



Checklist and Key to the Asteraceae of Bihar, India

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Abstract

The checklist of Asteraceae flora of Bihar has been constructed herewith the help of existing literatures and study after voucher specimens deposited in Central National Herbarium, herbarium of Ranchi University and National Botanical Research Institute etc. The objective of the present communication is to enlist the diversity in the family Asteraceae and facilitate the identification by taxonomic keys. All the genera, species and varieties have been enumerated with easy taxonomic diagnostic keys along with the generic distributional record at state, national and global level. The valid names are provided along with author citation (s), flowering and fruiting time. The present study reveals the current status of the family Asteraceae in Bihar, which is represented by 84 species and 02 varieties under 53 genera. The checklist will be helpful to the students, botanists, environmentalists, naturalists and policy makers.

Keywords: Asteraceae, Checklist, Flora, Bihar.

Introduction

The state of Bihar encompassing an area of 94,163 sq km with geo-coordinates 24° 16' to 27° 45' N, 83° 16' to 88° 30' E (<https://himset.com/states/statewise-latitude-longitude.php>). It is bounded in north to Nepal, West to Uttar Pradesh, south to Jharkhand. About 7.1% of the geographical area (6,764.14 sq km) of the state is covered by natural forest. The very dense forest is 231 sq km and 3,280 sq km is covered by moderately dense forest whereas, 3,334 sq km area is under open forest range.

According to Champion and Seth (1968), Bihar has 10 types of forest which broadly classified in four major types of forests, i.e. Tropical wet evergreen (1.22%), Tropical moist deciduous (6.81%), Littoral and swamp forest (0.24%) and Tropical dry deciduous forest (84.66%). There are three well-defined seasons in

Bihar viz. summer, rainy and winter. The summer season is in between March to June, it is hot and dry and temperature varies from 40 to 46°C. The rainy season starts in middle of June and ends in middle of October, the annual average rainfall is about 1200 mm. The winter sets in the month of November and continues up to February.

The rich diversity of flora attracts many tourists and taxonomists herein throughout the year. The first exploration of plants in the state was done by Buchanan-Hamilton from 1809-1813. After 50 years of interval Anderson (1863) had collected plants in this region and published a checklist. However, significant taxonomic study was performed by Haines (1921-1925), in form of "The Botany of Bihar and Orissa" in six volumes. After independence major

publications are: Flora of Champaran district (1965) and contribution to the flora of Udaipur forest in Champaran district (1966) by Thothathri; Grass flora of Bhagalpur by Paul (1967); Dicotyledons flora of Bhagalpur (Verma, 1981); Dicotyledons Flora Patna (Singh, 1986) and Flora of West Champaran (Bhattacharya and Krishnendu, 1998). Some other notable publications are made by Sanyal (1957), Srivastava (1955-58), Thakur (1963), Srivastava et al. (1966), Mishra (1969-1971), Mishra and Jha (1972), Jain et al. (1975), Paul (1966, 1973), Saxena (1976, 1978), Uniyal and Datta (1984), Mishra (1985), Singh et al., 2001 and Bhattacharya et al. (2011). The past publications revealed that the conspicuous study of family Asteraceae of Bihar has never been studied consolidately so far, therefore, the present work was taken up to evaluate the easy key diagnostic characters of entire range of diversity within the family in the state.

Materials and Methods

The present work was initiated in June, 2016 and accomplished in March, 2017. Various concerned literatures like, Botany of Bihar & Orissa (Haines, 1921–1925), Flora of Bihar analysis (Singh et al., 2001), and some additions to the Botany of Bihar & Orissa (Mooney, 1941) and Supplement to the Botany of Bihar & Orissa (Mooney, 1950), Dicotyledons flora of Bhagalpur (Verma, 1981), Dicotyledons Flora Patna (Singh, 1986) and Flora of West Champaran

Key to the genera

- 1a. Achenes covered in burr**Xanthium**
- 1b. Achenes not covered in burr**2**
- 2a. Capitula homogamous**3**
- 2b. Capitula heterogamous.....**23**
- 3a. Plants produces milky juice; flowers all ligulate.....**4**
- 3b. Plants produces watery juice, if present; flowers all tubular.....**9**
- 4a. Ligule bluish; pappus absent or with alternating hairs**Cichorium**
- 4b. Pappus present, simple or feathery**5**
- 5a. Achens distinctly beaked; beak slender**6**
- 5b. Achenes not beaked, if beaked, beak very short and stout in Youngia**7**
- 6a. Radical leaves long petioled**Ixeris**
- 6b. Radical leaves sessile.....**Lactuca**
- 7a. Achenes compressed.....**Sonchus**

(Bhattacharya and Krishnendu, 1998) were referred. Also, the voucher specimens deposited in Central National Herbarium (CAL), herbarium of Ranchi University and National Botanical Research Institute (LWG) were consulted. Worldwide distribution of species was verified through Mabberley (2017). The National level and state level distribution was verified from Flowering plants of India (Karthikeyan et al., 2009) and Flora of Bihar analysis (Singh et al., 2001), respectively. The nomenclature were updated through authentic online databases: Wold Checklist of selected plant Families (<https://wcsp.science.kew.org/>) and International Plant Name Index (<http://www.ipni.org>). The Bentham and Hooker’s system of classification was followed and a diagnostic generic and species key have also been framed for easy identification of taxa.

Results

A total of 84 wild species, 02 varieties under 53 genera were recorded after the study of various literatures and herbarium specimens deposited in Central National Herbarium (CAL), herbarium of Ranchi University and National Botanical Research Institute (LWG). The list of 13 cultivated species has been enumerated at the bottom. The species/varieties are arranged alphabetically along with phenology and distribution details at state, nation and world level. The taxonomic identification keys to the genera and species are as follows:

- 7b. Achenes narrow, truncate at both the ends**8**
- 8a. Achenes 4–5–ribbed; inner involuclral bracts scarious margined.....**Launaea**
- 8b. Achenes 10–20–ribbed; inner involuclral bracts not scarious margined.....**Youngia**
- 9a. Anthers tailed at base**10**
- 9b. Anthers not tailed at base**16**
- 10a. Leaves not spinous margined; achenes winged**Caesulia**
- 10b. Leaves mostly spinous margined; achenes not winged**11**
- 11a. Heads one flowered, crowded into globose involucre.....**Echinops**
- 11b. Heads many flowered, separate.....**12**
- 12a. Flowers usually unisexual.....**Cirsium**
- 12b. Flowers all bisexual.....**13**
- 13a. Plants armed; achenes of outer florets without pappus.....**Carthamus**
- 13b. Plants unarmed; achenes of outer florets with pappus.....**14**

