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## Ethnobotanical Studies on *Solanum* species from Nilgiri Biosphere Reserve of Western Ghats, Tamil Nadu, India

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### ABSTRACT

Ethnobotany leads to drug discovery and its deals with the study of inter relationships between human and plants. However, several medicinal plants possess their own therapeutic properties and every ethnic group of tribal's having some unique knowledge about local medicinal plants. Owing to documenting the indigenous knowledge through ethno medicinal studies is important for the conservation and utilization of biological resource using questionnaires. In general, egg plants have been used an important vegetable, valuable household crop, ideal traditional ethno medicines, suitable alternative, clinically useful therapeutic compounds, low cost production, high quality, much safer and biologically active. The present investigation were find out, about 1/3 population of Nilgiri biosphere reserve forest area depends on traditional ethno medicine and some reliable source of drugs were obtained from genera of *Solanum* under the family Solanaceae. Ethnobotanical data were collected from traditional practitioners of study area using questionnaires. A total of 5 *Solanum* species were recorded for medicinal and household maintenance applications. The most reported uses were for gastrointestinal problems, Cough medicine, pulmonary ailment, and Toothache remedy. The commonly used plant parts were leaves and fruits and they were commonly administered as a paste, decoction, infusion, juice and poultice or taken orally without preparation. There was strong agreement among the informants as to the usages of the plants (informant consensus factor 0.80–0.92). The significance value of 5 for *Solanum americanum* Mill., *Solanum torvum* Sw., *Solanum virginianum* L., *Solanum trilobatum* L., and *Solanum incanum* L. indicated are the most important species and also adequate utilizations of Nilgiri tribals. Five plants had a fidelity level of 100%.

**Keywords:** Ethnobotany, *Solanum* species, Traditional medicine, Nilgiri Biosphere Reserve

## 1. INTRODUCTION

India has a long tradition of ethnobotanical studies, because it is acquire rich in ethnic diversity and has well accomplished knowledge of herbal medicines. Therefore, in recent year the growing clinical demands on inspiring the biomedical technology researcher to searching for the new suitable therapeutic compound directed towards the ethnobotanical knowledge because of the belief that such remedies may be useful sources for new therapeutic products. However, the increasing human population has led to over utilization of land in many areas, accordingly reduction the biodiversity of medicinal plants.

Meanwhile, worldwide threatening factors, on traditional heritages have been valid for the influencing factors of Modernization: i.e., urbanization, migration developments of roads, communication by the media, easier access to orthodox medicine and drugs etc., for the line with [25]. Thus there is an urgent need to record, conserve and utilize the wealth of ethnobotanical resources at the Nilgiri Biosphere reserve. It is located at the Western Ghats of India is one such high bio-cultural diversity region, which is one of the global biodiversity hot-spot [14]. Tribal's have always made use of their native flora, not just as a source of nutrition, but also for fuel, medicines, clothing, dwelling and chemical production. Therefore, establishing the local names and the indigenous uses of plants has significant potentials in benefiting society [3, 26].

The traditional system of medicine, especially the herbal medicine, in India is directly linked to its rich floral diversity. Traditional knowledge plants and their properties have always been transmitted from generation to generation through natural course of everyday life [12]. This indigenous knowledge was preserved first verbally in songs. Later, documented in the form of medicinal knowledge can be traced back to vedic period (1000-5000 BC). In vedic compendia, i.e., Reg vada, Yajur veda, Sama veda and Atharvana veda there are sample evidences regarding the use of natural resources at many places. Approximately 80% of the world population depend exclusively on plant for their health and healing. Herbal medicines are comparatively safer than synthetic drugs. Plant –based traditional knowledge has become recognized tool in search for new sources of drugs and Nutraceutical [21].

Although several medicinal plants are having their own therapeutic properties. However, egg plants have been used an important vegetable, household crop and traditional ethno medicines. The genus *Solanum* plants with their intra-specific variation represent a chemical and medicinal goldmine is evident from the strong traditions of natural drug use. A point of ethnobotanical significance is that more than ten tribal belts in Tamil Nadu state within this tract. [23].

