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Vernonieae Cass. (Asteraceae) in South Gujarat

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Abstract
The tribe Vernonieae (Asteraceae) represents a taxonomically complex and predominantly pantropical group characterized by distinct floral and reproductive features. The present study provides a comprehensive account of Vernonieae in South Gujarat based on extensive field surveys conducted between 2019 and 2025. A total of six species belonging to six genera, namely *Acilepis divergens*, *Baccharoides anthelmintica*, *Centratherum punctatum*, *Cyanthillium cinereum*, *Elephantopus scaber*, and *Phyllocephalum microcephalum*, were documented. Earlier floristic reports recorded seven species under five genera from the region; however, the present investigation did not encounter *Adenoon indicum* and *Phyllocephalum phyllolaenum* from their previously reported localities. Their absence may be attributed to habitat alteration, local extinction, or insufficient recent collections. Furthermore, the possibility of misidentification of *P. phyllolaenum*, particularly with *Centratherum punctatum*, cannot be ruled out. The study highlights the need for critical taxonomic reassessment and updated regional treatments to resolve such ambiguities. Overall, the findings contribute to a refined understanding of the diversity and distribution of Vernonieae in South Gujarat and provide a baseline for future floristic and systematic studies.

Keywords: Vernonieae, Asteraceae, South Gujarat, Taxonomy, Floristic diversity, Misidentification, Field survey, Western India

Introduction

The tribe Vernonieae Cass. (1819) is one of the major lineages within the family Asteraceae, comprising approximately 90–120 genera and 1000–1300 species distributed predominantly in tropical and subtropical regions of the world (Funk *et al*. 2009; POWO, 2026). The tribe shows its greatest diversity in tropical America, followed by Africa and Madagascar, and is considered to have undergone extensive diversification with complex evolutionary history. Traditionally, a large number of species were placed under the broadly circumscribed genus Vernonia Schreb., but subsequent taxonomic revisions, particularly by Harold Ernest Robinson, led to its segregation into several smaller genera based on detailed morphological and palynological characters (Robinson 1999) [8]. Members of Vernonieae are primarily characterized by homogamous capitula bearing only bisexual tubular florets (usually purple, pink, or bluish), style branches with sweeping hairs on the outer surface and an undivided stigmatic surface internally, anthers sagittate or tailed at the base, and cypselae generally lacking phytomelanin and often crowned with a well-developed pappus. Vegetatively, the taxa range from herbs to shrubs and small trees, typically with alternate leaves and absence of latex, although considerable variation exists across genera (Funk *et al*. 2009; Mukherjee & Bertil Nordenstam 2012) [4].

In India, Vernonieae is represented by about 8–10 genera and nearly 60–70 species, with a significant concentration in peninsular India, particularly along the Western Ghats, which harbour several endemic taxa (Uniyal 1995; Mukherjee & Nordenstam 2012) [4, 10]. Earlier floristic accounts reported fewer taxa, but recent taxonomic revisions and regional studies have refined the generic limits and species circumscription, leading to a better understanding of the tribe's diversity in the country. Despite this progress, identification of species remains challenging due to overlapping morphological characters, phenotypic plasticity, and inadequate regional taxonomic treatments.

Gujarat, situated in western India, encompasses diverse habitats such as dry deciduous forests, grasslands, wetlands, and coastal ecosystems, supporting a varied angiosperm flora. However, the representation of Vernonieae in the state remains poorly documented, with earlier works such as Shah (1978) [9], Bole & Pathak (1988), and Parmar (2025) [5] reporting 7 genera represented by one species each. In current study, 6 species under 6 genera of the tribe are reported from South Gujarat.

Therefore, the present study aims to provide a detailed taxonomic treatment of the tribe Vernonieae in South Gujarat, including updated nomenclature, descriptions, identification keys, and photoplates. This work is intended to facilitate accurate identification and contribute to the floristic and taxonomic understanding of the tribe in the region, thereby providing baseline data for biodiversity assessment and future systematic studies.

