endangered category indicates, a species facing a very high risk of extinction in the wild. It indicates that the species population size has been reduced, or will be reducing by 80% within three generations. It is the highest risk category assigned by IUCN Red List for the wild species. The objective of this paper was to bring forth their habitat, ecology, distribution, medicinal usage, threats and conservation measure status of some of the commonly used medicinal plants in the Siddha system of medicine.

2. Results and Discussion

Siddha medicinal plants like *Aconitum heterophyllum*, *Aquilaria malaccensis*, *Adhatoda beddomei*, *Nardostachys jatamansi* are some of the examples of critically endangered species of plants facing threat due to continuous exploitation from wild. *CiroparaNivaranitTailam*, *IncicCuranam*, *NantiMeluku*, *PuraMattirai*, *MakaElatikKulikai*, *Vallarai Ney*, *Cintil Ney*, *ArakkutTailam*, *Cantanallakam*, *MurukkanVitaiMattirai*, *KaucikarKulampuetc* are some of the highly demand Siddha formulations containing RET medicinal plants. In Siddha system both external and internal medications are provided. *Karpam*, *Cunnam*, *Kalanku*, *Kattu*, *Parpam*, *Centuram*, *Karuppu*, *Patankam*, *Kulampu*, *Meluku*, *Tinir*, *Tiravakam*, *Mattirai*, *Tailam*, *Ilakam*, *Iracayanam*, *Ney*, *Manappaku*, *Venney*, *Vatakam*, *Curanam*, *Kutinir*, *Puramaruntukal* are the main classes of medicines which are used for curing of diseases like bronchial asthma, eczema, haemorrhoids, periodic fever, splenomegaly, diarrhoea, drowsiness, emesis, venereal diseases, rheumatism, chronic fever, excessive thirst, osteomyelitic fever, body heat, abdominal swelling, insomnia, body ache, diarrhoea, indigestion, thirst, ulcers, phlegm, wheezing cough, nasal block, poison, dysgeusia, disordered humour, loss of taste and *Tabes mesenterica*.^[13,14] The following tables depict the various threatened medicinal plants used, their habitat, status and the formulations prepared from them. It is noted that eight critically endangered plants are used for the preparation of 34 formulations, five endangered plants for the preparation of 11 formulations and ten vulnerable plants are used for the preparation of 26 formulations.

AYUSH which comprises of the traditional medicinal systems rely upon plants and their derivatives for the production of medicine. In developing countries, the usage of

medicinal plants in health care practices is relatively high. India exhibits remarkable outlook in modern medicines that are based on natural products besides traditional system of medicines. According to Hamilton, India has about 44% of flora, which is used medicinally.^[11] India with its enormous natural flora is considered as the "herbarium of world" and is one of the 12-mega biodiversity countries harboring three unique "biodiversity hot spot" in the world. India and world market demands for medicinal plants and their raw materials is increasing over the year and income obtained from cultivating these crop give higher income to the farmer and employment opportunity to the people throughout the year. An urgent need is required to popularize and create awareness and familiarity with plant products by the usage of press reports, advertising, education, and scientific reports. As a precaution to conserve its population and to maintain the gene pool of these medicinal plants, the germplasm of it should be collected through vegetative, reproductive parts and the gene bank be maintained. The biotechnological methods should be adopted for its conservation, along with its vegetative propagation in the centers for conservation of threatened category plants. Botanical Gardens maintained by institutes and universities which are funded by MOEF, BSI, DST, DBT, UGC etc.^[14] The tribal communities should be educated with the importance and significance of these medicinal plants. Even though there are several regulations and policies for the conservation of medicinal plants, no actions are being taken for most of the endangered ones. It's high time to take effective steps for the conservation of these highly demanded threatened plants by drafting effective policies on aspects like conservation, cultivation, education, capacity building, research, regulations and trade.