14a. Filaments hairy; pappus modified in scales.....	Goniocaulon
14b. Filaments glabrous; pappus feathery.....	15
15a. Achenes top truncate, copular or crowned with thickened disc and persistent base of style; pappus 1–2-seriate, outer prominent.....	Saussurea
15b. Achenes top contracted, not as above; pappus 2-seriate, outer dimidiate.....	Hemistepta
16a. Anthers sub-entire or cleft at base.....	17
16b. Anthers entire at base.....	24
17a. Leaves opposite.....	18
17b. Leaves alternate.....	21
18a. Plants usually twining herbs; heads 4-flowered; involucre bracts 3-5.....	Mikania
18b. Plants usually erect herbs; heads more than 4-flowered; involucre bracts more than 5.....	19
19a. Pappus of capillary bristles.....	Eupatorium
19b. Pappus of scales or clavate hairs.....	20
20a. Pappus of scales.....	Ageratum
20b. Pappus of clavate hairs.....	Adenostemma
21a. Heads distinct; florets 1–many.....	Vernonia
21b. Heads in glomerules; florets 1–5.....	22
22a. Glomerules bracteate; involucre bracts 2–seriate; pappus bristles straight.....	Elephantopus
22b. Glomerules ebracteate; involucre bracts 4–seriate; 2 pappus bristles bent doubly.....	Pseudelephantopus
23a. Leaves usually opposite; heads in terminal glomerules, 1-flowered; pappus a toothed or fimbriate cup.....	Lagascea
23b. Leaves usually alternate; heads not in glomerules, many flowered; pappus a fine capillary hairs or bristle.....	Emilia
24a. Anthers tailed at base (except Laggera and Blumeopsis).....	25
24b. Anthers not tailed at base (rarely tailed in Senecio).....	35
25a. Leaves mostly spinous margined; involucre bracts with long spreading or recurved spinescent awns; receptacles shortly bristly; achenes punctate between angles.....	Amberboa
25b. Leaves not spinous margined; involucre bracts not with long spreading or recurved spinescent awns; receptacles glabrous; achenes not punctate between angles.....	26
26a. Heads usually radiate (except Carpesium).....	27
26b. Heads discoid or disciform.....	29
27a. Achenes obscurely ribbed; pappus 1-seriate, few or absent in ray florets.....	Pentanema
27b. Achenes prominently ribbed; pappus 1-2-seriate, many in ray florets.....	28
28a. Heads solitary; outer row of pappus of short jagged teeth or forming a setulose-laciniate cup.....	Pulicaria
28b. Heads solitary, corymbose or panicled; outer row of pappus of hairs, not forming cup.....	Inula
29a. Involucre bracts all scarious; style arms of bisexual florets filiform, obtuse, capitate, truncate or 2-cleft; achenes scaly or papillose.....	30
29b. Outer involucre bracts herbaceous or dry and inner scarious; style arms of bisexual florets filiform; achenes variously hairy or glandular.....	31
30a. Bisexual florets all sterile; styles undivided or notched.....	Anaphalis
30b. Bisexual florets all or mostly fertile; styles divided.....	Gnaphalium
31a. Shrubs or undershrubs; involucre bracts broad, scaly.....	Pluchea
31b. Herbs, rarely shrubs or undershrubs; involucre bracts narrow, not scaly.....	32
32a. Heads compound, few flowered aggregated into globose glomerules.....	Sphaeranthus
32b. Heads solitary, many flowered, arranged in lax panicles or corymbs.....	33
33a. Leaves decurrent.....	Laggera
33b. Leaves not decurrent.....	34
34a. Anthers tailed.....	Blumea
34b. Anthers not tailed.....	Blumeopsis
35a. Leaves usually alternate.....	36
35b. Leaves usually opposite.....	39
36a. Style arms truncate or appendiculate.....	37
36b. Style arms flattened or plano-convex.....	41
37a. Heads many.....	Artemisia
37b. Heads solitary.....	38
38a. Leaves toothed or lobed; heads sessile or subsessile; involucre bracts 2-seriate; achenes angled, not stipitate.....	Centipeda
38b. Leaves pinnatifid or pinnatisect; heads peduncled; involucre bracts sub-2-seriate; achenes compressed, stipitate.....	Cotula
39a. Ray florets absent.....	Grangea
39b. Ray florets present.....	40
40a. Heads in corymbose or panicles; involucre bracts many seriate; ligules indistinct.....	Conyza
40b. Heads solitary or few in lax racemes; involucre bracts 2–3-seriate; ligules distinct.....	Erigeron
41a. Filaments papillose or pubescent.....	Cosmos

41a. Filaments glabrous42
 42a. Heads in terminal glomerules, one flowered.....**Flaveria**
 42b. Heads non-glomerulate, more than one flowered.....43
 43a. Leaves divided to the base or deeply pinnatifid 44
 43b. Leaves simple or pinnately compound.....45
 44a. Achenes linear, with retrorsely barbed pappus awns.....**Bidens**
 44b. Achenes somewhat rounded, without retrorsely barbed pappus awns.....**Parthenium**
 45a. Disc achenes rounded or laterally compressed; pappus absent or of 2 short, weak awns.....46
 45b. Disc achenes dorsally compressed or angular; pappus present or absent.....51
 46a. Outer involucre bracts clavate, spreading; inner ones enclosing the achenes.....47
 46b. Outer involucre bracts not clavate, erect; inner ones not enclosing the achenes.....48
 47a. Terrestrial herbs; outer involucre bracts prominently glandular.....**Sigesbeckia**
 47b. Marshy herbs; outer involucre bracts eglandular.....**Enydra**
 48a. Receptacles flat, never conical.....49
 48b. Receptacle convex or conical.....**Acemella**
 49a. Paleas bristle or awn like.....**Eclipta**
 49b. Paleas linear or oblanceolate, concave or folded.....50
 50a. Flowers white; paleas obtuse, lacerate; pappus of 2-5 unequal bristles.....**Blainvillea**
 50b. Flowers yellow; paleas acute, entire; pappus cup like or of 1-2 weak awns or absent..... **Wedelia**
 51a. Pappus of 2-3 bristles or awns (lacking in *Chrysanthellum*)52
 51b. Pappus consisting of 5 or more bristles or scales**Tridax**
 52a. Achenes compressed**Guizotia**
 52b. Achenes fusiform, angular.....53
 53a. Achenes often dimorphic; pappus absent.....**Chrysanthellum**
 53. Achenes not dimorphic; pappus present.....
**Glossocardia**

1. ACMELLA Persoon

About 30 species distributed in tropical regions (Mabberley, 2017); 4 species in India (Karthikeyan *et al.*, 2009); 2 species in Bihar.

Key to the species

1a. Achenes eciliate; pappus absent.....**A. calva**

1b. Achenes ciliate; pappus present.....**A. oleracea**

1. **Acemella calva** (DC.) R.K. Jansen in Syst. Bot. Monogr. 8: 41. 1985. *Spilanthes calva* DC. in Wight, Contr. Bot. India 19. 1834; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 409. 1995; N.P. Singh *et al.*, Fl. Bihar: 278. 2001. *Spilanthes acemella* L. var. *calva* (DC.) C.B. Clarke, Compos. Ind.: 138. 1876; Hook. f., Fl. Brit. India 3: 307. 1881; Haines, Bot. Bihar Orissa: 482. 1922.

Fl. & Fr.: February–August.

Distrib.: Champaran.

2. **Acemella oleracea** (L.) R.K. Jansen in Syst. Bot. Monogr. 8: 65. 1985. *Spilanthes oleracea* L., Syst. Nat. Ed. 12, 2: 534. 1767; R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 73. 1988; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 410. 1995; N.P. Singh *et al.*, Fl. Bihar: 278. 2001. *Spilanthes acemella* var. *oleracea* (L.) C.B. Clarke, Compos. Ind.: 138. 1876; Hook.f., Fl. Brit. India 3: 307. 1881.

Fl. & Fr.: Throughout the year.

Distrib.: Almost throughout the state.