Solanaceae plants are mostly used for food plants (Potato, Aubergine, Tomato, Pepper), Ornamentals, and vast numbers of alkaloids used in Medicine (Solosodine, Solanine, Solanidane etc.) and Tobacco. Solanaceae (night shadow plants) about 90 genera, the genus *Solanum* is a very large group of about 2,000-3,000 species in cosmopolitan distribution of the world. Solanaceae plants are herb or shrubs, erect or climbing or rarely small trees, leaves alternate often in unequal pairs rarely clustered never truly opposite, entire lobed or pinnatifid; stipules 0; Flowers regular, hermaphrodite or rarely dioeciously, in terminal or lateral axillary

or extra – auxiliary cymes or on solitary or clustered pedicels; bracts and bracteoles 0. Calyx inferior, limb usually 5 lobed or toothed, usually persistent, often accrescent in fruits [26].

Corolla – funnel shaped campanulate or rotate, often plicate; lobes 5, rarely 10 or the limb sub entire. Stamens 5 on the Corolla tube; anthers ovate or oblong, dehiscing by apical pores or longitudinally. Ovary 2 - celled or imperfectly 1- 4 celled; rarely 3-5 celled; ovules many, on prominent peltate placentations; Style linear; Stigma capitate or very shortly lobed. Fruits a berry or a circumsciss or valvate capsules, usually 2 – celled, many - seeded. Seeded compressed discoid or subreniform; testa usually Crustaceous; albumen fleshy; embryo peripheric with linear cotyledons or rarely straight. Fruits indehiscent, a berry.

The study of ethnobotany can include many fields of research - botany, biochemistry, pharmacology, toxicology, medicine, nutrition, agriculture, ecology, evolution, religion, sociology, anthropology, linguistics, history and archaeology. Therefore, there are numerous approaches and applications of ethnobotanical studies [1].

The present study was planned keeping in view of the following objectives

1. To explore the ethnomedicinal knowledge of local tribal people of Nilgiri biosphere reserve southern Western Ghats district of Tamil Nadu.
2. To enlist the indigenous medicinal plants used by local people for common day ailments.
3. To create the awareness among the local community about the protection of native medicinal flora.

## **2. METHODOLOGY**

### **2. 1. Identification and Authentication of Plant materials:**

The ethnomedicinal information was collected from Nilgiri tribals, on the usage of plant crude drugs for various diseases. A survey was carried out during December, 2013 to March, 2015. Much importance was given to medicinal plants used by the tribes. Out of the 50 villages, a detailed survey on indigenous medicinal plants was done in the six villages, namely Panthalur taluk (Cherancode), Gudalur taluk (Muthumalai), Udthagamandalam taluk (Masinagudi), Kodagiri taluk (Jagathala), and Coonoor taluk (Wellington).

The in – depth study was done to document medicinal plants used by different tribal communities for various purposes and treating different ailments. Based on useful information, the best five plants were collected (Table 1) than herbarium specimens prepared, the plant species were initially identified and got specimen accession number with reference to [5-7,9,10,19,22] and herbarium voucher specimen was deposited at Department of Botany, Annamalai University, Annamalai Nagar, Tamil Nadu. Further, identified and authenticated

By Dr. G.V.S Murthy, Scientist 'F' & Head of Office, Botanical Survey of India (BSI), Southern Regional Centre, Coimbatore. Herbarium Voucher Number is BSI/SRC/5/23/2015/Tech. Dated July 7<sup>th</sup> 2015.

### **2. 2. Source of Plant and Ethnobotanical data collections**

In India consists of 18 Biosphere Reserve, the Nilgiri biosphere Reserve is a chain of hills and one of the most floristically rich area in India, established under MAB Program by UNESCO in 1986.