Table 1. IUCN status of RET plants with their important Siddha formulations

SN	Botanical Name	Siddha Name	Distribution	Status	Formulations
1	<i>Aconitum heterophyllum</i> Wall. ex Royle	<i>Ativitayam</i>	Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh at an altitude range: 2400-4500 m.	CE	<i>KapataMattiraiNantiMeluku, PuraMattirai, Narattailakam,</i>
2	<i>Aconitum ferox</i> Wall. ex Ser.	<i>Napi</i>	Eastern Himalayas, Sikkim	CE	<i>AkastiyaKulampu, AstaPairavammattirai, CanciviMattirai, EmatantakKulikai, Irajajeshwarammattirai, KaucikarKulampu, MakaVacantaKucumakarammattirai, VisnuCakkarammattirai</i>
3	<i>Aconitum chasmanthum</i> Stapf ex Holmes	<i>Karunapi</i>	Alpine and Sub alpine zones of Western Himalayas, in high plateaus between 2000-4000m	E	<i>AkkiniCanciviMattirai, Katukenney</i>
4	<i>Acorus calamus</i> L.	<i>Vacampu</i>	In marshes, ascending upto 1800m in Himalayas	V	<i>AtimaturaMattirai, IracaKantiMezuku, Narkarantailakam, Omak Kutinir, UlututTailam, Vizi Enney</i>
5	<i>Aegle marmelos</i> (L.) Correa	<i>Vilvam</i>	Himachal Pradesh, Uttar Pradesh, West Bengal, Tripura, Maharashtra, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu	V	<i>KattuvayMattirai, Makavillatillakam, Pitta CurakKutinir, Vilvatillakam,</i>
6	<i>Anacyclus pyrethrum</i> (L.) Lag.	<i>Akkarakaram</i>	Native to North Africa,	V	<i>Korocanaimattirai, MakaElatikKulikai,</i>

			imported to India		<i>NantiMeluku, NarataiLekiyam, Tutuvalai Ney, VacantaKucumakaramattirai</i>
7	<i>Aquilaria malaccensis</i> Lam.	<i>Akilkattai</i>	Arunachal Pradesh, Assam, Meghalaya, Tripura	CE	<i>Cintilney, CukkuTailam, liakuCantanatitTailam, MakaElatikKulikai</i>
8	<i>Cinnamomum wightii</i> Meisn.	<i>Sirunagapoo</i>	Endemic to Western Ghats- Anamalai, Palani and Nilgiris	V	<i>ChandragandhiChooranam, IlavangathiChooranam, Katukkailagam, Mahavilvadillagam, Megathennai, MilaguThailam, Navalpattai Ney, Pooranadhillagam</i>
9	<i>Coptis teeta</i> Wall.	<i>Pitarokini</i>	Eastern Himalayas, Arunachal Pradesh	V	<i>TiratcaticKutineer</i>
10	<i>Coscinium fenestratum</i> (Goetgh.) Coleb.	<i>Maramancal</i>	Western Ghats of Karnataka, Kerala and Tamil Nadu	CE	<i>CampiranippuPatankam</i>
11	<i>Hydnocarpus pentandraus</i> (Buch.-Ham.) Oken	<i>Nirati</i>	Endemic to tropical forest of Western Ghats	V	<i>KarappanTailam, Manta Enney -2, MekaviranakKalimpu</i>
13	<i>Kaempferia galanga</i> L.	<i>Katcolam</i>	Eastern and southern India, throughout the plains	CE	<i>Tiratcaticcuranam</i>
14	<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr.	<i>liuppai</i>	Tropical Himalaya and Western Ghats	E	<i>Canatanallakam, CantirakanticCuranam, Makavillatillakam, MilakutTailam</i>
15	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	<i>Canpaka</i>	Eastern Himalayas, North East India and Western Ghats	V	<i>AmirtatikKulikai, Manta Enney, TampiracCenturam, Vallari Ney</i>
16	<i>Nardostachys jatamansi</i> (D.Don) DC.	<i>Catamancil</i>	Sub- Alpine Himalayas from Punjab to Sikkim at an altitude of 3000-5000m	CE	<i>CiroparaNivaranitTailam, IncicCuranam, MakaElatikKulikai, MayanatTailam, NoccitTailam, TalicatiCuranam</i>
17	<i>Operculina turpethum</i> (L.) Silva	<i>Vencivatai</i>	Drier zones of	V	<i>TiratcaticKutineer</i>