2. ADENOSTEMMA J.R. Forst. & G. Forst.

About 20 species distributed in America, Asia (Mabberley, 2017); 2 species & 8 varieties in India (Karthikeyan *et al.*, 2009); 1 species & 2 varieties in Bihar.

Adenostemma lavenia (L.) Kuntze, Revis. Gen. Pl. 1: 304. 1891; B.P. Uniyal in Hajra *et al.*, Fl. India 12: 346. 1995; N.P. Singh *et al.*, Fl. Bihar: 250. 2001. *Verbesina lavenia* L., Sp. Pl. 902. 1753. *Adenostemma viscosum* J.R. Forst. & G. Forst., Char. Gen. Pl. 90, t. 45. 1776; Hook.f., Fl. Brit. India 3: 242. 1881 *p.p.*; Haines, Bot. Bihar Orissa: 461. 1922.

Key to the varieties

- 1a. Achenes sparingly tuberculate..... var. **lavenia**
- 1b. Achenes densely tuberculate.....2
- 2a. Leaves broadly ovate or cordatevar. **latifolium**
- 2b. Leaves ellipticvar. **microcephalum**

Adenostemma lavenia (L.) Kuntze var. **lavenia**.

Fl. & Fr.: October–January.

Distrib.: Champaran, Giridih, Singhbhum.

Adenostemma lavenia (L.) Kuntze var. **latifolium** (D. Don) Panigrahi in Kew Bull. 30(4): 651. 1975; B.P. Uniyal in Hajra *et al.*, Fl. India 12: 347. 1995;

N.P. Singh *et al.*, Fl. Bihar: 250. 2001. *Adenostemma latifolium* D. Don, Prodr. Fl. Nepal. 181. 1825. *Adenostemma viscosum* J.R. Forst. & G. Forst. var. *latifolium* (D. Don) C.B. Clarke, Comp. Ind. 29. 1876; Hook.f., Fl. Brit. India 3: 242. 1881; Haines, Bot. Bihar Orissa: 462. 1922.

Fl. & Fr.: October–January.

Distrib.: Purnia (Haines, *l.c.*).

Adenostemma lavenia (L.) Kuntze var. **microcephalum** (DC.) Koster in Blumea 1: 474. 1935; Uniyal in Hajra *et al.*, Fl. India 12: 347. 1995; N.P. Singh *et al.*, Fl. Bihar: 251. 2001. *Adenostemma microcephalum* DC., Prodr. 5: 111. 1836. *Adenostemma viscosum* var. *elatum* sensu Hook.f., Fl. Brit. India 3: 242. 1881, p.p. non *Adenostemma elatum* D. Don, 1825.

Fl. & Fr.: October–January.

Distrib.: Bihar.

3. AGERATUM L.

Mainly found in Tropical America; c. 40 species (Mabberley, 2017); 2 species in India (Karthikeyan *et al.*, 2009) including Bihar.

Key to the species

- 1a. Involucral bracts narrowly lanceolate, apex long acuminate, pilose; corolla same as or longer than the awned pappus scales**A. houstonianum**
1b. Involucral bracts broad, oblong or lanceolate-oblong, acute, corolla shorter than the awned pappus scales**A. conyzoides**

1. **Ageratum houstonianum** Mill., Gard. Dict. ed. 8, no. 2. 1768; B.P. Uniyal in Hajra *et al.*, Fl. India 12: 349. 1995; N.P. Singh *et al.*, Fl. Bihar: 251. 2001.

Fl. & Fr.: November–December.

Distrib.: Patna.

2. **Ageratum conyzoides** L., Sp. Pl.: 839. 1753; Hook.f., Fl. Brit. India 3: 243. 1881; Haines, Forest Fl. Chota Nagpur: 514. 1910 & Bot. Bihar Orissa: 462. 1922; B.P. Uniyal in Hajra *et al.*, Fl. India 12: 348. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 373. 1998; N.P. Singh *et al.*, Fl. Bihar: 251. 2001.

Fl. & Fr.: Almost throughout the year.

Distrib.: Throughout the state.

4. AMBERBOA (Pers.) Less.

About 20 species distributed in Mediterranean to C. Asia (Mabberley, 2017); 2 species in India (Hajra, 1995); 1 species in Bihar.

Amberboa ramosa (Roxb.) Jafri in Scientist 3: 29. 1959; Hajra in Hajra *et al.*, Fl. India 12: 153. 1995; N.P. Singh *et al.*, Fl. Bihar: 251. 2001. *Carduus ramosus* Roxb., Fl. Ind. (Ed. Carey) 3: 407. 1832. *Voluterella divaricata* (DC.) Benth. & Hook.f., Gen. Pl. 2: 416. 1873; Hook.f., Fl. Brit. India 3: 383. 1881; Haines, Bot. Bihar Orissa: 493. 1922.

Fl. & Fr.: August–January.

Distrib.: Bhagalpur, Gaya, Patna.

5. ANAPHALIS DC.

About 40 species distributed in Asia, America and Europe (Mabberley, 2017); 37 species & 5 varieties in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Anaphalis busua (Buch.-Ham. ex D. Don) DC., Prodr. 6: 275. 1838 (1837); P.C. Pant in Hajra *et al.*, Fl. India 13: 57, f. 17. 1995. *Gnaphalium busua* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 173. 1825. *Anaphalis araneosa* DC., Prodr. 6: 275. 1838 (1837); Hook.f., Fl. Brit. India 3: 283. 1881; N.P. Singh *et al.*, Fl. Bihar: 252. 2001.

Fl. & Fr.: February–November.

Distrib.: Patna.

6. ARTEMISIA L.

About 400 species, distributed in north temperate regions, W. S. America and south Africa (Mabberley, 2017); 46 species, 19 varieties & 3 forma in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Artemisia nilagirica (Clarke) Pamp. in Nuov. Giorn. Bot. Ital. 33: 452. 1926; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 374. 1998; N.P. Singh *et al.*, Fl. Bihar: 253. 2001. *A. vulgaris* var. *nilagirica* C.B. Clarke, Comp. Ind.: 162. 1876. *A. vulgaris* sensu Hook.f., Fl. Brit. India 3: 325. 1881, non L., 1753.

Fl. & Fr.: October – December.

Distrib.: West Champaran.

7. BIDENS L.

About 230 species distributed throughout the world

(Mabberley, 2017); 12 species & 2 varieties in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Bidens biternata (Lour.) Merr. & Sherff in Bot. Gaz.: 293. 1929; Singh, Fl. Patna: 197. 1986; N.P.Singh *et al.*, Fl. Bihar: 253. 2001; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 374. 1998. *Coreopsis biternata* Lour., Fl. Cochinch. 2: 508. 1790. *Bidens pilosa auct. non* L., 1753; Hook.f., Fl. Brit. India 3: 309. 1881; Haines, Bot. Bihar Orissa: 483. 1922. *Fl. & Fr.*: April – October. *Distrib.*: Patna, West Champaran.

8. BLAINVILLEA Cass.

About 10 species (Mabberley, 2017); 1 in India (Karthikeyan *et al.*, 2009) including Bihar.

Blainvillea acmella (L.) Philipson in Blumea 6: 350. 1950. *Verbesina acmella* L., Sp. Pl.: 901. 1753; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 377. 1995; N.P. Singh *et al.*, Fl. Bihar: 254. 2001. *B. latifolia* (L.f.) DC. ex Wight, Contr. Bot. Ind.: 71. 1834; Hook. f., Fl. Brit. India 3: 305. 1881; Haines, Bot. Bihar Orissa: 480. 1922. *Fl. & Fr.*: August–January. *Distrib.*: Bhagalpur, Patna.