Thus, it lies between Latitude: 11°08' to 11°37'N and longitude: 76°27'E to 77°4E with the total regions of 2,479 square kilometers and there are ranging between 750m and 2580m above Mean sea Level, it is an important region in the overall bio diversity ranking in South Asia. Nilgiri Biosphere Reserve located in the north western corner of Tamil nadu, are bounded on the north by Mysore district of Karnataka, on the west and south west by wyanad district of Kerala on the east by Erode district and south by Coimbatore district of Tamil Nadu states.

During summer, the temperature is around 21 to 25 degrees of Celsius. During winter, the region has an average rainfall around 1,960 mm. Ethnomedicinal data were through conservations and interviews with Vaidhyars (Traditional healers), Tailaivar (tribal heads), sages (elders) and well distinguished personalities about local ethnomedicine. Kurumbas and Irulas call their village Motta, Toda-Mund, Badagas-Hatti, Kotas-kokai. Frequent field visits were made t collected from dense forest continues to be very near to tribal settlement. Viz., Cherangode (Panthalur), Muthumalai (Gudalur), Masinagudi (Ooty), Jagathala (Godhagiri) and Wellington (Coonoor).

Where the natives gather and consume a good condition of plants and standard method was followed with regard to collection of plant materials, drying, mounting, preparation and preservation of plant specimens and maintain voucher specimens in minimum triplicates were collected method was made [11].

### **2. 3. People**

The hill tribes or Adivasis (“Original Inhabitants”) were barely 5 % of the area populations in the Western Ghats. India is a rich in ethnic diversity and traditional knowledge, having diversified and traditional knowledge, having 53 million tribal people diversified aboriginal groups of 537 tribe communities and 227 ethnic groups occupy the forested region the only country in the world [15], and also there exist 600,000 licensed medicinal practitioners of traditional systems, like Ayurveda, Sidha, Unani, and over one million communities based on traditional based on traditional health care workers [8].

A variety of human cultural diversity can be found in the Nilgiri Biosphere Reserve.) It has a large number of indigenous communities: most of them are forest dwellers, agricultural labour, Pastoral, Shifting cultivations, Collecting wild peper, Axeman, Collecting Non-timber forest products, Collecting tubers, Cultivation, and hunter gathers. The increase in population is attributed to migration from surrounding areas rather than the population growth of indigenous people.

There are about 36 tribal communities in Tamil nadu. Tribal groups like the Todas, Kotas, Irullas, Kurumbas, Paniyas, Adiyans, Edanadan Chettis, Cholanaickens, Allar, Malayan, etc., are native to the reserve. Except for Cholanaickens who live exclusively on food gathering, hunting and fishing, all the other tribal groups are involved in their traditional occupation of agriculture, they are found only in the Nilgiri districts of Tamil Nadu [17]. Apart from these tribal communities use, medicinally, an extremely wide range of plants species at local level.

Ethanobotanical studies on plant materials other than food and medicine are scanty [4]. However studies on ethano-botany or ethano-taxonomy and ethno veterinary for food yielding plants and indigenous medicine have been largely conducted in the Nilgiri Biosphere Reserve [13, 18].

