



Endemic Herbs of Western Ghats – A Herbaceous Survey at Nadugani Hills, The Nilgiris

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Abstract

The present survey of herbs at Gene-Pool garden, Nadugani hills, Gudalur Taluk, The Nilgiris, Tamilnadu, India was undertaken to list out the floral endemism of the Western Ghats. The study was conducted with frequent visits to the study area covering various seasons so as to sort out the endemics. The survey accomplished with 140 species of angiosperms belonging to 104 genera spreading over 42 families of dicots and monocots. The predominant species belonged to Poaceae and Cyperaceae. The survey revealed 27 endemic species of Western Ghats and The Nilgiris Bioreserve and 59 medicinally important plant species by the local people.

Keywords: Endemic plants, Western Ghats, Nilgiri Bioreserve, Nadugani, Gene-Pool.

Introduction

India is one among the 18 Mega Biodiversity countries of the world holding 3 of the 25 identified hot spots (Meyers, 2000), concurring geographical area of ca.329 million hectares and over 6000 kms of coastline, is the 7th largest country in the world and 2nd largest in Asia. The variations in climate, topography, altitude and monsoon patterns coupled with various ecological habitats have contributed immensely to the floristic richness of India from coastal mangroves to tropical and evergreen temperate forests. With only 2.4% of the world's total landmass, India harbors ca.45,000 plant species representing as much as 11% of the known world flora. Singh and Hajra reported that 5,400 species are endemic out of 17,500 angiospermic species in India (Singh and Hajra, 1996). Western Ghats region is considered as one of the most important biographic zones of India (Nayar, 1982) since it is one of the richest centre of endemism

holding 56 genera and 2,000 endemic species. The richness is currently decreasing at an alarming rate as the forests remain unprotected. Approximately ca.654 plant species (mostly flowering plants) are recorded as extinct (WCMC, 1992). This compels a detailed botanical account of several regions. Adequate knowledge about the plants is necessary for planning sustainable development of any region. Conservation and preservation of floral diversity is an important social, moral and economic issue where documentation of plants is the basic step in such program. Therefore, the current research focus on the documentation of herbal diversity at the Tropical Gene-Pool Garden, a part of The Nilgiri Biosphere of Western Ghats, India.

Materials and Methods

Study area

The Tropical Gene-Pool Garden, Nadugani, is located at 11° 15' between 11° 39' North latitude and 76° 15' between 76° 30' East longitude. Its elevation ranges 900 meters above mean sea level and 62 kms from Ootakamand and 12 kms from Gudalur on Gudalur-Calicut road (Fig. 1, 2). The area consists of rolling hills and is surrounded by Government and Private Tea Plantations, roads and for habitations. It is nearly free from all human disturbances and industrial wastes and provides a congenial undisturbed environment.



Fig. 1. Map showing Study Area

Field work

Frequent exploration trips were made in the study area from June 2013 to March 2014 by covering various seasons so as to collect ephemerals and red listed plants. Herbarium specimens were prepared as per Jain & Rao's manual (Jain and Rao, 1977). Identifications were made with the help of "Flora of the Presidency of Madras" by J. S. Gamble and C. E. C. Fischer (1957) "Flora of Palani Hills" by K. M.

The hill tract of the garden is intersected by perennial streams. The area enjoys a salubrious climate. The mean maximum temperature is 30° C and 15° C respectively. Rain is well distributed. The area receives maximum rainfall in June to September through South West monsoon, North East monsoon continues upto the end of December. The annual rainfall is 2,860.4 mm. The dry period exceeds from January to April. According to Champion and Seth (1968) the area falls under the category 'Western Tropical Evergreen type. The vegetation falls into following three types: evergreen forest type, southern moist mixed deciduous forest type and grassland type.



Fig. 2. View of Study area

Mathew (1982), revisions and monographs. Identification of rare and endemic species were confirmed by matching with the authentic specimens deposited in Madras herbarium, Botanical Survey of India, Coimbatore. Details were worked out and short descriptions were written using the herbarium specimens. The herbarium specimens of collected species were deposited in the Herbarium of Kongunadu Arts and Science College (KASC), Coimbatore.

