

## RESEARCH ARTICLE

### OBSERVATIONS ON THE ENDEMIC TAXA OF VELLIANGIRI HILLS, A PART OF SOUTHERN WESTERN GHATS, INDIA

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#### ABSTRACT

The present exploration based on the floristic studies carried out shows that there are about 121 endemic taxa of flowering plants in Velliangiri hills belonging to 34 families have been recorded and are listed. Out of the plants listed, the dominant families are Asteraceae, Lamiaceae, Fabaceae and Orchidaceae. From the list of the endemic plants in the study, it is indicated that the phylo-genetically advanced families such as Orchidaceae, Asteraceae, and Lamiaceae are the most diversified families on the basis of their number of genera and species. The herbs and shrubs are better represented than the trees in the list. A large number of endemic taxa (about 20 species) are known only by their type collection, which could not be recollected or relocated even after repeated field explorations. It seems that either these taxa are vanished from their localities or alternatively, that species misidentification has occurred.

**Keywords:** Endemic taxa, Velliangiri hills, exploration, assessment of status.

#### 1. INTRODUCTION

The Velliangiri hills, the horse-shoe-shaped range of hills which are situated exactly to the west of Coimbatore town and comes under Boluvampatti reserve forests (1). At the base of this hill and facing east is Siruvani foot. Here there are settling tanks and these collect water from a narrow channel drawn from Muthukolam, which is the main source of water supply for Coimbatore town and is situated in a ravine at the top of a group of hills. The study site Velliangiri hills which forms a major hill range in the Western Ghats that is rich in biodiversity and largely untouched by development because of its cultural and religious importance (2). It is situated to the western boundary of Palghat district of Kerala, the plains of Coimbatore district of Tamil Nadu to the east, the Nilgiri Mountains to the north. The area extended approximately 48 sq. km. and consists of seven hillocks with different altitudes and micro-topography. It lies between 76° 40' and 77° 10' E longitude and 10° 55' and 11° 10' N latitude. The altitude ranges from 520 to 1840 m above MSL (Fig. 1)

Velliangiri hills is popularly known as "Thenkailaya malai" (in Tamil) which means the holy hills of Southern India. The Velliangiri Andavar temple and the cave of "Shivalinga" is situated at the peak of this hill. The season of pilgrims visiting to this temple is the month of March to May of each year and on moon days of each month. The pilgrims visit the hill peak temple bare foot as they believe that the holiness will lose if they wear shoes and chapels. The devotees visit

this temple by walk through the thick jungles, wet evergreen forests, shola forests and grassland vegetation. The pilgrims start walking up the hill early in the morning and climb down before dark (night).

#### 2. GEOLOGY, ROCK AND SOIL

The hills have come in the existence due to the upright by block faulting in the cretaceous and Miocene periods and consist of Precambrian Archean crystalline hard rocks of charnokites belonging to the Nilgiri gneiss. The gneiss is finely foliated and is composed of quartz, feldspar, and biotite (black mica) with an occasional admixture of garnet (3). Though laterite in its pure form is not met on the hills, the rocks do undergo a change akin to laterite metamorphosis resulting in the formation of soil varying from pale yellow to red colour in the form of a sandy loam. The soil type of this hill is red, loamy, acidic and ferruginous. Along the foot hills, the soil is reddish with irregular galleries filled with yellow clay running through its mass and it has the property of hardening on exposure to the air. The scrub jungle region possess dry rocky soil whereas in the evergreen as well as the grassland regions the soil becomes dark humus and fertile (4). In the plains where the crops are cultivated, the black cotton soil and a sandy soil along the Noyil River.