**Table 1.** Collection details of *Solanum* species from Natural Populations of Nilgiri

S. No	Plants name with Accession No.	Synonyms, Vernacular Name & Common Name	Collected Places, Agronomical & Ecological Status	Geographical, locations, GPS Coordinate & Elevations	Habit, Habitat & Collection periods	Parts used, formulation & ethno medicinal uses
1	<i>Solanum torvum</i> . Sw Acc. No. 290	<i>Solanum ferugineum</i> Jacq. <i>Solanum mayanum</i> L undell. V. Sundai C. Princklynightsade	Udhagamandalam, Cultivated, Common	Masinagudi 11° 56'84.07" N 76° 63'96.67" E (MSL - 1,121m)	Shrub, Wild/ Cultivated, Farm / kitchen garden, July – September	Leaves & Fruits/ Fruits powder paste used stomach- ache, colic, headache, pain menstruation and liver pain
2	<i>Solanum incanum</i> . L Acc. No. 242	<i>Solanum panduriforme</i> E. Mey <i>Solanum bojeri</i> Dunal. V. Mullakathirikkai C. Indian nightshade	Panthalur, Wild, Rare	Cherangode 11° 53'15.12" N 76° 32'52.81" E (MSL - 1,055m)	Herb, Wild, Roadside/w aste land August – October	Roots, Leaves and Fruits / The paste of fruits powder is used as vermifuge for Ascaris.
3	<i>Solanum virginianum</i> L Acc. No. 243	<i>Solanum surratanse</i> . Burm <i>Solanum xanthocaroum</i> . Schrd V. Kandakathirikkai C. Yellow – berried nightshade	Kodagiri Wild, Rare	Jagathala 11° 38'03.79" N 76° 76'75.84" E (MSL - 1,843m)	Herb, Wild, Roadside May- August	Leaves & Fruits/ Seed soaked in water and used to reduced sperm count, seed smoke used for Tooth ache remedy
4	<i>Solanum americanum</i> . Mill Acc. No. 244	<i>Solanum adventitium</i> . Polger <i>Solanum nigrum</i> . var. nodiflorum (Jacq.) V. Ananthakkali C. Black night shade	Coonoor Weeds - Rare	Wellington 11° 34'12.57" N 76° 79'43.64" E (MSL - 1,804m)	Herb, Weedy plant, Farm land, cultivated land June – September	Fruits & Leaves/ Leaf Juice used Gastrointestin al ailments
5	<i>Solanum trilobatum</i> . L Acc. No. 245	<i>Solanum canaranum</i> Miq. <i>Solanum fuscum</i> B. Heyue. ex. wall. V. Tuduvilai C. Thai nightshade	Gudalur Wild – Common	Muthumalai 11° 57'83.25" N 76° 58'24.40" E (MSL -1,266m)	Climber, Wild, Above the fence July – September	Leaves/ Leaf Juice used pulmonary ailments and cough medicine

V - Vernacular name: C - Common name

## 2. 4. Health Infrastructure in Nilgiri Districts

Good health is an essential pre-requisite which contributes significantly both to the improvement in labour productivity and human resource development. Health services are an important indicator to understand the healthcare delivery provisions and mechanisms in the State and are subdivided into three categories viz. primary, secondary and tertiary health care systems. The Primary Healthcare System consists of Primary Health Centres (PHCs) and Health Sub-Centres (HSCs). Secondary healthcare system comprises of District Head Quarters Hospitals, Taluk Hospitals, Women and Children Hospitals, Dispensaries, Mobile Medical Units, Police Hospitals and Non-Taluk Hospitals etc., Tertiary healthcare system covers multi-specialty hospitals. In addition to Government efforts, the private sector is also contributing to the provision of Health Care Services. In the absence of data relating to private sector health services, an attempt has been made to assess only the efficacy of Government healthcare system Health infrastructure facilities of the Nilgiri District comprises of one District Head Quarters Government Hospital, 5 Taluk Hospitals, 28 Primary Health Centres, 194 Health Sub Centres and 5 Plague circles.

**Table 2.** Health Infrastructure in Nilgiri districts details

S. No	Classification	Modern Medicine	Indian Medicine					Homeopathy	Grand Total
			Ayurvedic	Siddha	Unani	Ayurvedic siddha Unani combined	Total		
1	Hospitals	26	-	6	-	-	-	-	26
2	Dispensaries	2	-	2	-	-	2	2	6
3	Primary Health Centers	30	-	5	-	-	-	-	30
4	Health Sub Centers	194	-	-	-	-	194	-	194
5	Other Medical Institutions	-	-	9	-	-	-	-	9
6	Bed Strength	904	-	35	-	-	904	-	904
7	No. of Doctors	74	-	8	-	-	74	3	75
8	Number of Nurses	105	-	-	-	-	105	-	105