9. BLUMEA DC.

About 100 species distributed in Old World Tropics and S. Africa (Mabberley, 2008); 29 in India (Kumar, 1995); 32 in India (Karthikeyan, 2009).

Key to the species

- 1a. Plants densely white woolly all over.....**B. hieracifolia**
- 1b. Plants glabrate or variously pubescent but never woolly all over..... **2**
- 2a. Corolla lobes of bisexual florets with multicellular hairs in addition to colleters.....**B. obliqua**
- 2b. Corolla lobes of bisexual florets glabrous or with unicellular hairs in addition to colleters..... **3**
- 3a. Heads solitary, axillary or terminal; the uppermost pair of leaves sub-opposite**B. bifoliata**
- 3b. Heads glomerulate or variously paniculate, all leaves alternate**4**
- 4a. Leaves spiny toothed; corolla hairy**5**
- 4b. Leaves not spiny toothed; corolla of female florets glabrous**7**

- 5a. Heads in sessile, axillary clusters; anthers well developed; achenes terete**B. belangeriana**
- 5b. Heads in pedunculate clusters; anthers abortive; achenes angled**6**
- 6a. Prostrate herbs with branches radiating from the rootstock; leaves irregularly dentate; corolla hairy on lobes.....**B. oxyodonta**
- 6b. Erect herbs; leaves alternately long and short toothed; corolla hairy all over**B. eriantha**
- 7a. Receptacles minutely pilose.....**B. laciniata**
- 7b. Receptacles glabrous **8**
- 8a. Achenes ribbed.....**B. atropurpurea**
- 8b. Achenes not ribbed **9**
- 9a. Leaves not lyrate lobed; heads purple...**B. mollis**
- 9b. Leaves lyrate lobed; heads yellow**B. lacera**

1. **Blumea atropurpurea** Haines, Bot. Bihar Orissa 469. 1922; N.P. Singh *et al.*, Fl. Bihar 255. 2001. *Fl. & Fr.*: December – January. *Distrib.*: Purnia.

2. **Blumea belangeriana** DC., Prodr. 5: 555. 1836; Hook.f., Fl. Brit. India 3: 266. 1881; S. Kumar in Hajra *et al.*, Fl. India 13: 119. 1995; N.P. Singh *et al.*, Fl. Bihar: 255. 2001. *Fl. & Fr.*: November – April. *Distrib.*: Patna.

3. **Blumea bifoliata** (L.) DC. in Wight, Contrib. Bot. Ind.: 14. 1834; Hook.f., Fl. Brit. India 3: 261. 1881; S.K. Verma, Fl. Bhagalpur: 208. 1981; S. Kumar in Hajra *et al.*, Fl. India 13: 120. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 375. 1998; N.P. Singh *et al.*, Fl. Bihar: 255. 2001. *Conyza bifoliata* L., Sp. Pl. ed. 2, 1207. 1763. *Fl. & Fr.*: December – March. *Distrib.*: Bhagalpur, Patna and West Champaran.

4. **Blumea eriantha** DC. in Wight, Contrib. Bot. Ind.: 15. 1834; Hook.f., Fl. Brit. India 3: 266. 1881; S. Kumar in Hajra *et al.*, Fl. India 13: 122, f. 38. 1995; N.P. Singh *et al.*, Fl. Bihar: 255. 2001. *Fl. & Fr.*: December – April. *Distrib.*: Patna

5. **Blumea hieracifolia** (D. Don) DC. in Wight, Contrib. Bot. Ind.: 15. 1834; Hook.f., Fl. Brit. India 3: 263. 1881; S. Kumar in Hajra *et al.*, Fl. India 13: 125. 1995; N.P. Singh *et al.*, Fl. Bihar: 255. 2001. *Erigeron*

hieracifolium D. Don, Prodr. Fl. Nepal.: 172. 1825.

Fl. & Fr.: February – June.

Distrib.: Sheohar.

Key to the varieties

1a. Stems branched at apex; heads peduncled.....var. **macrostachya**

1b. Stems not branched; heads sessile.....var. **hieracifolia**

var. **macrostachya** (DC.) Hook.f., Fl. Brit. India 3: 263. 1881; S. Kumar in Hajra *et al.*, Fl. India 13: 126. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 375.1998; N.P. Singh *et al.*, Fl. Bihar: 256. 2001. *Blumea macrostachya* DC., Prodr. 5: 442. 1836.

Fl. & Fr.: January – March.

Distrib.: West Champaran.

6. **Blumea lacera** (Burm.f.) DC. in Wight, Contrib. Bot. Ind. 14. 1834; Hook.f., Fl. Brit. India 3: 263. 1881; Haines, Bot. Bihar Orissa: 470. 1922; S.K. Verma, Fl. Bhagalpur: 209. 1981; M.P. Singh, Fl. Patna: 198. 1986; S. Kumar in Hajra *et al.*, Fl. India 13: 128. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 375. 1998; N.P. Singh *et al.*, Fl. Bihar: 256. 2001. *Conyza lacera* Burm.f., Fl. Ind.: 180. t. 59, f. 1. 1768.

Fl. & Fr.: January – April.

Distrib.: Bhagalpur, Patna and West Champaran.

7. **Blumea laciniata** (Roxb.) DC., Prodr. 5: 436. 1836; Hook.f., Fl. Brit. India 3: 264. 1881; Haines, Bot. Bihar Orissa: 470. 1922; S.K. Varma, Fl. Bhagalpur: 209. 1981; M.P. Singh, Fl. Patna: 198. 1986; S. Kumar in Hajra *et al.*, Fl. India 13: 128, f. 39.1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran 376. 1998; N.P. Singh *et al.*, Fl. Bihar: 256. 2001. *Conyza laciniata* Roxb., Fl. Ind. 3: 428. 1832.

Fl. & Fr.: March - April.

Distrib.: Bhagalpur, Champaran, Patna and Purnia.

8. **Blumea mollis** (D. Don) Merr. in Philipp. J. Sci. (Bot.) 5: 395. 1910; S.K. Varma, Fl. Bhagalpur: 208. 1981; M.P. Singh, Fl. Patna: 198. 1986; S. Kumar in Hajra *et al.*, Fl. India 13: 135, f. 41. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 376.1998; N.P. Singh *et al.*, Fl. Bihar: 257.2001. *Erigeron molle* D. Don, Prodr. Fl. Nepal.: 192. 1825. *Blumea wightiana* DC.in Wight, Contrib. Bot. Ind.: 14. 1834; Haines, Bot. Bihar Orissa: 469. 1922.

Fl. & Fr.: December – April.

Distrib.: Bhagalpur, Champaran, Patna and Purnia.

9. **Blumea obliqua** (L.) Druce, Rep. Bot. Exch. Club. Brit. Isles 4: 609. 1916; S. Kumar in Hajra *et al.*, Fl. India 13: 137, f. 42. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 376.1998; N.P. Singh *et al.*, Fl. Bihar: 257. 2001. *Erigeron obliquum* L., Mant. Pl. 573. 1771. *Blumea amplectens* DC. in Wight, Contrib. Bot. Ind.: 13. 1834 & Prodr.5: 483. 1836; Hook.f., Fl. Brit. India 3: 260. 1881; Haines, Bot. Bihar Orissa: 468. 1922.