#### 3. CLIMATE AND RAIN FALL

The difference in elevation between the plains and the ghats makes appreciable variations in their climatic conditions. As, the area lying on the

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eastern side, it receives more wind during the South-west monsoon from June to September and during this period climate is cool and pleasant. The North-east monsoon brings most of the annual rainfall and the climate regions cool from November to February. The climate is cool and pleasant for the major part of the year except during the month of March to May when it is hot and dry. The temperature of the hills ranging from 2°C during winter and upto 41°C during summer. Temperature at the foot hills ranges from 24°C to 38°C and night temperatures 18°C to 29°C and the mean annual humidity is 51% (5). The prevailing winds are from the west and south-west during April to September and from the east and north-east from October to March. The western sea-breeze blows slightly in the evenings from the month of March onwards developing into the South-west monsoon about the beginning of June.

The high mountains in the Western Ghats keep study site away from South-west monsoon

and the small showers received during June and July are only the portion of the South-west monsoon escaping through the narrow gaps of the Western Ghats. As the hill ranges open eastwards the North-east monsoon is received properly. Venkateswara Ayyar (1939) has given the average rainfall of this area based on the observations made at the Iruttupallam Office of the Forest Department. The average annual rainfall of this hills is 3500 mm at the foot hills and 4500 mm at the peak and the amount of rainfall increases with increase of altitude. The area is subjected to both South-West and North-East monsoon and the rainfall during South-West monsoon is heavy and usually starts by the middle of May and lasts up to August. The configuration of mountain ranges, the topographical variations, angles of slopes and the altitudinal levels at different hills generally favour the precipitation during south-west (June-August) and north-east (October-December) monsoon periods.



**Fig. 1. Study area.**



Fig. 2. An overview the species in Velliangiri Hills.

Table 1. List of species in Velliangiri Hills.

Sl. No.	Name of the family with species	Habit	Phenology	Region	Reference	Specimen No.
	<b>Ranunculaceae</b>					
1	<i>Clematis wightiana</i>		February – March			8211
2	<i>Ranunculus wallichianus</i>	Climber	June – October	WG	Matthew, 1999 (6)	8212
	<b>Berberidaceae</b>					
3	<i>Mahonia leschenaultia</i>	Tree	May – December	WG	Nayar, 1996 (7)	8213
	<b>Polygalaceae</b>					
4	<i>Polygala jacobii</i>	Herb	May – December	TN	Ahmedullah & Nayar, 1986 (8)	8163
	<b>Clusiaceae</b>					
5	<i>Mesua ferrea</i>	Tree	March – October	SI	Nair & Henry, 1983 (9)	8216
	<b>Bombacaceae</b>					
6	<i>Bombax insignie</i>	Tree	November – March	TN	Jain & Sastry, 1984 (10)	8217
	<b>Elaeocarpaceae</b>					
7	<i>Elaeocarpus recurvatus</i>	Tree	February – May	SWG	Nayar & Sastry, 2000 (11)	8191
	<b>Oxalidaceae</b>					
8	<i>Biophytum longipedunculatum</i>	Herb	December – April	SI	Nair & Henry, 1983 (9)	8222
	<b>Balsaminaceae</b>					
9	<i>Impatiens clavicornu</i>		June – October		Nair & Henry, 1983	8168