Source: Annual report The Nilgiri 2015-16

**Table 3.** Tribal distribution, occupation and populations details

S. No.	Names of tribe	Occupation	Tribes location (intense population)	Total No. Pop. of location (Approx.)	Tribal Literacy rate (Approx.)	No. people Surveyed	People Herb used percentage
1	Kurumbas	Agriculture Hunting – gathering, Fishing	Throught out Nilgiris Nilgiris	11545	78.4	120	80.2
2	Alu Kurumbas	Shepherding	Lower Kundah				
3	Mullu Kurumbas	Swidden Agriculture, Basket makers, laborers	Panthalur				
4	Betta Kurumbas	Hunder - gather	Gudalur				
5	Urali Kurumbas	Cultivation	Panthalur				
6	Jenu Kurumbas	NTFP collector	Gudalur				
7	Irular	Snake and Rat catchers	Kodagiri	1024	75.1	75	70.4
8	Kattunaiken	Wax collector	Gudalur	1792	76.7	88	65.8
9	Solainaiken	Honey collector	Devarsola				
10	Kotas	Artisan Cultivation	Kollimalai	2059	67.2	115	60.5
11	Toda	Pastoral	Glenmorgan	1692	75.9	92	85.3
12	Badgas	Farming of millets	Throughout Nilgiris	20000	82.2	211	63.6
13	Paniyans	Coffee planter	Gudalur	5823	70.7	80	79.9
14	Urali Sholagar	Collecting NTFP, Agriculture labourer	Kodagiri	192	72.8	62	82.1
15	Konda Reddi	Cultivation & Animal husbandary	Throught out Nilgiris Nilgiris	2061	73.5	100	85.4

## 2. 5. Vegetations

The Nilgiri Biosphere Reserve is very rich in plant diversity; about 3,300 species of flowering plants can be seen here. Of the 3,300 species, 132 are endemic to the reserve. The

Nilgiri Biosphere Reserve comprises of substantial unspoilt areas of natural vegetation ranging from dry scrub to evergreen forests and swamps thus contributing to highest biodiversity. The altitude and climatic gradients support and nourish the different vegetation types. The northern part of the Nilgiri Biosphere Reserve (NBRs) has a wide variation of flora ranging from the scrub to evergreen species. About 80% of flowering plants reported from Western Ghats occur in NBRs (UNESCO, 2015). Within a period of 92 years (1920–2012), the forest cover decline was 1,423.6 km<sup>2</sup> i.e. 24.5% of the total forest [20]. The Nilgiri Biosphere Reserve possesses different habitat types, unspoilt areas of natural vegetation types with several dry scrubs, dry and moist deciduous, semi- evergreen and wet evergreen forests, evergreen sholas, grasslands and swamps. The flora comprises about 3,500 species of flowering plants. About 80 per cent of the flowering plants reported from Nilgiri Biosphere Reserve.

**Table 4.** Vegetation types of the Nilgiri Biosphere Reserve

<b>S. No</b>	<b>Forest type</b>	<b>Nature of Vegetation</b>	<b>Area of occurrence</b>	<b>Distribution</b>
1	Moist evergreen	Dense, moist and multi storeyed forest with gigantic trees	In the narrow valleys of Silent Valley	350-1250m ASL 2,500-5,000 MM Rainfall
2	Semi evergreen	Moist, deciduous	Nilambur and Palghat division	400-1000m ASL 2,500-3,500MM Rainfall
3	Thorn	Dense	North east part of the Nilgiri district	200-500m ASL 300-600 mm Rainfall
4	Savannah woodland	Trees scattered amid woodland	Mudumalai and Bandipur	1,700-1,900 m ASL Medium to High Rainfall
5	Sholas & grasslands	High elevated evergreen with grasslands	South and western catchment area, Mukurthi national park	Above 1,500m ASL Medium to high rainfall