Materials and Methods

The present study was conducted through extensive field surveys carried out in different regions of Gujarat, India, during various seasons from 2019 to 2025. Plant specimens were collected during the flowering and fruiting stages, ensuring the presence of mature cypselae, and their geographic coordinates were recorded using a Global Positioning System (GPS). Collected specimens were pressed and dried using standard herbarium techniques and subsequently treated with 1% mercuric chloride solution for preservation. The dried specimens were mounted on herbarium sheets following conventional herbarium procedures.

Specimens were identified with the help of relevant floras, monographs, and taxonomic literature (Shah 1978; Robinson, 1999; Bole & Pathak 1988; Uniyal 1995; Parmar

2025) [5, 9, 10]. Identifications were further confirmed by comparison with authenticated specimens housed in the BARO herbarium. Nomenclature and accepted names were verified using the Plants of the World Online (POWO, 2026) database. Micromorphological characters were examined under a Leica stereo zoom microscope.

Results

Keys to the Genera

1a. Capitula are compound ……
……...…… *Elephantopus*
1b. Capitula are simple ……
……...……...…...…… (2)
2a. Leaves are present below the head ……
…….…...… (3)
2b. Leaves are absent below the head …..……
…..……...…… (4)
3a. Leaves white tomentose beneath ……
…..…… *Phyllocephalum*
3b. Leaves not white tomentose beneath ……
…..…. *Centratherum*
4a. Pappus in two rows …….
……...…….. (5)
4b. Pappus in one row ……..
……..……... *Cyanthillium*
5a. Involucre phyllaries are hairy ……
……..…… *Acilepis*
5b. Involucre phyllaries are glabrous ……
…….…….. *Baccharoides*

Taxonomic treatment

***Acilepis divergens* (DC.) H.Rob. & Skvarla**. Proc. Biol. Soc. Washington 122: 140 (2009); *Vernonia divergens* (DC.) Edgew. in J. Asiat. Soc. Bengal 21(2): 172 (1852); Hook.f., Fl. Brit. India 3: 234 (1883); Hajra *et al.*, Fl. of India 13: 370. (1995); Cooke, FBP 2: 11. (1904) [2]; Shah 399. (1978) [9]; Raghavan *et al.* 47. (1981).

Shrub, 1 - 2.5 m tall. Stems less branched, stout, pubescent. Leaves simple, alternate, 5-12 cm, elliptic - lanceolate, margin serrate, apex acute. Capitulescence corymb. Capitulum discoid, 5-7 mm. Involucre multiseriate, ovate - oblong; apex acute, woolly, 1-3 mm. Florets bisexual, tubular, lilac – lavender, 7-9 mm. Anther apex acute and base sagittate 2.5-3.5 mm. Style apex acute 1-2 mm. Cypsela obovoid, ribbed, glabrous, 2.5-3.5 mm. Pappus bristles 3-4 mm.

Common Name: Diverge Vernonia.

Vernacular Name: Bandar

Specimen: Gujarat: Dang, Saputara Hills, JJS 71, Dt. 25 January 2022 (20°35’09.84” N, 73°44’59.93” E).

Origin: India (Native).

Flw-Fru: January-March.

Distribution: Restricted to hilly areas of Saputara hills in Dang.

Taxonomic Note: It resembles to *Chromolaena odarata* but can be differentiate on the basis of leaf shape where it is elliptical-lanceolate in *A. divergens* and deltoid in *C. odorata*. Another character is less branching in *A. divergens*. Involucre is hairy.

***Baccharoides anthelmintica* (L.) Moench**. Methodus: 578 (1794); *Vernonia anthelmintica* (L.) Willd., Sp. Pl. 3: 1634 (1803); Hook.f., Fl. Brit. Ind. 3: 236 (1883); Hajra *et al.*, Fl. of India 13: 357. (1995); Cooke, FBP 2: 10. (1904) [2]; Shah 398. (1978) [9]; Raghavan *et al.* 47. (1981); Bole & Pathak, FS 2: 38. (1988).