10	<i>I. inconspicua</i>	Herb	September – December	WG	(9)	8154
11	<i>I. leschenaultii</i>	Shrub	April – December		Matthew, 1999 (6)	8148
12	<i>I. phoenicea</i>	Herb	September – October	SWG	Ahmedullah & Nayar, 1999 (8)	8144
13	<i>I. viscida</i>	Herb	April – December		Nair & Henry, 1983 (9)	8141
<b>Rutaceae</b>						
14	<i>Atalantia wightii</i>	Shrub	March – June	PI	Matthew, 1999 (6)	8222
15	<i>Melicope indica</i>	Tree	September – December	SWG	Nayar, 1996 (7)	8223
<b>Meliaceae</b>						
16	<i>Aglaiia indica</i>	Tree	May – June	SWG	Nayar, 1996 (7)	8224
<b>Vitaceae</b>						
17	<i>Ampelocissus araneosa</i>	Climber	July – December	WG	Nayar, 1996 (7)	8227
18	<i>Cayratia pedata</i>	Climber	March – August	TN	Nayar & Sastry, 1987 (11)	8228
<b>Sapindaceae</b>						
19	<i>Allophylus serrulatus</i>	Shrub	July – October			8229
20	<i>Buchanania lanceolata</i>	Tree	November – March	WG	Ahmedullah & Nayar, 1987 (8)	8230
<b>Fabaceae</b>						
21	<i>Crotalaria fysonii</i>		September – December	WG		8232
22	<i>C. globosa</i>		November – March	SWG		8193
23	<i>C. hirsuta</i>		March - April	WG		8172
24	<i>C. longipes</i>		November – January			8157
25	<i>C. obtecta</i>		December – March	SWG		8145
26	<i>C. scabrella</i>	Herb	November – March	WG	Nayar, 1996 (7)	8140
27	<i>Indigofera uniflora</i>		September – December	SWG	Ahmedullah & Nayar, 1987 (8)	8233
28	<i>Rhynchosia filipes</i>	Climber	November – March	SI	Ahmedullah & Nayar, 1987 (8)	8235
29	<i>Tephrosia roxburghiana</i>	Herb	July – September	SWG	Nayar, 1996 (7)	8236
<b>Rosaceae</b>						
30	<i>Rubus racemosus</i>	Climber	December – May	SWG	Ahmedullah & Nayar, 1987 (8)	8237
<b>Crassulaceae</b>						
31	<i>Kalanchoe olivacea</i>	Shrub	December – March	TN	Nayar & Sastry, 1987 (11)	8238
<b>Myrtaceae</b>						
32	<i>Eugenia indica</i>		March – May		Nayar, 1996 (7)	8239
33	<i>Syzygium benthamianum</i>		December – February	SWG		8240
34	<i>S. densiflorum</i>	Tree	April – June		Ahmedullah & Nayar, 1987 (8)	8175
35	<i>S. travancoricum</i>			WG	Nayar & Sastry, 1987 (11)	8151
<b>Melastomataceae</b>						
36	<i>Medinilla malabarica</i>		September – December		Ahmedullah & Nayar, 1987 (8)	8241
37	<i>Memecylon lawsonii</i>	Shrub	September – March	WG		8242
38	<i>Osbeckia gracilis</i>				Nayar, 1996 (7)	8243
39	<i>O. leschnaultiana</i>		January – April	SWG	Ahmedullah & Nayar, 1986 (8)	8183
40	<i>Sonerila rotundifolia</i>		July – October		Nayar, 1987 (11)	8179
41	<i>S. versicolor</i>	Herb	June – December	SWG	Ahmedullah & Nayar, 1987 (8)	8162
<b>Apiaceae</b>						
42	<i>Bupleurum distichophyllum</i>	Herb	June – October	SWG		8245
43	<i>B. plantaginifolium</i>		August – October		Nayar, 1996 (7)	8195
44	<i>Heracleum rigens</i>		August – September			8246
45	<i>H. sprengelianum</i>		July – November	WG		8187