Fl. & Fr.: February – March.

Distrib.: Muzaffarpur and West Champaran.

10. **Blumea oxydonta** DC. in Wight, Contrib. Bot. Ind.: 15. 1834; Hook.f., Fl. Brit. India 3: 266. 1881; Haines, Bot. Bihar Orissa: 468.1922; S.K. Varma, Fl. Bhagalpur: 208.1981; S. Kumar in Hajra *et al.*, Fl. India 13: 139, f. 43.1995; N.P. Singh *et al.*, Fl. Bihar: 257.2001; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 377. 1998.

Fl. & Fr.: January – April.

Distrib.: Bhagalpur, Patna and West Champaran.

10. BLUMEOPSIS Gagnep.

One species reported from Western Malesia (Mabberly, 2008); 1 in India (Kumar, 1995 and Karthikeyan, 2009).

Blumeopsis flava (DC.) Gagnep. in Bull. Mus. Hist. Nat. Paris 26: 76. 1920; S. Kumar in Hajra *et al.*, Fl. India 13: 145, f. 45.1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 377. 1998; N.P. Singh *et al.*, Fl. Bihar: 258. 2001. *Blumea flava* DC., Prodr. 5: 439. 1836; Haines, Bot. Bihar Orissa: 472. 1922. *Laggera flava* (DC.) C.B. Clarke, Comp. Ind.: 90. 1876; Hook.f., Fl. Brit. India 3: 270. 1881.

Fl. & Fr.: November – January.

Distrib.: Champaran.

11. CAESULIA Roxb.

Onespecies reported from NE India (Mabberly, 2008); a monotypic genus of the Indian subcontinent (Pant, 1995 and Karthikeyan, 2009).

Caesulia axillaris Roxb., Pl. Coromandel 1: 64, t. 93. 1798; Hook.f., Fl. Brit. India 3: 291. 1881; Haines, Bot. Bihar Orissa: 475. 1922; S.K. Varma, Fl. Bhagalpur: 203.1981; M.P. Singh, Fl. Patna: 199. 1986; P.C. Pant in Hajra *et al.*, Fl. India 13: 2. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran

377.1998; N.P. Singh *et al.*, Fl. Bihar: 259. 2001.
Fl. & Fr.: August – February.
Distrib.: Throughout the state.

12. CARTHAMUS L.

About 13 species distributed in Mediterranean regions, Africa and Asia (Mabberley, 2017); 3 species in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Carthamus tinctorius L. Sp. Pl.: 830.1753; Hook.f., Fl. Brit. India 3: 386. 1881; Haines, Bot. Bihar Orissa: 494. 1922; Haines, Bot. Bihar Orissa: 494. 1922; Hajra in Hajra *et al.*, Fl. India 12: 163. 1995; N.P. Singh *et al.*, Fl. Bihar: 259. 2001.
Fl. & Fr.: February – April.
Distrib.: Bhagalpur, Munger, Patna.

13. CENTIPEDA Lour.

About 5 species, distributed in Madagascar, Afghanistan, Indomalesia, Australia, New Zealand, Polynesia and Chile (Mabberley, 2017); 1 species reported from India including Bihar (Karthikeyan *et al.*, 2009).

Centipeda minima (L.) A. Br. & Aschers., Ind. Sem. Fl. Berol. App. 6: 1867; M.P. Singh, Fl. Patna: 199. 1986; S.K. Varma, Fl. Bhagalpur: 206.1981; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 377. 1998; N.P. Singh *et al.*, Fl. Bihar: 266. 2001. *Artemisia minima* L., Sp. Pl.: 849. 1753. *Centipeda orbicularis* Lour., Fl. Cochinch.: 493. 1790; Hook.f., Fl. Brit. Ind. 3: 317. 1881.
Fl. & Fr.: March – January.
Distrib.: Bhagalpur, Patna, Purnia, West Champaran.

14. CHRYSANTHELLUM Rich.

About 6 species distributed throughout the world (Mabberley, 2017); 1 species in India including Bihar (Karthikeyan *et al.*, 2009).

Chrysanthellum americanum (L.) Vatke in Abh. Naturwiss. Ver Eine Bremen 9: 122. 1887; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 379, f. 102. 1995. *Anthemis americana* L., Sp. Pl.: 895. 1753. *Chrysanthellum indicum* DC., Prodr. 5: 631. 1836; Hook.f., Fl. Brit. India 3: 310. 1881; R.R. Rao *et al.*,

Fl. Ind. Enum. Aster.: 24. 1988; N.P. Singh *et al.*, Fl. Bihar: 260. 2001.
Fl. & Fr.: August – December.
Distrib.: Bhagalpur, Patna, Purnia.

15. CICHORIUM L.

About 6 species distributed in Eurasia (Mabberley, 2017); 02 species in India (S. K. Mangain & R. R. Rao, 1995), 02 species in Bihar (N.P. Singh *et al.*, 2001).

Cichorium intybus L., Sp. Pl.: 813. 1753; Hook.f., Fl. Brit. India 3: 391. 1881; Mangain & R.R. Rao in Hajra *et al.*, Fl. India 12: 248. 1995; S.K. Varma, Fl. Bhagalpur: 216.1981; N.P. Singh *et al.*, Fl. Bihar: 260. 2001.
Fl. & Fr. March – September
Distrib.: Bhagalpur, Bhojpur, Patna.

16. CIRSIUM Mill.

About 150 species, distributed in north temperate zones (Mabberley, 2017); 15 species & 8 varieties in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Cirsium arvense (L.) Scop., Fl. Carniol. ed. 2, 2: 126. 1772. *Serratula arvensis* L., Sp. Pl.: 820. 1753. *Cnicus arvensis* (L.) Roth, Catalecta B. 1: 115. 1797; Haines, Bot. Bihar Orissa: 491. 1922. *Breea arvensis* (L.) Less., Syn. Comp.: 9. 1832; N.P. Singh *et al.*, Fl. Bihar: 258. 2001.
Fl. & Fr.: December – April.
Distrib.: Bhagalpur, Champaran, Muzaffarpur, Patna and Purnia.

17. CONYZA Less.

About 60 species, distributed in temperate and subtropical regions, temperate and warm Africa (Mabberley, 2017); 9 species & 1 variety in India (Karthikeyan *et al.*, 2009); 3 species in Bihar.

Key to species

1a. Heads in long leafy panicles.....**C. bonariensis**
1b. Heads in corymbose panicles**2**
2a. Achenes puberulous; pappus hairs reddish, c. 1 mm long.....**C. stricta**

2b. Achenes not puberulous; pappus hairs reddish brown, c. 3 mm long**C. japonica**

1. **Conyza bonariensis** (L.) Cronquist in Bull. Torrey Bot. Club 70: 632. 1943; N.P. Singh *et al.*, Fl. Bihar: 261. 2001; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 379. 1998. *Erigeron bonariensis* L., Sp. Pl.: 863. 1753. *Conyza ambigua* DC., Fl. Franc.: 468. 1815; Haines, Bot. Bihar Orissa: 465. 1922.

Fl. & Fr.: August – February.

Distrib.: W. Champaran.

Note: Many websites display it under *Erigeron bonariensis* L. as a synonym.