## **2. 6. Documentation of Indigenous Knowledge**

Ethnobiological studies deals with indigenous societies and their relationship with surrounding flora and fauna. Many ethno biological studies focus on indigenous knowledge associated with the use of flora and fauna by local communities. These collections were accompanied by comprehensive ethnobotanical information were interviewed using a semi-structured questionnaire basedon [2, 24]. A Questionnaire was administered to the local people,

through face to face interviews (**Appendix - A**). The questionnaire consisted of two parts. The first parts consist of demographic profile of the informants such as name, age, sex, years of experience, education and occupation. The second part explains with their knowledge on medicinal plants; parts used method of preparing drugs, mode of usage and diseases treated. The interviews were conducted in the local language “Tamil”. The ethnobotanical data were recorded in Tamil in the field, translated to English in the laboratory and used for further analysis.

All the procedures conducted were in accordance of ISE code of ethics for ethno biological research. During the field research work, we were accompanied by a field guide Mr. Therthey Goodden, Govt. Approved tourist guide Agency on “KATPOOF NATURE WALFS” from Udthagamandalam, commonly known as Ooty (Head quarters of the Nilgiris districts) for proper interactions with the tribes. Traditional healers and elderly and knowledgeable people (>60 years) of each tribals community in the visited villages were approached to get the information on the usage of medicinal plants. During the entire study period, a formal door-to-door survey was carried out in all the villages. Astutely, the plant was collected in the early morning, simultaneously, data was obtained from people, particularly, the heads of the households. All the collected data was analyzed for the current study.

## **2. 7. Enumeration of Medicinal Plants Used by Nilgiri tribes**

### **1. *Solanum torvum* Sw.**

- **Sundai (Solanaceae)** Leaf paste mixed with table salt and applied at the site if dog bite.
- The stem extracts eaten with gingerly oil it cure Haedache.
- The fruits extract applied locally it controlled Blood pressure, fertility, wounds healing properties.
- Fruits paste used stomach-ache, colic, headache, painful menstruation and liver pain

### **2. *Solanum incanum* L**

- The fruits are used by nutrients supplements.
- Roots, Leaves and Fruits / The paste of fruits powder is used as vermifuge for Ascaris.

### **3. *Solanum virginianum* L.**

- **‘Kandankathri’ (Solanaceae)** Whole plants, Fruits, Seeds. Single and in combination for fever, stomach ailment, indigestion, toothache. 15-20g Whole plants Boiled in 150 ml water for 15 min, 25ml decoction given orally 2 times per day, 3 days in fever, 5-10 g ripe raw fruits eaten orally for indestion and stomach ailments. 1 g seed and 5 ml neem oil heated up in a steel vessel, applied in toothache. Reported Kadar, Madavars, Sunkans.
- Fruit paste is applied locally on bone fracture and tooth decay, Flower paste, is taken orally with water against stomach disorders. Smoke of seeds is inhaled to relieve toothache. (IR) Seed paste is applied locally on ringworm. Root juice is given orally against intestinal worms. The roots are used for cough, asthma. The plants given in various animal diseases to cattle.

#### 4. *Solanum americanum* Mill.

- Fruits were used for Ulcer Complaints. The matured fruit paste is mixed with few ml of mustard oil and is taken once daily for 10 to 15 days to treat ulcer complaints.
- Fruits & Leaves/ Leaf Juice used Gastrointestinal ailments

#### 5. *Solanum trilobatum* L.

- ‘Thuduvalai’, (Solanaceae) Root decoction given two times to children (5-8 years) in case of whooping cough. A handful of leaves boiled in water till reduced to one hand full of leaves boiled in water till reduced to one –tenth, cooled and filtered. Resultant liquid drunk for bodyache.
- The crude extracts used for fever, stomach, loose motions. 50g whole plants boiled in 200 ml water for 30 min., 30 ml decoctions taken orally 2 times per day, 3 days for fever. 20-25 g Whole plants ground in water, paste mixed with 80ml water given for stomachache and for loose motions. 10-15 g raw Fruits eaten for intestinal worms for week