Results and Discussion

Nilgiris a part of Western ghats region is one of the richest biogeographic provinces in Indian sub-continent. The floral wealth of The Nilgiris region consists of about 1175 species belonging to the 416 genera (Sharma *et al.*, 1997). The rapid exploitation and conservation of forests in Nilgiris, for raising horticultural and agricultural crops, creation of hydroelectric project have affected virgin forest cover. As a result, many of the valuable and rare, endemic plant species which were once abundant are now facing extinction. Conservation and preservation of

plant diversity is an important social economic and moral issue and has deep inter – connections with all bio resources. A thorough taxonomic study of the flora is essential to understand and access the richness of their bio-diversities.

In the current floristic survey, a total of 140 taxa belonging to 104 genera spread over 42 families of angiosperms were collected, of which dicots consists of 29 families, 64 genera and 79 species; monocots consist of 13 families, 40 genera and 61 species (Fig. 3).

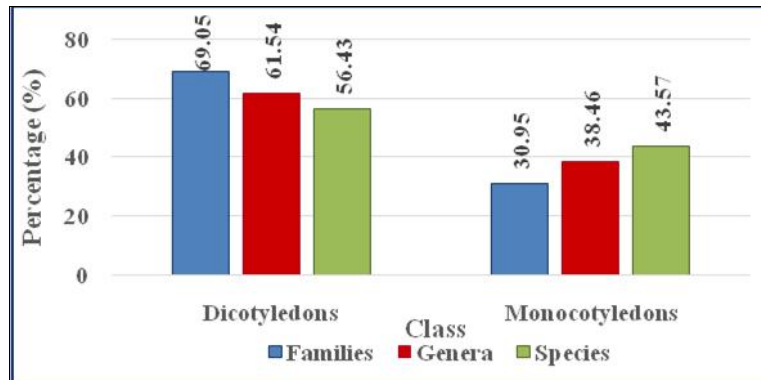


Fig. 3. Statistical analysis of the flora.

The dominant families in the study area showing maximum density with maximum diversity of species include Poaceae (23 species) followed by Cyperaceae

(18 species), Fabaceae (13 species) and Asteraceae (11 species). The plant species surveyed were represented in table 2, fig. 4-(a, b), 5.

Table 2. Plant species from the survey of Topical Gene-Pool Garden, Nadugani.

S. No.	SPECIES	FAMILY	STATUS	LOCAL USE
1.	<i>Aerides crispum</i>	Orchidaceae	Endemic	Decoration
2.	<i>Aerides ringens</i>	Orchidaceae	-	Decoration
3.	<i>Allotropis cimicina</i>	Poaceae	-	Medicinal
4.	<i>Alternanthera sessilis</i>	Amaranthaceae	-	Medicinal
5.	<i>Amischophacelus axillaris</i>	Commelinaceae	-	Fodder
6.	<i>Ammania baccifera</i>	Lythraceae	-	Medicinal
7.	<i>Anisomeles indica</i>	Lamiaceae	-	Medicinal
8.	<i>Aristolochia ringens</i>	Aristolochiaceae	-	Medicinal
9.	<i>Artemisia japonica</i>	Asteraceae	-	Medicinal, Fodder
10.	<i>Arundinella ciliata</i>	Poaceae	Endemic	Fodder
11.	<i>Arundinella purpuria</i>	Poaceae	Endemic	Fodder
12.	<i>Blumea membranacea</i>	Asteraceae	Endemic	Medicinal
13.	<i>Brachiaria reptans</i>	Poaceae	-	Fodder
14.	<i>Bupleurum distichiophyllum</i>	Apiaceae	Endemic	Medicinal
15.	<i>Canna indica</i>	Cannaceae	-	Medicinal