	Manso.		Karnataka and Tamil Nadu			
18	<i>Picrorhiza kurroa</i> Royle Benth.	ex <i>Katukurokani</i>	Alpine Himalayas of Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim between altitude range of 3300-4300 m.	E	<i>EmatantakKulikai, MurukkanVitaiMattirai, Vallarai Ney</i>	<i>KaucikarKulampu, NakkuppuccikKutinir,</i>
19	<i>Santalum album</i> L.	<i>Cantanam</i>	Natural tracts confined to Karnataka, Tamil Nadu and Andhra Pradesh	E	<i>ArakkutTailam, Cintil Ney, CukutTailam, NacirokaNacatTailam, Vallarai Ney</i>	
20	<i>Pterocarpus santalinus</i> L.f.	<i>Cencantanam</i>	Andhra Pradesh, Tamil Nadu and Karnataka at an altitude of 150 to 900m	V	<i>Cintil Ney</i>	
21	<i>Saussurea costus</i> (Falc.) Lipsch.	<i>Kottam</i>	Himalayas, Kashmir at an altitude of 2500-3600m. Cultivated in Uttaranchal and Sikkim	CE	<i>AmirtatikKulikai, Kecarillakam, KorocanaiMattirai, Pitta CurakKutinir, VacantaKucumakara matirai, Vallarai Ney</i>	
22	<i>Taxus wallichiana</i> Zucc.	<i>Talicapattiri</i>	Temperate Himalayas, hills of Meghalaya and Manipur at an altitude of 1500m	CE	<i>AtatotaikKutinir, NantiMeluku, TalicatiCurnam, TalicatiVatakam, Tippliracayanam, Tutuvalai Ney</i>	
23	<i>Celastrus paniculatus</i> Willd	Valuluvai	Almost all over India chiefly in the deciduous forests, up to an altitude of 1800 m.	V/R	<i>CivanarVempukkulitTailam, ItiVallati, Makavallatillakam</i>	<i>IracaKanthimeluku, KarutankilankuEnney,</i>

CE: critically endangered, E : Endangered, R: Rare, V: Vulnerable

Table 2. Siddha formulation with threatened ingredients

SN	Type of formulations	Critically Endangered	Endangered	Vulnerable
1	Kutineer	2	2	-
2	Chooram	3	1	1
3	Vatakam	1	-	1
4	Ney	3	3	-
5	Iracaynam	1	-	2
6	Ilakam/Lekiyam	2	2	5
7	Tailam/Enney	5	4	-
8	Matarai	11	2	1
9	Meluku	1	3	3
10	Kulambu	2	1	1
11	Patankam	1	-	-
12	Centuram	-	-	1
13	Kalimbu	2	1	1

These conservation challenges cannot be met by single countries but international co-operation is needed between harvesters, traders, manufacturers, government agencies, non-governmental organizations and researchers to secure a sustainable future for these medicinal plants and the people who depend on them. Specific recommendations are aimed at securing sustainable sources of medicinal plants through achieving better implementation of regulations, including those linked to CITES, and obtaining better information on the trade, market trends and the status of the species traded, current collection practices and those involved in the harvesting. TRAFFIC, BfN, the IUCN/SSC Medicinal

Plant Specialist Group (MPSG) and WWF Germany (International Standard for Sustainable Collection of Wild Medicinal and Aromatic Plants, ISSC-MAP), which is currently under trial at several projects worldwide including one in Uttarakhand in the Western Himalayas and one in Karnataka in the Western Ghats are some of the measures taken for conservation.

3. Conclusion

As depicted above, the status of the medicinal plants are highly alarming and in near future they may get extinct. If there is no sustainable availabilities of these crude drugs, the classical Siddha formulations and medications used for the treatment of a large number of

diseases including life style diseases like diabetes, hypertension, bronchial asthma will be lost forever. Only by the strict compliances towards these laws and conservation strategies we can make sure these valuable medicinal plants will be protected and will remain an unending genuine natural source for the crude drugs which forms the firm base of the traditional systems comprising AYUSH.

Acknowledgement

The authors extend their heartfelt thanks to Director General, Central Council for Research in Siddha, Chennai for the support.

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