2. **Conyza japonica** (Thunb.) Less. ex DC., Prodr. 5: 382. 1836; Hook.f., Fl. Brit. India 3: 258. 1881; M.P. Singh, Fl. Patna: 201. 1986. *Erigeron japonicum* Thunb. in Fl. Jap.: 312. 1784. *Conyza stricta* Wall., Numer. List n. 3044. 1831, (nom. nud.). *C. multicaulis* DC., Prodr. 5: 383. 1836; N.P. Singh *et al.*, Fl. Bihar: 261. 2001.

Fl. & Fr.: May – October.

Distrib.: Patna.

3. **Conyza stricta** Willd., Sp. Pl. 3: 1922. 1803; Hook.f., Fl. Brit. India 3: 258. 1881; Haines, Bot. Bihar Orissa: 464. 1922; M.P. Singh, Fl. Patna: 201. 1986; Hajra in Hajra *et al.*, Fl. India 12: 109. 1995; N.P. Singh *et al.*, Fl. Bihar: 262. 2001.

Fl. & Fr.: August – October.

Distrib.: Patna.

Note: Many websites display it under *Erigeron trilobus* (Decne.) Boiss. as a synonym.

18. COSMOS Cavanilles

About 25 species, distributed in tropical America, West Indies, Asia (Mabberley, 2017); 3 species in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Cosmos sulphureus Cav., Icon. 1: 56, t. 79. 1791. *Bidens sulphurea* (Cav.) Sch.Bip. in Seem., Bot. Voy. Herald: 308. 1856; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 373, f. 99. 1995. Haines, Bot. Bihar Orissa: 484. 1922; N.P. Singh *et al.*, Fl. Bihar: 262. 2001.

Fl. & Fr.: April – December.

Distrib.: Palamau.

19. COTULA L.

About 50 species, distributed in Southern hemisphere to N. Africa & Mexico (Mabberley, 2017); 6 species in India (Karthikeyan *et al.*, 2009); 2 species in Bihar.

Key to the species

1a. Achenes of marginal female florets ovate, with broad and thick lateral wings; ultimate segments of leaves shortly triangular or lanceolate**C. anthemoides**

1b. Achenes of marginal female florets narrowly oblong, angled, wing absent or very narrow; ultimate segments of leaves linear or linear-lanceolate.....**C. hemisphaerica**

1. **Cotula anthemoides** L., Sp. Pl.: 891. 1753; Hook.f., Fl. Brit. India 3: 316. 1881; Haines, Bot. Bihar Orissa: 487. 1922; S.K. Varma, Fl. Bhagalpur: 206.1981; N.P. Singh *et al.*, Fl. Bihar: 262. 2001.

Fl. & Fr.: December – March.

Distrib.: Bhagalpur, Koderma, Patna.

2. **Cotula hemisphaerica** (Roxb.) Wall. ex C.B. Clarke, Comp. Ind.: 150.1876; Haines, Bot. Bihar Orissa: 487. 1922; S.K. Varma, Fl. Bhagalpur: 206. 1981; N.P. Singh *et al.*, Fl. Bihar: 262. 2001. *Artemisia hemisphaerica* Roxb., Fl. Ind. 3: 422. 1832; Hook.f., Fl. Brit. India 3: 316. 1881.

Fl. & Fr.: December – April.

Distrib.: Bhagalpur, Purnia.

20. ECHINOPS L.

About 100 species distributed in Mediterranean regions, Europe, Africa and Asia (Mabberley, 2017); 4 species in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Echinops echinatus Roxb., Fl. Ind. 3: 447. 1832; Hook.f., Fl. Brit. India 3: 358. 1881; Haines, Bot. Bihar Orissa: 490. 1922; N.P. Singh *et al.*, Fl. Bihar: 264. 2001.

Fl. & Fr.: March – July.

Distrib.: Patna, Sasaram.

21. ECLIPTA L.

About 4 species distributed in warmer regions of America, Africa, Australia and Asia (Mabberley, 2017); 1 species in India (Karthikeyan *et al.*, 2009) including Bihar.

Eclipta prostrata (L.) L., Mant. Pl. 2: 286. 1771; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 381, 1995; N.P. Singh *et al.*, Fl. Bihar: 264. 2001. *Verbesina prostrata* L., Sp. Pl.: 902. 1753. *Eclipta alba* (L.)

Hassk., Pl. Jav. Rar. 528. 1848; Hook.f., Fl. Brit. India 3: 304. 1881; Haines, Bot. Bihar Orissa: 480. 1922.
Fl. & Fr.: Throughout the year.
Distrib.: Throughout State.

22. ELEPHANTOPUS L.

About 25 species distributed in tropics and warmer temperate regions of both hemispheres (Mabberley, 2017); 01 in India (B.P. Uniyal in Hajra *et al.*, 1995), 01 species in Bihar (N.P. Singh *et al.*, 2001).

Elephantopus scaber L., Sp. Pl.: 814. 1753; Hook.f., Fl. Brit. India 3: 242. 1881; M.P. Singh, Fl. Patna: 202. 1986; Haines, Bot. Bihar & Orissa: 489.1922; J.G. Srivast. in J. Indian Bot. Soc. 34(3): 204. 1955; B.P. Uniyal in Hajra *et al.*, Fl. India 13: 333. 1995; N.P. Singh *et al.*, Fl. Bihar: 264. 2001.
Fl. & Fr.: August – December
Distrib.: Bhagalpur, Bhojpur, Champaran, Munger, Patna, Rajgir and Kaimur.

23. EMILIA Cass.

About 30 species distributed in S. Africa. S. China, Japan, Phillipines and Sri Lanka and in Old world tropical countries (Mabberley, 2017); 08 species & 02 varieties in India (Karthikeyan & al., 2009); 08 species in India (R. Mathur in Hajra *et al.*, 1995) 01 species in Bihar (N.P. Singh *et al.*, 2001).

Emilia sonchifolia (L.) DC. in Wight, Contr. Bot. India: 24. 1834; Hook.f., Fl. Brit. India 3: 336. 1881; Haines, Bot. Bihar & Orissa: 4: 489. 1922; S.K. Varma, Fl. Bhagalpur: 201. 1981; R. Mathur in Hajra *et al.*, Fl. India 13: 211. 1995; N.P. Singh *et al.*, Fl. Bihar: 264. 2001.
Fl. & Fr.: March – January
Distrib.: Bhagalpur, Gaya

24. ENYDRA DC.

About 10 species distributed in warmer parts of the world (Mabberley, 2017); 01 Species in India (H. J. Chowdhery in Hajra *et al.*, 1995); 01 species in Bihar (N.P. Singh *et al.*, 2001).

Enydra fluctuans Lour., Fl. Cochinch.: 511. 1790; Hook.f., Fl. Brit. India 3: 304. 1881; Haines, Bot. Bihar & Orissa: 479. 1922; S.K. Varma, Fl. Bhagalpur: 214. 1981; P.K. Bhattach. & K. Sarkar, Fl.

W. Champaran: 380. 1998; N.P. Singh *et al.*, Fl. Bihar: 265. 2001.
Fl. & Fr.: December – January
Distrib.: Bhagalpur, Patna, West Champaran.

25. ERIGERON L.

About 390 species, distributed throughout the world, especially N. America & C. America (Mabberley, 2017); 21 species & 2 varieties in India (Karthikeyan & al 2009); 1 species in Bihar.