46	<i>Pimpinella candolleana</i>		Aug. – October	SWG		8248
	<b>Rubiaceae</b>					
47	<i>Hedyotis hirsutissima</i>	Shrub	November – March	WG	Nayar & Sastry, 1987 (11)	8250
48	<i>H. leschenaultiana</i>			SWG	Nayar, 1996 (7)	8188
49	<i>Knoxia wightiana</i>			WG		8251
50	<i>Lasianthus parvifolius</i>	Shrub	December – May	WG	Ahmedullah & Nayar, 1987 (8)	8252
51	<i>Psychotria bisulcata</i>		March – July	SWG		8254
52	<i>P. nilgiriensis</i>		September – December	WG	Nayar, 1996 (7)	8180
	<b>Asteraceae</b>					
53	<i>Anaphalis aristata</i>		July – April	WG		8256
54	<i>A. beddomei</i>		June – October	TN	Henry et al., 1987 (12)	8198
55	<i>A. elliptica</i>		April – November	WG	Henry et al., 1987 (12)	8143
56	<i>A. lawii</i>		September – March	SI	Ahmedullah & Nayar, 1987(8)	8173
57	<i>A. leptophylla</i>		June – October	SWG		8158
58	<i>A. neelgerryana</i>	Herb	July – October	WG	Henry et al., 1987(12)	8150
59	<i>A. wightiana</i>		September – June	SWG	Ahmedullah & Nayar, 1987(8)	8146
60	<i>Blumea wightiana</i>		January – November	SWG	Nayar, 1996 (7)	8257
61	<i>Gynura nitida</i>		January – December	WG	Ahmedullah & Nayar, 1987 (8)	8258
62	<i>Helichrysum wightii</i>		November – April		Henry et al., 1987 (12)	8259
63	<i>Soncio lavandulaefolius</i>		October – December	SWG	Ahmedullah & Nayar, 1987(8)	8260
64	<i>Vernonia conyzoides</i>		September – March	SWG		8261
65	<i>V. travancorica</i>	Tree	February – July	WG	Henry et al., 1987(12)	8174
	<b>Ebenaceae</b>					
66	<i>Diospyros bourdillonii</i>	Tree	March – December	SWG	Nayar, 1996(7)	8262
	<b>Symplocaceae</b>					
67	<i>Symplocos macrophylla</i>	Tree	February – May	SWG	Ahmedullah & Nayar, 1987(8)	8263
68	<i>S. racemosa</i>		December – February	WG	Henry et al., 1987 (12)	8176
	<b>Oleaceae</b>					
69	<i>Jasminum rottlerianum</i>	Climber	January – June	PI	Henry et al., 1987 (12)	8264
70	<i>Ligustrum perrottetii</i>	Tree	February – June	WG	Nayar, 1996(7)	8265
	<b>Asclepiadaceae</b>					
71	<i>Ceropegia intermedia</i>		June – December	SWG	Ahmedullah & Nayar, 1987 (8)	8266
72	<i>Sarcostemma intermedium</i>	Climber	Aug. – December	PI		8267
	<b>Gentianaceae</b>					
73	<i>Exacum wightianum</i>		April – July			8268
74	<i>Swertia beddomei</i>		November – April	SWG	Ahmedullah & Nayar, 1987 (8)	8269
75	<i>S. corymbosa</i>		October – December	WG		8177
76	<i>S. densifolia</i>		September – January	SI	Henry et al., 1989(12)	8160
77	<i>S. lawii</i>	Herb	November – January	WG	Ahmedullah & Nayar, 1987(8)	8152
78	<i>S. minor</i>		August – September	WG		8147
	<b>Gesneriaceae</b>					
79	<i>Didymocarpus gambleanus</i>	Herb	April – August	SWG	Ahmedullah & Nayar, 1987 (8)	8273
	<b>Acanthaceae</b>					
80	<i>Andrographis lobelioides</i>		September – December			8274
81	<i>Barleria acuminata</i>	Herb	December – March		Ahmedullah &	8275

