# Distribution of Asteraceae along the altitudinal gradient from Kallar to Doddabetta, Nilgiris, Tamil Nadu, India

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# Abstract

A surveyof Asteraceae was conducted in Doddabetta, Aruvankadu, Lamb's rock, Marapplam and Kallar of Nilgiris, Western Ghats, India. A total number of 65 genera and 125 species of Asteraceae were observed. Among them 91 wild plant species, and 34 **or**namental plants.

**Keywords :** Asteraceae, conservation, floral bio-diversity, Nilgiris, Western ghats

## INTRODUCTION

The name Asteraceae is derived from the term aster means star like or composite and refers to the characteristic inflorescence - have flower heads composed of many small flowers, called florets, which include ray florets and disc florets and are surrounded by bracts (Moreira and Munoz 2007). The Asteraceae (Compositae) is the richest vascular plant family in the world, with 1600–1700 genera and 24,000–30,000 species. They are easily distinguished by the florets grouped in capitula, and the fruit a cypsela often with a pappus. Asteraceae comprises almost every life-form: herbs, succulents, lianas, epiphytes, shrubs, trees, and they have been recorded from every environment and continent, except Antarctica (Funk et al., 2005). Bisht and Purohit (2010) reported 85 species of medicinal and aromatic plants with 54 genera of Asteraceae from Uttarakhand.

Approximately 10% of flowering plant species belong to the Compositae (Funk *et al.*, 2005), making it the largest angiosperm family in terms of named species

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(Anderberg and Eldenas 2007). Despite its great diversity, there are only two major food crops known from the Compositae which include sunflower and lettuce, a handful of minor, domesticated crops and several useful species that show little or no signs of domestication. It should be noted that a great variety of Compositae have been domesticated as ornamentals. In addition to the beneficial uses of Compositae species, the family is well known for its 'weedy nature', which has considerable negative economic effects (Anderberg et al., 2007). Whether most members of the family are 'weedy' has been questioned recently due to the restricted geographic distribution of most species (Funk et al., 2005). The weedy habit of the species of Compositae received the attention of early farmers, as Compositae might have invaded early cultivated fields, much as they do now; examples of species with a weedy habit in the Compositae that have become domesticated include common sunflower, Jerusalem artichoke, lettuce, and chicory (Ladizinsky, 1998).

Asteraceae seeds are readily dispersed to natural areas by wind, water and wildlife, sometimes far from the original plantings. Wild plants are found growing in unwanted agricultural lands, gardens, roadsides and mainly distributed areas where they do not depend on human intervention for their reproduction and



survival (Ngugi *et al.*, 1978; Cassas *et al.*, 1996).India is one of the 17 mega biodiversity centers on the earth due to the presence of highly varied edaphic and climatic region (Meyers *et al.*, 2000). Sholas are places of high biodiversity, and include many endemic, endangered and rare species of both flora and fauna. . Low population size of Asteraceae is one of the characteristic features of the shola forests of the Nilgiris (Paulsamy, 2005).Most of the members of Asteraceae are found in edges of shoals or as forest undergrowth in exposed localities. They also immediately colonize in disturbed areas, fallow field and human settlements. The present study documents Astraceae plants and their significance in selected parts of Nilgiris District,

## MATERIALS AND METHODS

Tamilnadu, southern India.

The Nilgiri Biosphere Reserve is an International Biosphere Reserve occupies a total area of 2542.49 Sq. Kms, located in the Western Ghats of Palghat Gap (10° 45' - 12° 5' N latitude and 76° 10' - 77° 10' E longitude), spreads over an area of 5,520 km<sup>2</sup> in the states of Karnataka (1527.4 km<sup>2</sup>), Kerala (1455.4 km<sup>2</sup>) and TamilNadu (2537.6 km<sup>2</sup>). The total geographical area of sholas in Nilgiris is 4225 ha (Rajan. 1992). The Niligiri hills have the second highest peak in South India viz., Doddabetta, which is situated in the south of Western Ghats at a height of 2637 meters above MSL while Kallar is situated at 300 meter above MSL. The area covered shows a wide diversity and temperature varies based on altitude. The climatic and ecological diversity create a foundation for very rich diversity (Kaul et al., 1982). The present study area covers the area from Doddabetta and places viz., Aruvankadu, Lamb's Rock shola areas, Marapplam and Kallar regions of Nilgiris (Figur 1).