Erigeron sublyratus DC. in Wight, Contrib.: 9. 1834 & Prodr. 5: 292. 1836; Hajra in Hajra *et al.*, Fl. India 12: 125. 1995. *Erigeron asteroids* Roxb., Fl. Ind. 3: 432. 1832 (non Andr. ex Besaer 1821); Hook.f. in Fl. Brit. India 3: 254. 1881; Haines, Bot. Bihar & Orissa: 2:486. 1961; N.P. Singh *et al.*, Fl. Bihar: 265. 2001.
Fl. & Fr.: October - April.
Distrib.: Bhagalpur, Champaran, Patna, Purnia.

26. EUPATORIUM L.

About 1200 species (before segregation), distributed in Europe, Asia, Africa, chiefly in Mexico, West Indies and Tropical S. America (Mabberley, 2017); 11 species & 1 variety in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Eupatorium odoratum L., Syst. Nat. Ed. 10, 2: 1205. 1760; Hook.f., Fl. Brit. India 3: 244. 1881; B.P. Uniyal in Hajra *et al.*, Fl. India 12: 354. 1995; N.P. Singh *et al.*, Fl. Bihar: 265. 2001. *Chromolaena odorata* (L.) R.M. King & H. Rob. in Phytologia 20: 204. 1970.
Fl. & Fr.: February – May.
Distrib.: Bhagalpur, Patna, Purnia, West Champaran.

27. FLAVERIA Juss.

About 21 species, distributed in America, Australia (Mabberley, 2017); 2 species in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Flaveria trinerva (Spreng.) C. Mohr in Contr. U. S. Natl. Herb. 6: 810. 1901; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 386. 1995. *Oedera trinerva* Spreng., Bot. Gard. Halle: 63. 1800; N.P. Singh *et al.*, Fl. Bihar: 266. 2001. *Flaveria australasica* sensu Gamble, Fl. Pres. Madras 2: 711 (501). 1921.
Fl. & Fr.: March – October.
Distrib.: Without specific locality (Haines, l.c.).

28. GLOSSOCARDIA Cass.

About 12 species, distributed in S.E. Asia.Africa (Mabberley, 2017); 2 species in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Glossocardia bidens (Retz.) Veldkamp in Blumea. 35: 468. 1991. *Zinnia bidens* Retz., Observ. Bot. 5: 28. 1789. *Glossogyne pinnatifida* DC. in Wight, Contrib. Bot. Ind.: 19. 1834; Hook.f., Fl. Brit. India 3: 310. 1881; Haines, Bot. Bihar Orissa: 484. 1922; S.K. Varma, Fl. Bhagalpur: 203. 1981; N.P. Singh *et al.*, Fl. Bihar: 266. 2001.

Fl. & Fr.: March – December.

Distrib.: Patna.

29. GNAPHALIUM L.

About 300 species, cosmopolitan in distribution (Mabberley, 2017); 4 species in India (Karthikeyan & al, 2009); 7 species in Bihar.

Key to species

- 1a. Heads in leafless corymbs clusters.....**G. luteo-album**
- 1b. Heads in spikes or panicles**2**
- 2a. Stout herbs; leaf bases semiamplexicaul, more or less decurrent.....**G. hypoleucum**
- 2b. Slender herbs; leaf bases attenuate or narrowed to the stem**3**
- 3a. Lower surface of leaves white pannose, the subappressed hairs tightly emeshed.....**G. purpureum**
- 3b. Lower surface of leaves loosely villose lanate to appressed white tomentose.....**4**
- 4a. Pappus hairs free.....**G. polycaulon**
- 4b. Pappus hairs coherent at base**5**
- 5a. Leaves flaccid.....**G. flaccidum**
- 4b. Leaves not flaccid.....**6**
- 6a. Stems erect or decumbent, branching from base; disc florets 2–3, corolla 5-toothed, c. 2.25 mm long**G. pensylvanicum**
- 6b. Stem prostrate; disc florets 4–5, corolla minutely papillose, c. 1 mm long**G. pulvinatum**

1. **Gnaphalium flaccidum** Kurz in C.B. Clarke, Compos. Ind.: 115. 1876; Hook.f., Fl. Brit. India 3: 290. 1881; P.C. Pant in Hajra *et al.*, Fl. India 13: 86. 1995; N.P. Singh *et al.*, Fl. Bihar: 267. 2001.

Fl. & Fr.: February – March.

Distrib.: Patna.

2. **Gnaphalium hypoleucum** DC. in Wight, Contrib. Bot. Ind.: 21. 1834; Hook.f., Fl. Brit. India 3: 288.

1881; Pant in Hajra *et al.*, Fl. India 13: 86. 1995; N.P. Singh *et al.*, Fl. Bihar: 267. 2001.

Fl. & Fr.: May – October.

Distrib.: Gangetic Plain.

Note: Many websites display it as synonym of *Pseudognaphalium hypoleucum* (DC.) Hilliard & B.L.Burt.

3. **Gnaphalium luteo-album** L., Sp. Pl.: 851. 1753; Hook.f., Fl. Brit. India 3: 288. 1881; S.K. Varma, Fl. Bhagalpur: 210. 1981; M.P. Singh, Fl. Patna: 204. 1986; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 381. 1998; N.P. Singh *et al.*, Fl. Bihar: 268. 2001; Haines, Bot. Bihar Orissa: 474. 1922, incl. var. *pallidum*. *G. luteo-album* L. subsp. *pallidum* (Lam.) Maheshw. in J. Bombay Nat. Hist. Soc. 57(2): 377. 1960. *Gnaphalium luteoalbum* subsp. *affine* (D. Don) J. Kost. in Blumea 4(3): 484. 1941.

Fl. & Fr.: January - April. *Distrib.*: Bhagalpur, Patna.

Note: Many websites display it as synonym of *Laphangium luteoalbum* (L.) Tzvelev

4. **Gnaphalium pensylvanicum** Willd., Enum. Hort. Berol.: 867. 1809. *G. peregrinum* Fernald in Rhodora 45: 479. t.795. 1943. *G. purpureum* auct. non L.; Hook.f., Fl. Brit. India 3: 289. 1881; M.P. Singh, Fl. Patna: 204. 1986; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 381. 1998; N.P. Singh *et al.*, Fl. Bihar: 268. 2001.

Fl. & Fr.: January – November.

Distrib.: Patna, West Champaran.

5. **Gnaphalium polycaulon** Pers., Syn. Pl. 2: 421. 1807; P.C. Pant in Hajra *et al.*, Fl. India 13: 91. 1995; M.P. Singh, Fl. Patna: 204. 1986; S.K. Varma, Fl. Bhagalpur: 210. 1981; N.P. Singh *et al.*, Fl. Bihar: 268. 2001. *Gnaphalium indicum* auct. sensu Hook.f., Fl. Brit. India 3: 289. 1881, *non* L., 1753.

Fl. & Fr.: Throughout the year.

Distrib.: Bhagalpur, Muzaffarpur, Patna, Saran, West Champaran.

6. **Gnaphalium pulvinatum** Del., Fl. Aegypt.: 122. t. 44. f. 1. 1812; Hook.f., Fl. Brit. India 3: 289. 1881; Haines, Bot. Bihar Orissa: 475. 1922; M.P. Singh, Fl. Patna: 204. 1986; S.K. Varma, Fl. Bhagalpur: 211. 1981; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 381.1998; N.P. Singh *et al.*, Fl. Bihar: 268. 2001.

Fl. & Fr.: December – March.

Distrib.: Bhagalpur, Champaran, Patna.