82	<i>Justicia wynaadensis</i>		November – March		Nayar, 1987 (8)	8276
83	<i>Strobilanthes foliosus</i>	Shrub	October – December	WG		8277
84	<i>S. kunthianus</i>	Shrub	September – January			8178
85	<i>S. lawsonii</i>	Shrub	July – September		Nayar, 1996 (7)	8161
<b>Lamiaceae</b>						
86	<i>Anisochilus dysophylloides</i>	Herb	December – March		Nayar, 1996 (7)	8278
87	<i>Isodon nilgherricus</i>		October – February			8279
88	<i>Leucas lancifolia</i>	Shrub		SWG		8280
89	<i>L. pubescens</i>		June – August		Ahmedullah &	8185
90	<i>L. ternifolia</i>	Herb	July – February		Nayar, 1987 (8)	8167
91	<i>Plectranthus bishopianus</i>	Shrub	September – December	WG	Nayar & Sastry, 1990 (11)	8281
92	<i>P. subincisus</i>	Shrub	September – November	TN	Henry et al., 1987 (12)	8165
93	<i>P. urticifolius</i>	Herb	October – January			8153
94	<i>Pogostemon atropurpureus</i>	Shrub	February – May		Nayar, 1996(7)	8282
95	<i>P. mollis</i>	Herb	October – February			8181
96	<i>P. nilagiricus</i>	Shrub	January – April	WG	Nayar & Sastry, 1990 (11)	8164
97	<i>P. vestitus</i>		November – January		Nayar, 1996 (7)	8215
98	<i>Scutellaria colebrookiana</i>	Herb	October – December		Ahmedullah & Nayar, 1987 (8)	8283
<b>Lauraceae</b>						
99	<i>Actinodaphne bourdillonii</i>		April – August		Ahmedullah & Nayar, 1987 (8)	8284
100	<i>Cinnamomum perrottetii</i>		February – May			8285
101	<i>C. sulphuratum</i>		March – August	WG		8194
102	<i>Cryptocarya bourdillonii</i>	Tree	April – December		Henry et al., 1987 (12)	8286
103	<i>Litsea floribunda</i>		December – April	SWG	Nayar, 1996(7)	8287
104	<i>L. insignis</i>		March – July	WG	Henry et al., 1987 (12)	8184
<b>Euphorbiaceae</b>						
105	<i>Bridelia crenulata</i>		May – September		Nayar, 1996 (7)	8289
106	<i>Glochidion bourdillonii</i>	Tree	February – July	WG	Ahmedullah & Nayar, 1987 (8)	8290
<b>Orchidaceae</b>						
107	<i>Calanthe triplicata</i>		October – December	WG	Jain & Rao, 1983 (13)	8294
108	<i>Disperis neilgherrensis</i>		May – June	SI	Sarkar, 1995 (14)	8295
109	<i>Habenaria elliptica</i>		August – November	WG	Ahmedullah & Nayar, 1987 (8)	8297
110	<i>H. longicorniculata</i>	Herb		WG	Sarkar, 1995 (14)	8189
111	<i>H. polyodon</i>			SI	Ahmedullah &	8170
112	<i>H. rariflora</i>		July – September	WG	Nayar, 1987 (8)	8156
113	<i>Malaxis acuminata</i>		June – December	WG	Sarkar, 1995 (14)	8298
<b>Zingiberaceae</b>						
114	<i>Curcuma neilgherrensis</i>		April – October	SI	Henry et al., 1989 (12)	8192
115	<i>C. pseudomontana</i>	Herb	July – August	PI		8171
<b>Liliaceae</b>						
116	<i>Lilium neilgherrense</i>	Herb	October – December	WG	Ahmedullah & Nayar, 1987 (8)	8303
<b>Eriocaulaceae</b>						
117	<i>Eriocaulon robustum</i>		June – April		Ansari & Balakrishnan (15)	8190
<b>Poaceae</b>						
118	<i>Arundinella mesophylla</i>		July – December	SWG	Henry et al., 1989 (12)	8308
119	<i>Digitaria tomentosa</i>		September – December	SI	Ahmedullah &	8311

		Herb			Nayar, 1987 (8)	
120	<i>Eragrostiella brachyphylla</i>		July – December	SI	Henry et al., 1989 (12)	8312
121	<i>Garnotia arundinacea</i>		October – February	WG	Ahmedullah & Nayar, 1987 (8)	8313

(WG: Western Ghats; SWG: Southern Western Ghats; SI: Southern India; PI: Peninsular India; TN: Tamil Nadu)