In the present study 5 stations *viz.*, Doddabetta, Aruvankadu, Lamb's Roc, were selected. Marappalam and Kallar. During the present study, regular field trips were made from June - May during the year 2018- 2019 to collect plant species of Asteraceae family. All the collected plant specimens were pressed, poisoned and mounted on herbarium sheets, herbarium specimens were prepared by standard methodology (Jain and Rao, 1976). Plant species were identified by referring to "Flora of the Presidency of Madras" (Gamble, 1935), "The Flora of the South Indian Hill Stations" (Fyson, 1915)," Flora of Tamil Nadu "(Nair and Hendry, 1983), "The Flora of Tamil Nadu and Carnatic" (Mathew, 1969)," The Flora of Nilgiris, Tamil Nadu" (Sharma *et al*, 1975) and "Manual of cultivated plants" (Bailey, 1949). The identified plant specimens were deposited at Government Arts College Herbarium, Udhagamandalam, for future reference.

### RESULT

Totally 68 genera and 125 species of Asteraceae plants were observed. Among them 91 were wild plant species and 34 were ornamental plants. Higher number of plant species (36 genera 101 species) were observed in Doddabetta. In Lamb's rock 41 genera and 89 species were recorded. Aruvankadu followed with 35 genera 71 species. In Marapalam there are only 22 genera and 36 species, and the least number of 17 genera and 24 species was in Kallar. In Doddabetta there were 5 shrubs, 92 herbs, 2 climbers and one tree. In Lamb's Rock, there were only 6 shrub, 79 herbs, and 3 climbers and one tree. In Aruvankadu there were 4 shrubs, 65 herbs and one climber and one tree. In Marappalam, there were 5 shrubs, 30 herbs and one tree. In Kallar, there were only 1 shrub and 23 herbs.

Maximum number of species had been recorded from the genus *Anaphalis spp* (9 species) followed by *Gnaphalium spp* (7 species), *Artimesia* spp, *Senicio* spp and *Chrysanthimum* spp (6 species each), *Conyza* spp ( 5 species), *Bidens* spp, *Erigeron* spp (4 species each), *Helichrysum* spp, *Vernonia* spp, *Tagetes* spp, *Sonchus* spp, *Spilanthus* spp (3 species each), *Adenostemma* spp, *Ageratum* spp, *Aster* spp, *Centatherum* spp, *Cripis* spp, *Dahlia* spp, *Dicrocephala* spp, *Emilia* spp, *Hypocharis* spp, *Taraxacum* spp, *Wedilia* spp, *Xanthium* spp, (2 species each) and in one species each in the genera

S.NO	LOCATION	LATITUDE	LONGITUDE	ALTITUDE
1	Kallar	11 <sup>°</sup> 20 <sup>°</sup> 13.48 N	76 <sup>°</sup> 52 <sup>°</sup> 10.82" E	435 m
2	Marapalam	11 <sup>°</sup> 20 <sup>°</sup> 05.31 N	76 <sup>°</sup> 49 <sup>°</sup> 02.94" E	1252 m
3	Lamb's rock	11 <sup>°</sup> 21 <sup>°</sup> 37.01 N	76 <sup>°</sup> 50 <sup>°</sup> 17.76" E	1758 m
4	Aruvankadu	11 <sup>°</sup> 22 <sup>°</sup> 13.12 N	76 <sup>°</sup> 45 <sup>°</sup> 43.94" E	1977 m
5	Doddabetta	11 <sup>0</sup> 25'19 48"N	76 <sup>0</sup> 43' 42 20" E	2516 m