16.	<i>Capillipedium assimile</i>	Poaceae	-	Fodder
17.	<i>Caraxhebe carpa</i>	Cyperaceae	-	-
18.	<i>Cardiospermum halicacabum</i>	Sapindaceae	-	Medicinal
19.	<i>Cenchrus biflorus</i>	Poaceae	-	Forage, Fodder
20.	<i>Cenchrus ciliaris</i>	Poaceae	-	Fodder
21.	<i>Centella asiatica</i>	Apiaceae	-	Medicinal
22.	<i>Chrysopogon asper</i>	Poaceae	Endemic	-
23.	<i>Commelina clavata</i>	Commelinaceae	Endemic	-
24.	<i>Commelina longifolia</i>	Commelinaceae	-	-
25.	<i>Costus speciosus</i>	Zingiberaceae	-	Medicinal
26.	<i>Crotalaria acicularis</i>	Papilionaceae	-	-
27.	<i>Crotalaria bifaria</i>	Papilionaceae	-	-
28.	<i>Crotalaria clarkei</i>	Papilionaceae	Endemic	-
29.	<i>Crotalaria umbellate</i>	Papilionaceae	-	-
30.	<i>Curculigo orchioides</i>	Hypoxidaceae	-	Medicinal
31.	<i>Cyperus stoloniferus</i>	Cyperaceae	-	Medicine, fodder
32.	<i>Cyperus difformis</i>	Cyperaceae	-	Fodder
33.	<i>Cyperus iria</i>	Cyperaceae	-	Fodder
34.	<i>Cyperus nutans</i>	Cyperaceae	-	Fodder
35.	<i>Cyperus rotundus</i>	Cyperaceae	-	Medicinal
36.	<i>Cypreris tenuispica</i>	Cyperaceae	-	Fodder
37.	<i>Dactyloctenium aegyptium</i>	Poaceae	-	Fodder
38.	<i>Dendrobium nanum</i>	Orchidaceae	Endemic	-
39.	<i>Desmodium alysicarpoides</i>	Papilionaceae	-	-
40.	<i>Desmodium pulchellum</i>	Papilionaceae	-	Medicinal
41.	<i>Desmodium triflorum</i>	Papilionaceae	-	Medicinal
42.	<i>Desmodium triquetrum</i>	Papilionaceae	-	Medicinal
43.	<i>Dichrocephala integrifolia</i>	Asteraceae	-	Medicinal
44.	<i>Didypos andralurida</i>	Acanthaceae	Endemic	-
45.	<i>Digitaria setigera</i>	Poaceae	-	Fodder
46.	<i>Dioscorea bulbifera</i>	Dioscoreaceae	Endemic	Medicinal
47.	<i>Drymaria cordata</i>	Caryophyllaceae	-	Fodder
48.	<i>Dumasia villosa</i>	Papilionaceae	-	-
49.	<i>Elephantopus scaber</i>	Asteraceae	-	Medicinal
50.	<i>Eleusine indica</i>	Poaceae	-	Fodder
51.	<i>Emilia sonchifolia</i>	Asteraceae	Endemic	Medicinal
52.	<i>Eragrostis gangetica</i>	Poaceae	-	Fodder
53.	<i>Eragrostis reparaia</i>	Poaceae	Endemic	Fodder
54.	<i>Eragrostis tremula</i>	Poaceae	Endemic	Fodder
55.	<i>Eragrostis uniolooides</i>	Poaceae	Endemic	Fodder
56.	<i>Eria reticosa</i>	Orchidaceae	-	-
57.	<i>Eriocaulon truncatum</i>	Eriocaulaceae	-	-
58.	<i>Eryngium foeticulum</i>	Apiaceae	-	Medicinal
59.	<i>Exacumtetragonum</i>	Gentianaceae	Endemic	-
60.	<i>Fimbristylis aestivalis</i>	Cyperaceae	-	-
61.	<i>Fimbristylis bisumbellata</i>	Cyperaceae	Endemic	-
62.	<i>Fimbristylis complanata</i>	Cyperaceae	-	-