#### 4. VEGETATION

The study area composed of Bamboo forests mixed with grasslands and evergreen forests. It also forms a thick shrub jungle extending from the foot of the mountain upto a height of 700 m. At places the thorny climbers and shrubs make the scrub jungles almost impenetrable. Above this region is the beginning of the evergreen type of vegetation interspersed by grasslands. The gentle eastward slopes of the hills support shola vegetation here and there. The shola feeds a number of tributaries of the Noyil River (Subramanyam, 1959). The observations made on the vegetation of the area and showed that the forest types of (i) southern tropical thorn forests (scrub jungles), (ii) tropical dry deciduous forests, (iii) tropical wet evergreen forests, (iv) temperate forests (sholas) and (v) southern montane humid grasslands as described by Champion and Seth (16). The moist deciduous forests and wet evergreen vegetation are the most dominant habitats, compared with semi-evergreen and grassland vegetation, which are restricted to a few patches at higher elevations and along streams. The forests of this area are subjected to extreme biotic influences and extensive areas are planted with Eucalyptus, Teak, Bombax, etc. The natural regeneration of trees in these forests is very poor which may be due to excessive grazing and other biotic influences. The major threat for this area is human interference during festival seasons. The devotees cut and burn many plants to keep themselves warm during the cold winter times. Hence, the indiscriminate collection of wild plants leads to extinction from the study area.

#### 5. OBSERVATIONS

The present observations relate mainly to the endemic taxa in the Velliangiri hills and all the plants listed below have been carefully observed in the field and collected on the spot (Fig. 2). The classification of Bentham and Hooker is followed and the species under each family are arranged in an alphabetical manner and presented in the below table. For each species the following data are given: botanical name with family, habit, phenology, region of occurrence, reference for these endemic status and finally the field/collection number.

Every attempt has been made to bring the nomenclature up-to-date and the following International Plant Names Index (IPNI) websites.

Out of the plants listed, the dominant families are Asteraceae, Lamiaceae, Fabaceae and Orchidaceae. It was noticed from the list that the Asteraceae very well represented with the largest number of genera and species, the next in order was Lamiaceae and Fabaceae. Among the other families which have five and more species are Orchidaceae, Melastomataceae, Rubiaceae, Gentianaceae, Acanthaceae, Lauraceae and Apiaceae. Further it was also observed from the list that the herbs, shrubs and climbers are better represented than the trees. It is proposed to conduct more field trips to this study region to bring different seasons of the year and additional lists will be published as and when data are gathered.

#### 6. SUMMARY

Botanical exploration as undertaken by the authors in the Velliangiri hills during 2011-2014. Several field trips were made to the various locations of these forests and valleys throughout the different season of the year (four years). Plants collected during these exploration trips were processed for the Herbarium and were identified after comparing with the authentic specimens in the Madras Herbarium. A total of 121 endemic species belonging to 34 families which have been recorded are given under observations. Out of the plants listed, the dominant families are Asteraceae, Lamiaceae, Fabaceae and Orchidaceae. The herbs, shrubs and climbers are better represented than the trees in the list.

Varying topographic and climatic conditions provided the favorable conditions for survival of the plants. The rapid global change including climate fluctuation and man-made impacts are threatening their long-term survival. The endemic plants are threatened by rapid climate change, forest fragmentation, habitat loss, on and introduction of exotic species that bring slow death of native species. Many of the earlier described/collected taxa needs special attention to solve the taxonomic problems and conservation measures. This can be confirmed only by collecting samples

from type localities as well as different localities. Recent studies have ascertained that many taxa are endemic to Velliangiri hills and several of them are threatened. Unless proper conservation measures are taken, many of them will become extinct. In fact there are only a few historical botanical collections from the Velliangiri hills. Hence, a thorough assessment of rare, endemic and endangered species in this area is highly essential to know the actual status and conservation of the endemic species.

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