**Table 1.** Geographical positions of the study stations.

S.No.	B. Name of the Plant	Habit	S1	<b>S</b> 2	<b>S</b> 3	<b>S</b> 4	<b>S</b> 5
1	Achillea millefolium L. *	Herb	_	_	_	_	+
2	Acanthospermum hispidum L.	Herb	+	+	+	_	_
3	Adenostemma reticulata DC.	Herb	_	_	_	+	_
4	Adenostemma lavenia L.	Herb	_	-	+	_	_
5	Ageratina adenopora (Spreng) R.M. King& H. Rob.	Herb	_	+	+	+	+
6	Ageratum conyzoides L.	Herb	+	+	+	+	+
7	Ageratum houstonianum Mill. *	Herb	+	-	+	+	+
8	Anaphalis aristata DC.	Herb	_	-	+	+	+
9	Anaphalis beddomei Hook.f.	Herb	_	_	_	_	+
10	Anaphalis bournei <sub>Fys.</sub>	Herb	_	_	_	_	+
11	Anaphalis elliptica DC.	Herb	_	_	_	_	+
12	Anaphaliswightiana DC.	Herb	_	_	_	_	+
13	Anaphlislawii Gamb.	Herb	_		+	+	+
14	Anaphalis leptophylla DC.	Herb	_		+	+	+
15	Anaphalis marcescens (Wt.) Clarke.	Herb			+	+	+
16	Anaphlis neelgherryana DC.	Herb					+
17	Anthemis nobilis L *	Herb	_	_	_	_	+
18	Artemisia annua 1.*	Shrub		+	+	+	+
19	Artemisia dracunculus [.*	Herb		-	-	-	+
20	Artemisia parvifloraBuchHam.	Shrub		+	+	- +	-
21	Artemisia absinthium 1 *	Herb			+	+	- +
22	Artemisia lavandulifolia DC	Herb					+
23	Artemisia nilagirica (C B Clarke) Pamp	Shruh	-	- +	-+	-+	+
23	Aster amellus I *	Herb	_		+		+
25	Aster alnines I *	Herb	_	_	· +		+
20	Bidens hiternata (Lour) Merr & Sheriff	Herb	- +	-+	+	_	•
20	Bidens humilis H B K	Herb		•			- +
27	Bidens nilosa I	Horb	-	-	-	-	· +
20	Bidens trinartita I	Horb	' +	' +	' +	'	'
30	Blumea hieracifolia DC	Horb			· +	_	_
31	Bellis nerennis I *	Horb	—	_	' +		
22	Blumeonsis flava (DC) Compon	Horb	—	_	'		' -
32	Caluntocarnus vialis Loop	Horb				т	т
33	Calendula officinalis L *	Horb	-	-	- -		
25	Campecium cernum I *	Harb	-	-		Т	- T
35	Contratherum indicum (Less) CECEisch	Herb		_	-	_	- T
27	Contratherum rangacharii Comble	Herb	—	_	-	- T	- <del>-</del>
37	Chrusenthemum enthelminticum (L) O Karalas *	Herb	_	_	-	_	- T
38	Chrysanthemum annerminicum (L.) O.Kuntze. *	Herb	_				+
39	Chrysunnemum cinerurijoitum (Trev.)Vis. ^	Herb	—	+	+	+	+
40	Chrysantnemum coccineum Willd. *	Herb	—	_	+		
41	Cnrysanthemum leucanthemum L.*	Herb			+	+	+
42	Chrysanthemum parthenium (L.) Bernh. *	Herb			+	+	+
43	Chrysanthemum segetum L.*	Herb					+
44	Cnicus wallichii Hook. f.	Herb					+
45	Conyza stricta Willd.	Herb	+	+	+	+	+