Long erect herb, 0.8 - 1.2 m tall. Stem striate, pubescent. Leaves simple, alternate, ovate - lanceolate, 6 – 10 cm, margin serrate, apex acute, pubescent. Capitulescence solitary or corymb. Capitulum discoid, 12-14 mm; subtended to one foliaceous bract. Involucre multiseriate; 6-8 mm, linear-oblong, purple tipped, apex obtuse. Florets tubular, 8-10 mm, bisexual, pink - magenta. Anther apex acute and base sagittate, 1-2.5 mm. Style apex obtuse 1.5-2 mm. Cypsela obovoid, ca 4.5 mm long, ribbed, pubescent on the ribs. Pappus scaly or paleaceous, biseriate, dimorphic 3-4 mm.

Common Name: Ironweed.

Vernacular Name: Kali-jiri.

Specimen: Gujarat: Valsad, Jam Gabhan, JJS 80, Dt. 15 October 2021 (20°19’35.37” N, 73°09’44.83” E).

Origin: India (Native).

Flw-Fru: October-March.

Distribution: Occasional in Cultivated fields and hilly areas of Dang and Valsad.

Taxonomic Note: The phyllaries is recurving along with purple tip.

***Centratherum punctatum* Cass.** G.-F.Cuvier, Dict. Sci. Nat., ed. 2. 7: 384 (1817); *Baccharoides punctata* (Cass.) Kuntze in Revis. Gen. Pl. 1: 320 (1891).

Decumbent herb, 60 - 80 cm. Stem terete, glabrous. Leaves 3.5 - 5.5 cm, elliptical, prominent veins, serrate margins. Capitulescence solitary. Capitula discoid, calyculate by foliaceous phyllaries. Involucre in multi-seriate; phyllaries ovate, 2-12 mm apex attenuate. Florets tubular, 10-12 mm bisexual, 1-1.5 mm, pink. Anther apex acute and base sagittate 2.5-3.5 mm. Style acute 1.5-2.5 mm. Cypsela oblong, striated 2-2.5 mm. Pappus scaly 1.5-2 mm.

Common Name: Brazilian Bachelor's Button.

Vernacular Name: Kesavardhini.

Specimen: Gujarat: Dang, Ahwa, JJS 30, Dt. 2 November 2023 (20°29’35.10” N, 73°20’03.86” E).

Origin: Brazil.

Flw-Fru: September-June.

Distribution: Escape in Roads side and wastelands.

Taxonomic Note: This species was misidentified as *C. phyllolaenum* in which leaves not prominently reticulately veined beneath but the specimen found have prominently veined beneath.

***Cyanthillium cinereum* (L.) H.Rob.** Proc. Biol. Soc. Washington 103: 252 (1990); *Vernonia cinerea* (L.) Less. in Linnaea 4: 291 (1829); Hook.f., Fl. Brit. India 3: 233 (1883); Hajra *et al.*, Fl. of India 13: 367. (1995); Cooke, FBP 2: 10. (1904) [2]; Shah 398. (1978) [9]; Raghavan *et al.* 47. (1981); Bole & Pathak, FS 2: 39. (1988).

Erect herb, polymorphic, 10 - 80 tall. Stems terete, ribbed, pubescent. Leaves simple, alternate, variously shaped, 3 – 8 cm, serrate or entire, apex obtuse or acute, attenuate, glabrous. Capitulescence solitary or corymb. Capitulum discoid, 4 - 8 mm across. Involucre multiseriate, ovate - lanceolate, apex acuminate, 1.5 - 4.5 mm long. Florets tubular, 2-3 mm bisexual, pink - purple. Anther apex obtuse and base sagittate 0.5-1 mm. Style apex acute 1-2 mm. Cypsela obovoid, hairy, faintly ribbed, disc present 1-2 mm. Pappus dimorphic, bristles, biseriate.