63.	<i>Fimbristylis dichotoma</i>	Cyperaceae	-	-
64.	<i>Fimbristylis tenera</i>	Cyperaceae	-	-
65.	<i>Galactia tenuiflora</i>	Papilioniaceae	-	-
66.	<i>Galinsoga parviflora</i>	Asteraceae	-	Medicinal
67.	<i>Gnaphalium polycaulon</i>	Asteraceae	-	-
68.	<i>Hedychium coronarium</i>	Zingiberaceae	-	Medicinal
69.	<i>Heteropogon contortus</i>	Poaceae	-	-
70.	<i>Hydrocotyle javanica</i>	Apiaceae	-	Medicinal
71.	<i>Impatiens chinensis</i>	Balsaminaceae	-	-
72.	<i>Iphigenia indica</i>	Liliaceae	-	Medicinal
73.	<i>Ipomea hederifolia</i>	Convolvulaceae	-	-
74.	<i>Ipomoea indica</i>	Convolvulaceae	-	Decoration
75.	<i>Isachne miliacea</i>	Poaceae	-	-
76.	<i>Jasmanium flexile</i>	Oleaceae	-	Decoration
77.	<i>Leucas aspera</i>	Lamiaceae	-	Medicinal
78.	<i>Lindernia anagallis</i>	Scrophulariaceae	-	Medicinal
79.	<i>Lindernia antipoda</i>	Scrophulariaceae	-	Medicinal
80.	<i>Lindernia oppositifolia</i>	Scrophulariaceae	Endemic	Medicinal
81.	<i>Lindernia parviflora</i>	Scrophulariaceae	-	-
82.	<i>Lindernia tenuifolia</i>	Scrophulariaceae	Endemic	-
83.	<i>Lipocarphas phacelata</i>	Cyperaceae	-	-
84.	<i>Ludwigia perennis</i>	Onagraceae	-	Medicinal
85.	<i>Lycinathes laevis</i>	Solanaceae	-	Medicinal
86.	<i>Mariscus dubius</i>	Cyperaceae	-	-
87.	<i>Mariscus squarrosus</i>	Cyperaceae	-	-
88.	<i>Mariscus sumatrensis</i>	Cyperaceae	-	-
89.	<i>Melastoma malabathricum</i>	Melastomataceae	-	Medicinal
90.	<i>Micrococca mercurialis</i>	Euphorbiaceae	-	Edible
91.	<i>Mimosa polyancistia</i>	Mimosaceae	-	-
92.	<i>Mukia leiosperma</i>	Cucurbitaceae	-	Medicinal
93.	<i>Murdania dimorpha</i>	Commelinaceae	Endemic	-
94.	<i>Murdania semiteres</i>	Commelinaceae	Endemic	-
95.	<i>Ocimum gratissimum</i>	Lamiaceae	-	Medicinal
96.	<i>Oldenlandia biflora</i>	Rubiaceae	-	Medicinal
97.	<i>Oldenlandia herbacea</i>	Rubiaceae	-	Medicinal
98.	<i>Ophiorrhiza mungos</i>	Rubiaceae	-	Medicinal
99.	<i>Orthosiphon pallidus</i>	Lamiaceae	-	Medicinal
100.	<i>Osbeckia leschenaultiana</i>	Melastomataceae	Endemic	-
101.	<i>Oxalis corniculata</i>	Oxalidaceae	-	Medicinal
102.	<i>Panicum miliaceum</i>	Poaceae	-	Millet
103.	<i>Paspalidium geminatum</i>	Poaceae	-	-
104.	<i>Pavonia odorata</i>	Malvaceae	-	Medicinal
105.	<i>Pennisitum purpureum</i>	Poaceae	-	Fodder
106.	<i>Persicaria chinensis</i>	Polygonaceae	-	-
107.	<i>Physalis minima</i>	Solanaceae	-	Edible, Medicinal