### 3. RESULTS AND DISCUSSION

The tribals living in remote areas are unable to get the medicinal assistance. Hence they have to depend on the herbal medicines in most of the settlements; tribes conserve the medicinal plants in the form of sacred trees and sacred grooves. The conservation of medicinal plants not only saves the tribal lives, but also improves the socio economic condition of the people. Present survey reveals that the tribes of Nilgiri Biosphere Reserve aware of the indigenous or traditional knowledge of employing *Solanum incanum* and *Solanum torvum* fruits powder pasteused for stomach- ache, colic, headache, painful menstruation, liver pain and vermifuge for ascaris. *Solanum virginianum* seed soaked in water and used to reduced sperm count, seed smoke used foe tooth ache remedy. However, their practical knowledge about use of roots of *Solanum virginianum* and *Solanum incanum* and whole plant of *Solanum torvum* is new information for the traditional system of medicine. There is wide scope for further scientific study is need for these plants.

### 4. CONCLUSIONS

In our investigation, the adequately using five *Solanum* medicinal plants has been recorded in five different places in Nilgiri Districts. This means that local ethnobotanical knowledge is still quite rich and alive, even if not evenly distributed. On the other side, the large number of plants known only by one or few informants possibly reveals that knowledge about medicinal uses is highly specific, but in the case of “professional” healers this fact can also be explained with some reticence in sharing one’s knowledge. Our study appears to be the first document and compare knowledge on medicinal plants between common tribal people and traditional healers. As it could be expected, “professional” healers know significantly more plants than untrained common tribal people; especially women use several different plants to heal common diseases of the whole family, mostly for children common problems. Further,

most of the reported preparations are drawn from a single plant; formulations containing two or more plants are rarely used. Present study reveals that medicinal plants continue to play a major role in healthcare needs of Nilgiri tribals.

#### **Conflict of interest statement**

We declare that we have no conflict of interest.

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#### **References**

- [1] Alexiades, N.M., Collecting ethnobotanical data: an introduction to basic concepts and techniques. Selected Guidelines for Ethnobotanical Research: A Field Manual. Edited by: Alexiades NM. 1996.
- [2] Ayyanar, M. and Ignacimuthu, S., 2011. Ethnobotanical survey of medicinal plants commonly used by Kani tribals in Tirunelveli hills of Western Ghats, India. *Journal of Ethnopharmacology*, 134(3), pp. 851-864.
- [3] Bagci, S., Uygun, A., Kadayifci, A., Yesilova, Z., Erdil, A., Yaman, H., Saka, M., Deveci, M.S., Gulsen, M., Karaeren, N. and Dagalp, K., 2000. Serum leptin levels in patients with nonalcoholic steatohepatitis. *The American Journal of Gastroenterology*, 95(12), p. 3584.
- [4] Bidie, G., 1880. Calcareous Concretions in Timber. *Nature*, 22(556), p. 169.
- [5] Fischer, C.E.C., 1921. A survey of the flora of the Anaimalai Hills in the Coimbatore District, Madras Presidency. Dehra Dun, Bishen Singh Mahendra Pal Singh.
- [6] Fyson, P.F., 1915. Flora Of The Nilgiri and Pulney Hill-Tops Above 6,500 Feet. Being The Wild and Commoner Introduced Flowering Plants Round The Hill-Stations Of Ootacamund, Kotagiri & Kodaikanal. Bishen Singh Mahendra Pal Singh & Periodical Experts; Dehra Dun.
- [7] Gamble, J.S., 1997. The Flora of the Presidency of Madras, vols. I–III., reprinted ed. Bishen Singh – Mahendhra Pal Singh, Dehra Dun.
- [8] Hafeel A and Shankar D (1999). Revitalising indigenous health practices. *COMPAS Newslett* (Feb. 1999): 28-29
- [9] International Plant Names Index, 2010. <http://www.ipni.org>
- [10] International Society of Ethnobiology, 2006. ISE Code of Ethics (with 2008 Additions), [http://ise.arts.ubc.ca/global\\_coalition/ethics.php](http://ise.arts.ubc.ca/global_coalition/ethics.php)