Common Name: Little ironweed.

Vernacular Name: Sahadevi, Sadedi.
Specimen: Gujarat: Navsari, Vesma, JJS 113, Dt. 29 February 2020 (21°01'51.27" N, 72°57'49.37" E); Gujarat: Tapi, Khambhala, JJS 11, Dt. 5 August 2024 (21°07'52.19" N, 73°28'22.61" E)
Origin: Asia and Africa.
Flw-Fru: Throughout the year.
Distribution: Common in Wasteland, cultivated fields, hilly areas and aquatic areas.
Taxonomic Note: The habit is polymorphic where it can be prostrate or erect with variable size.

***Elephantopus scaber* L.** Sp. Pl.: 814 (1753); Hook.f., Fl. Brit. India 3: 242 (1883); Hajra *et al.*, Fl. of India 13: 333. (1995); Cooke, FBP 2: 12. (1904) [2]; Shah 379. (1978) [9]; Raghavan *et al*. 44. (1981); Bole & Pathak, FS 2: 16. (1988).
Acaulescent herb, 20 - 50 cm tall. Stems condensed, terete. Leaves simple, rosette, spathulate - obovate, 20 – 45 cm, crenate, obtuse, sparsely hairy on nerves beneath. Capitulescence corymb – biparous. Capitulum compound, receptacle branched with each branch possess each unit, discoid, compound head possess 3 phyllaries at the top of peduncle, foliaceous, prominently nerved. Involucre of each unit biseriate, 3-7 mm, enclosing 3 - 5 florets; ovate – linear, apex acute. Florets tubular, 6-10 mm, bisexual white – lilac. Anther apex appendiculate and base sagittate, 2-3 mm. Style apex obtuse, 1.5- 2.5 mm. Cypsela obovate, hispid, finely 10-ribbed, 3-5 mm. Pappus bristles, 2-4 mm.
Common Name: Elephant Foot.
Vernacular Name: Hastipad and Kharsat.
Specimen: Gujarat: Valsad, Wilson Hills, JJS 62, Dt. 21 October 2022 (20°30'00.38" N, 73°19'51.25" E).
Origin: India (Native).
Flw-Fru: September-March.
Distribution: Occasionally found in hilly areas and forests of Dang and Valsad.
Taxonomic Note: Capitula are compound. Both compound head and headlet possess involucre of phyllaries.

***Phyllocephalum microcephalum* (Dalzell) H.Rob.** Proc. Biol. Soc. Washington 112: 235 (1999); *Lamprachaenium microcephalum* (Dalz.) Benth. in C.B. Clarke, Comp. Ind. 5 (1876); Hook.f. Fl. Brit. India 3: 229 (1883); Hajra *et al.*, Fl. of India 13: 337. (1995); Cooke, FBP 2: 8. (1904) [2].
Erect herbs, 0.6-1 m tall. Stems terete, ridged, pubescent. Leaves simple, alternate, elliptic - lanceolate, 5-20 cm, serrate, acute to acuminate, white tomentose beneath. Capitulescence solitary or corymb. Capitulum discoid, calyculate with foliaceous bract. Involucre multiseriate; phyllaries ovate-lanceolate, 3-7 mm, apex acute. Florets tubular, bisexual, pink – magenta. Anther apex attenuate and base sagittate, 1-2 mm. Style apex obtuse, 1-1.5 mm. Cypsela obovate, 3 - 5 mm long, glabrous, 10-ribbed. Pappus bristles, 1-2 mm.
Common Name: Indian Bachelor's Button.
Vernacular Name: Parnagumphi.
Specimen: Gujarat: Valsad, Wilson Hills, JJS 61, Dt. 11 October 2020 (20°30'23.40" N, 7321'04.41" E); Gujarat: Dang, Saputara, JJS 60, Dt. 10 September 2023 (20°35'28.86" N, 73°45'24.71" E).
Origin: India (Native).
Flw-Fru: October- December.
Distribution: Rarely found in hilly areas of Dang and Valsad.
Taxonomic Note: Leaves are white Tomentose beneath and involucre is calyculate.