108.	<i>Phytoloca octandra</i>	Phytolochiaceae	-	Dye
109.	<i>Pilea melastomoides</i>	Urticaceae	-	Medicinal
110.	<i>Plumbago zeylanica</i>	Plumbaginaceae	-	Medicinal
111.	<i>Polygonum glabrum</i>	Polygonaceae	-	Medicinal
112.	<i>Polygonum hydropiper</i>	Polygonaceae	-	-
113.	<i>Polygonum plebcium</i>	Polygonaceae	-	-
114.	<i>Pothos scandens</i>	Araceae	-	Medicinal
115.	<i>Pycneus flavidis</i>	Cyperaceae	-	-
116.	<i>Pycneus pumilus</i>	Cyperaceae	-	-
117.	<i>Satyrium nepalens</i>	Orchidaceae	-	Medicinal
118.	<i>Scoparia dulcis</i>	Scrophulariaceae	Endemic	Medicinal
119.	<i>Setaria pumila</i>	Poaceae	-	-
120.	<i>Sida schimperiana</i>	Malvaceae	-	-
121.	<i>Smithia blanda</i>	Papilionaceae	-	-
122.	<i>Solanum torvum</i>	Solanaceae	-	Medicinal, Edible
123.	<i>Spermacoce pussilla</i>	Rubiaceae	-	-
124.	<i>Sphaeranthus indicus</i>	Asteraceae	-	Medicinal
125.	<i>Spilanthes calva</i>	Asteraceae	-	Medicinal
126.	<i>Sporobolous coromendelianus</i>	Poaceae	-	-
127.	<i>Sporobolus wallichia</i>	Poaceae	-	Craft
128.	<i>Tephrosia purpurea</i>	Papilionaceae	-	Medicinal
129.	<i>Teramnus labialis</i>	Papilionaceae	-	Medicinal
130.	<i>Thumbergia fragrans</i>	Acanthaceae	-	-
131.	<i>Thumbergia mysorenses</i>	Acanthaceae	Endemic	Decoration
132.	<i>Tinospora cordifolia</i>	Menispermaceae	Endemic	Medicinal
133.	<i>Torenia bicolor</i>	Scrophulariaceae	Endemic	Decoration
134.	<i>Torenia lindernioides</i>	Scrophulariaceae	-	-
135.	<i>Trichosanthes cucumerina</i>	Cucurbitaceae	-	Edible
136.	<i>Utricularica scandens</i>	Lentibulariaceae	-	-
137.	<i>Vernonia conyzoides</i>	Asteraceae	Endemic	Medicinal
138.	<i>Wedelia chinensis</i>	Asteraceae	-	Medicinal
139.	<i>Zehneria maysorenses</i>	Cucurbitaceae	-	Medicinal
140.	<i>Zingiber zerumbet</i>	Zingiberaceae	-	Medicinal



Fig. 4a). Plant species collected from Tropical Gene-Pool Garden, Naduganai.



Fig. 4b). Plant species collected from Tropical Gene-Pool Garden, Naduganai.



Fig.5. Endemic plants from Tropical Gene-Pool Garden, Nadugani.

According to Balakrishnan and Mohanan, (1999), there are about 818 taxa of flowering plants endemic to Nilgiri Biosphere Reserve. With further references from the Botanical Survey of India, Coimbatore, the collected endemic plants from the study area were sorted with endemism to Western Ghats and The Nilgiris Bioreserve and resulted with 27 species (table 2; Fig. 5). Among the 140 plants collected 59 species were utilized as with medicinal importance, one species as dying agent, 7 species for decoration and craft, 4 species with edible products and 22 species as fodder for cattle by the local people around the study area and were noted (Table 2; Fig. 4-(a, b), 5).

Conclusion

The herbaceous survey of Tropical Gene-Pool Garden, Nadugani Hills, recorded 140 angiosperms with 27 endemic species to Western Ghats and The Nilgiris Biosphere and 59 local medicinal plants were recorded. The survey helps to know the species richness and the status of the species in future studies.

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Conflict of interest

There remains no conflict of interest for the current research work.

Author contribution

All the three authors have their full role in research plan, selection of study area, plant identification, data analysis and manuscript review. Field collection and herbarium preparation are carried out by Aghil Soorya A and Jagathes Kumar S.

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