Table 2. Check list of the Astraceae plants in the prsent study area

S.No.	B. Name of the Plant	Habit	<b>S</b> 1	S 2	<b>S</b> 3	<b>S</b> 4	<b>S</b> 5
46	Conyza aegyptiaca Ait.	Herb	_	_	_	_	+
47	Conyza bonariensis (L.) Cronquist	Herb	+	+	+	+	+
48	Conyza japonica Less.	Herb	+	+	+	+	+
49	Conyza sumatrensis (Retz.) E.Walker	Herb	_	_	+	+	+
50	Cotula australis Hk. F	Herb	_	_	+	+	+
51	<i>Crassocephalum crepidioides</i> (Benth) S.Moore	Herb	_	+	+	+	+
52	Cirsium vulgare (Savi) Airy shaw	Shrub	_	_	-	+	+
53	Crepis cappillaris (L) Wallr.	Climber	_	_	+	_	_
54	<i>Crepis japonica</i> Benth.	Herb	_	_	+	+	+
55	Chromolaena odarata (L) R.M.King&H.Rob	Shrub	+	+	+	_	_
56	Cosmos sulphureus Cav. *	Herb	_	_	+	_	+
57	Cynara scolymus L.*	Herb	_	_	_	+	+
58	Dahlia imperialis Roezl ex Ortgies	Shrub	_	+	+	+	+
59	Dahlia coccinea Cav.*	Herb	_	_	+	+	+
60	Dichrocephala latifolia DC.	Herb	_	_	+	+	+
61	Dichrocephala chrysanthemifolia DC.	Herb		_		+	+
62	Emilia sonchifolia DC.	Herb		_	+	+	+
63	Emilia zeylanica C.B.Clarke.	Herb		-	+	+	+
64	Erigeron canadensis Linn.	Herb		_	+	+	+
65	Erigeron linifolius Willd.	Herb	+	+	+	+	+
66	Erigeron mucronatus DC.	Herb		_	+	+	+
67	Galinsoga parviflora Cav.	Herb	+	+	+	+	+
68	<i>Gerbera jamesonii</i> Bolus ex Hook.f. *	Herb	_	_	+	+	+
69	Gnaphalium coacrtatum Willd.	Herb	_	+	+	+	+
70	Gnaphalium falcatum Lam.	Herb	_	_	_	_	+
71	Gnaphalium hypoleucum DC.	Herb	_	_	+	+	+
72	Gnaphaliumuliginosum L.	Herb	_	_	+	+	+
73	Gnaphalium indicum L.	Herb	_	_	+	+	+
74	Gnaphalium luteo-album L.	Herb	_	_	+	+	+
75	<i>Gnaphalium luteo-album</i> L. var. palidum (Lam.) Mahes.	Herb	_	+	+	+	+
76	Gynura nitida DC.	Herb	_	_	+	_	+
77	Helianthus annuus L. *	Shrub	_	_	+	_	+
78	Helichrysum bractiatum (Vent.) Andr.	Herb	_	+	+	+	+
79	Helichrysum buddleioides DC.	Herb	_	_	+	+	+
80	Helichrysum hookerianum W& A.	Herb	_	_	_	_	+
81	Hypochaeris glabra L.	Herb	_	_	+	+	+
82	Hypochaeris radicata L.	Herb	_	_	+	+	+
83	Lactuca hastata DC.	Herb	_	_	+	+	+
84	Lagasca mollis Cav.	Herb			+		
85	Laggera alata SchBip.	Herb		_	+	+	+
86	Matricaria chamomilla L. *	Herb	_	_	_		+
87	Myriactis wightii DC.	Herb		_			+
88	Moonia hererophylla Arn,	Herb	_	_	_	_	+
89	Montanoa bipinnatifida (Kunth)K. Koch. *	Tree	_	_			+
90	Notonia grandiflora DC.	Herb		+		<u> </u>	_

S.No.	B. Name of the Plant	Habit	<b>S1</b>	S 2	S 3	S 4	S 5
91	Parthenium histerophorus L	Herb	+	+	+	-	-
92	Picris hieracioides L.	Herb	_	_	_	+	+
93	Santolina chamaecyparissus L. *	Herb	_	_	_	_	+
94	Senecio candicansDC.	Climber	_	_	+	+	+
95	Senecio cineraria DC. *	Herb	_	_	_	_	+
96	Senecio corymbosus Wall.	Climber	_	_	+	_	+
97	Senecio polycephalus C.B. Clarke.	Herb	_	_	+	+	+
98	Senecio vulgaris L.	Herb	-	_	+	+	+
99	Senecio wightii (DC.) Benthex.Clarke.	Herb	-	_	+	+	+
100	Siegesbeckia orientalis L.	Herb	+	+	+	+	+
101	Silybum marianum (L) Gaertner	Herb	_	_	_	_	+
102	Sonchus arvensis L.	Herb	_	_	+	+	+
103	Sonchus oleraceus L.	Herb	_	_	+	+	+
104	Sonchus wightianus DC.	Herb	_	_	+	+	+
105	Solidago canadensis L. *	Herb	_	_	+	_	+
106	Spilanthes acmella (L.) L.	Herb	_	+	+	+	+
107	Synedrella nodiflora Gaertn.	Herb	+	+	+	_	_
108	Spilanthes calva DC.	Herb	_	+	+	_	_
109	Spilanthes paniculata Wall. Ex DC.	Herb	_	_	+	+	_
110	Tagestes erecta L. *	Herb	+	+	+	+	+
111	Tagestes minuta L.*	Herb	_	_	+	+	+
112	Tagestes patula L.*	Herb	+	+	+	+	+
113	Taraxacum javanicum Soest.	Herb	_	_	+	+	+
114	Taraxacum officinnale Wigg.	Herb	_	+	+	+	+
115	Tithonia diversifolia (Hemsley) A.Gray.	Shrub	+	+	+	+	_
116	Tridax procumbens L.	Herb	+	+	+	_	_
117	Vernonia arborea Buch Ham.	Tree	_	+	+	+	+
118	Vernonia cinerea Less.	Herb	+	+	_	_	_
119	Vernonia albicans DC.*	Herb	+	_	+	+	+
120	Wedelia trilobata (L.) Hitchc. *	Herb	+	_	_	_	_
121	Wedelia urticaefolia DC.*	Herb	+	_	_	_	_
122	Xanthium strumarium L.	Herb	+	_	_	_	_
123	Xanthium spinosum L.	Herb	_	_	+	_	_
124	Youngia napifolia (DC.) DC.	Herb	_	_	+	_	_
125	Zinnia elegans Jacq.*	Herb	_	+	+		+