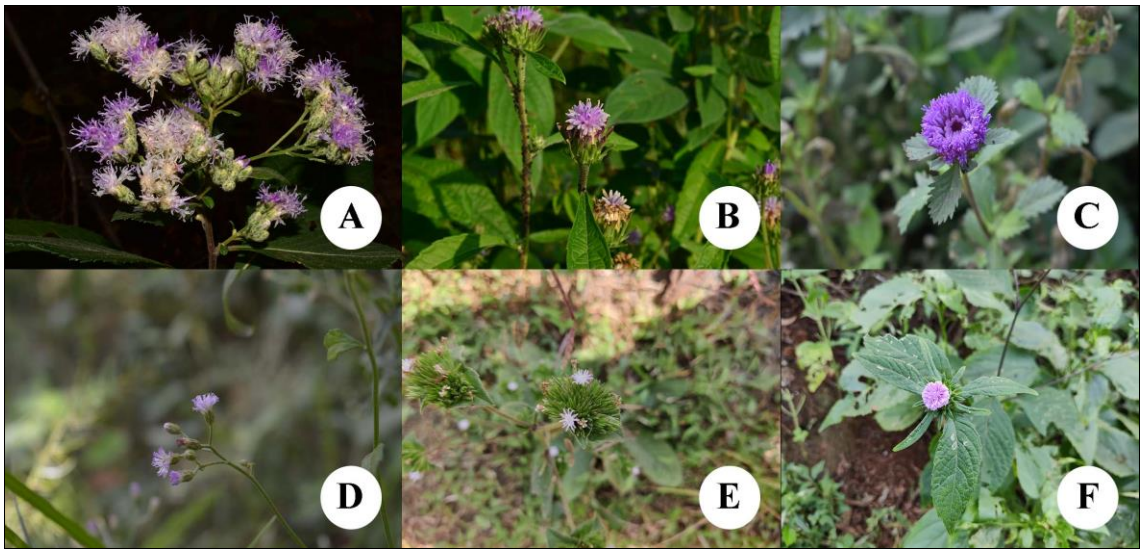

Fig 1: Vernonieae members of South Gujarat: A. *Acilepis divergens*; B. *Baccharoides anthelmintica*; C. *Centratherum punctatum*; D. *Cyanthillium cinereum*; E. *Elephantopus scaber*; F. *Phyllocephalum microcephalum*.

Discussion

The present study documents six species belonging to six genera of the tribe Vernonieae from South Gujarat, namely *Acilepis divergens*, *Baccharoides anthelmintica*, *Centratherum punctatum*, *Cyanthillium cinereum*, *Elephantopus scaber*, and *Phyllocephalum microcephalum*, based on extensive field surveys conducted between 2019 and 2025. Earlier floristic accounts reported seven species under five genera from the region (Shah, 1978; Raghavan *et al*., 1981) [9]. However, during the present investigation, *Adenoon indicum* Dalzell could not be relocated from its previously reported localities, and *Phyllocephalum phyllolaenum* (DC.) Narayana was also not encountered in any of the surveyed sites. The absence of these taxa may indicate local extinction, habitat alteration, or insufficient recent collections. Additionally, there is a possibility that

earlier records of *P. phyllolaenum* may have been based on misidentification, particularly with morphologically similar species such as *Centratherum punctatum*. Such taxonomic ambiguities highlight the need for critical re-examination of herbarium specimens and the application of updated diagnostic characters. Overall, the present study refines the understanding of Vernonieae diversity in South Gujarat and underscores the importance of continuous field exploration and taxonomic revision in accurately documenting regional flora.

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