- [11] Jain, S.K. and Rao, R.R., 1983. Ethnobotany in India: An overview. Botanical Survey in India, Department of Environment, Government of India.
- [12] Kargioğlu, M., Cenkeci, S., Serteser, A., Evliyaoğlu, N., Konuk, M., Kök, M.Ş. and Bağcı, Y., 2008. An ethnobotanical survey of inner-West Anatolia, Turkey. *Human Ecology*, 36(5), pp.763-777.
- [13] Krishnamurthy, V., 1953. On the structure and reproduction of a *Compsopogon* from Madras. *Phytomorphology*, 3(6), pp.369-376.
- [14] Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A. and Kent, J., 2000. Biodiversity hotspots for conservation priorities. *Nature*, 403(6772), p. 853.
- [15] Ragupathy S, Newmaster SG. Valorizing the 'Irulas' traditional knowledge of medicinal plants in the Kodiakkarai Reserve Forest. India. *J Ethnobiol Ethnomed* 2009; 5: 1-13.
- [16] Rajan, S., 1992. Medicinal plants of Ootacamund, Nilgirs, Tamil Nadu. *J. Econ. Taxon. Bot., Addit. Ser.*, 10, pp. 429-460.
- [17] Rajasekaran, C., Navaneethan, P., Nautiyal, S., and Kalaivani, T. 2011. Cross-cultural ethno-botany and conservation of medicinal and aromatic plants in the Nilgiris, Western Ghats: A case study. *Medicinal Plants. International Journal of Phytomedicine and Related Industries*, 3, pp. 27-45.
- [18] Rasingam, L. and Jeeva, S., 2013. Indigenous brooms used by the aboriginal inhabitants of Nilgiri Biosphere Reserve, Western Ghats, India.
- [19] Sahu, A.R., Behera, N. and Mishra, S.P., 2010. Use of ethnomedicinal plants by natives of bargarh district of Orissa, India. *Ethnobotanical Leaflets*, 14, pp. 889-910.
- [20] Satish, K.V., Saranya, K.R.L., Reddy, C.S., Krishna, P.H., Jha, C.S. and Rao, P.P., 2014. Geospatial assessment and monitoring of historical forest cover changes (1920–2012) in Nilgiri Biosphere Reserve, Western Ghats, India. *Environmental monitoring and assessment*, 186(12), pp. 8125-8140.
- [21] Sharma, P.P. and Mujumdar, A.M., 2003. Traditional knowledge on plants from Toranmal Plateau of Maharashtra. *Indian Journal of Traditional Knowledge* Vol. 2(3). July 2003, pp. 292-296
- [22] Sharma, G.K., 1977. Ethnobotany and its significance for Cannabis studies in the Himalayas. *Journal of Psychedelic Drugs*, 9(4), pp.337-339.
- [23] Shobha Kumari, Status of Nilgiri Biosphere reserve in 2015. *International Journal of Ecosystem* 2015, 5(4): 91-98.
- [24] Upadhyay, B., Dhaker, A.K. and Kumar, A., 2010. Ethnomedicinal and ethnopharmacostatistical studies of Eastern Rajasthan, India. *Journal of Ethnopharmacology*, 129(1), pp. 64-86.
- [25] Yesilada, E., and Schmeda-Hirschmann, G. 2005. Traditional medicine and gastroprotective crude drugs. *Journal of ethnopharmacology*, 100(1-2), pp. 61-66.
- [26] Damilola Grace Ogunrotimi, Joshua Kayode, Effect of Pre-chilling and Storage Temperature on Seed Germination of *Solanum macrocarpon* L. (African Eggplant). *World News of Natural Sciences* 20 (2018) 121-128

**Appendix**

*Solanum torvum* Collected from Kurumbas in Gudalur



*Solanum incanum* collected from Todas in Ooty