i.e., Achillea millifolium, Blumea hieracifolia, Bellis perennis, Blumeopsis flava, Calyptocarpus vialis, Calendula officinalis, Carpecium cernum, Cnicus wallichi, Crassocephalum crepidioides, Cirsium vulgare, Chromolaena odarata, Cosmos sulphureus, Cynara scolymus, Galinsoga parviflora, Gerbera jamesonii, Gynura nitida, Helianthus annuus, Lactuca hastata, Lagasca mollis, Laggera alata, Matricaria chamomilla, Myriactis wightii, Moonia heterophylla, Notonia grandiflora, Parthenium histerophorus, Picris hieracioides, Santolina chamaecyparissus, Siegesbeckia orientalis, Silybum marianum, Solidago canadensis, Tithonia diversifolia, Tridax procumbens, Youngia napifolia, Zinnia elegans.

# DISCUSSION

Asteraceae family is very interesting to the taxonomist due to its great diversity of its habit, habitat, morphology and histology of vegetative and reproductive structures (Bremer., 1994, Takhtajan, 1997) many species of Asteraceae are important medicinal plants. Heywood *et al.,* (1977) reported from Asteraceae plants an array of chemical compounds.

Paulsamy, (2005) recorded 20 plants of Asteraceae in eleven Sholas, namely, Ebbanadu, Governor Sholas, Honnathalai, Kammand, Kolacombai, Kodappamand, Korakundha, Kothagiri terrace, Longwood sholas, Thaishola and Wenlockdowns in Nilgiri District. Paulsamy, and Suresh, (2007) reported Asteraceae contributed six species in Exotic flora of some Grasslands of Nilgiris. Mohandoss(2008) reported six Asteraceae plants in floristic distribution in the montane swamps of the Korakundha and Upper



**Fig. 1.** Astraceae plants were documented in the Study site

Bhavani Reserve forest in Nilgiri District. Suresh Baburaj et al. (1992) reported to 9 Asteracae plant species as additions to the Flora of Nilgiris District. Sharmila (2015) reported that eight plants species in Asteraceae are used as medicinal plants by Toda tribes inThaishola and Manjoor area of Upper Nilgiris. Amudha (2015) reported Asteraceae with 12 species to be the dominant family Bandishola and Guernesey regions in Upper Nilgiris. Nishanthini (2015) reported Asteraceae represented by 18 species to be the dominant family in Upper Guernesey and Lower Guernesey regions in Coonoor, The Nilgiris. Present study reports a total number of 65 genera 125 species of Asteraceae plants from the present study area. Among them 91 were wild plant species and 34 were Ornamental and economically important plants in the 5 stations, namely, Doddabetta, Aruvankadu, Lamb's Rock, Marappalam and Kallar. Thus the Astraceae is a dominant family in the Nilgiri District and contributes significantly to the forest undergrowth and increase of biomass in the ecosystem.

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