Note: Many websites display it as synonym of *Homognaphalium crispatum* (Delile) Kirp.

7. Gnaphalium purpureum L., Sp. Pl.: 854. 1753; Hook.f., Fl. Brit. India 3: 289. 1881; Haines, Bot. Bihar Orissa: 474. 1922; N.P. Singh *et al.*, Fl. Bihar: 268. 2001.

Fl. & Fr.: August – May.

Distrib.: Bhagalpur, Patna, Purnia.

30. GONIOCAULON Cass.

One species found in tropical Africa & India (Mabberley, 2017; Karthikeyan *et al.*, 2009) also in Bihar.

Goniocaulon indicum (Klein ex Willd.) C.B. Clarke, Compos. Ind.: 236. 1876; Karthik. *et al.*, Fl. Pl. India Dicot. 1: 235. 2009. *Serratula indica* Klein ex Willd., Sp. Pl. 3: 1642. 1803. *Goniocaulon glabrum* Cass. in Bull. Sci. Soc. Philom. Paris 1817: 34. 1817; Hajra in Hajra *et al.*, Fl. India 12: 181. 1995; N.P. Singh *et al.*, Fl. Bihar: 264. 2001. *Amberboa indica* DC., Prodr. 6: 558. 1838; Hook.f., Fl. Brit. India 3: 377. 1881.

Fl. & Fr.: January – March.

Distrib.: Aurangabad.

31. GRANGEA Adans.

About 6 species, distributed in tropical Asia & Africa (Mabberley, 2017); 1 species in India including Bihar (Karthikeyan *et al.*, 2009).

Grangea maderaspatana (L.) Poir. in Lam., Encycl. Suppl. 2: 825. 1812; Hook.f., Fl. Brit. India 3: 247. 1881; Haines, Bot. Bihar Orissa: 464. 1922; Hajra in Hajra *et al.*, Fl. India 12: 127, f. 37. 1995; Karthik. *et al.*, Fl. Pl. India Dicotyl. 1: 235. 2009; M.P. Singh, Fl. Patna: 205. 1986; S.K. Varma, Fl. Bhagalpur: 205. 1981; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 381. 1998; N.P. Singh *et al.*, Fl. Bihar: 268. 2001. *Artemisia maderaspatana* L., Sp. Pl.: 849. 1753.

Fl. & Fr.: November – April.

Distrib.: Bhagalpur, Patna, Purnia, West Champaran.

32. GUIZOTIA Cass.

About 6 species distributed in Africa (Mabberly, 2008); 1 in India (Chowdhery, 1995 and Karthikeyan, 2009) including Bihar.

Guizotia abyssinica (L.f.) Cass. in Dict. Sci. Nat. 59: 248. 1829; Hook.f., Fl. Brit. India 3: 308. 1881; Haines, Bot. Bihar Orissa: 483. 1922; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 395, f. 109. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 382. 1998;

N.P. Singh *et al.*, Fl. Bihar: 269. 2001. *Polymia abyssinica* L.f., Suppl. Pl.: 383. 1782.

Fl. & Fr.: October – February.

Distrib.: Khagria, West Champaran.

33. HEMISTEPTA Bunge ex Fisch. & C.A. Mey.

About 4 species, distributed in China, Japan, Nepal and Bangladesh (Mabberley, 2017); 1 species in India (Karthikeyan *et al.*, 2009) including Bihar.

Hemistepta lyrata Bunge ex Fischer & Mey. in Index Sem. Hort. Bot. Petrop. 2: 38. 1835; N.P. Singh *et al.*, Fl. Bihar: 270. 2001. *Saussurea affinis* Spreng. ex DC., Prodr. 6: 540. 1838; Hook.f., Fl. Brit. India 3: 373. 1881; Haines, Bot. Bihar Orissa: 492. 1922.

Fl. & Fr.: February – April.

Distrib.: Purnia, West Champaran.

34. INULA L.

About 50 species distributed in temperate and subalpine regions of Europe, Africa and Asia; 20 in India (Kumar, 1995); 17 species in India (Karthikeyan *et al.*, 2009); 01 species in Bihar.

Inula cappa DC., Prodr. 5: 469. 1836; Hook.f., Fl. Brit. India 3: 295. 1881; Haines, Bot. Bihar Orissa: 476. 1922; S. Kumar in Hajra *et al.*, Fl. India 13: 13, f. 4. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 382. 1998; N.P. Singh *et al.*, Fl. Bihar: 270. 2001.

Fl. & Fr.: October – December.

Distrib.: Champaran.

35. IXERIS (Cass.) Cass.

About 20 species distributed in Himalayan region to Japan (Mabberley, 2017); 03 species in India (S. K. Mamgain & R. R. Rao, 1995), 01 species in Bihar (N.P. Singh *et al.*, 2001).

Ixeris polycephala Cass., F. Cuvier's Dict. Sci. Nat. 2, 24: 50. 1822. *Lactuca polycephala* (Cass.) Benth. in Benth. & Hook.f., Gen. Pl. 2: 526. 1873; Hook.f., Fl. Brit. India 3: 410. 1881; Haines, Bot. Bihar & Orissa: 496. 1922; Mamgain & R.R. Rao in Hajra *et al.*, Fl. India 12: 279. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 385. 1998; N. P. Singh *et al.*, Fl. Bihar: 271. 2001.

Fl. & Fr.: December – March

Distrib.: Champaran, Purnia.

36. LACTUCA L.

About 150 species, distributed throughout the World (Mabberley, 2017); 18 species & 02 varieties in India (Karthikeyan *et al.* 2009); 24 species in India (S. K. Mangain & R. R. Rao, 1995), 01 species in Bihar (N.P. Singh *et al.*, 2001).

Lactuca sativa L., Sp. Pl.: 795. 1753. *Lactuca scariola* var. *sativa* Boiss., Fl. Orient. 3: 809. 1875; Hook.f., Fl. Brit. India 3: 404. 1881; M.P. Singh, Fl.

Patna: 206. 1986; Haines, Bot. Bihar Orissa: 496. 1922; N.P. Singh *et al.*, Fl. Bihar: 271. 2001.

Fl. & Fr.: March – November

Distrib.: Bhagalpur, Patna.

37. LAGASCEA Cav.

About 15 species distributed in Mexico, tropical S. America to West Indies (Mabberley, 2017); 1 species in India (Karthikeyan *et al.*, 2009) including Bihar.

Lagascea mollis Cav., Anales Ci. Nat. 6: 332, t. 44.1803; Hook.f., Fl. Brit. India 3: 302. 1881; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 397. 1995; N.P. Singh *et al.*, Fl. Bihar: 271. 2001.

Fl. & Fr.: August – December.

Distrib.: Bhagalpur.

38. LAGGERA Sch.-Bip. ex Koch

About 17 species distributed in Old World tropical countries (Mabberly, 2008); 03 species in India (Kumar, 1995); 02 species in India (Karthikeyan *et al.*, 2009) including Bihar.

Key to the species

1 a. Stems not winged; corolla of bisexual florets pink; achenes sub-compressed.....**L. aurita**

1b. Stems winged; corolla of bisexual florets bluish purple; achenes faintly ribbed.....**L. crispata**

1. **Laggera aurita** L.f., Suppl. Pl.: 367. 1782; Hook.f., Fl. Brit. India 3: 271. 1881; Haines, Bot. Bihar Orissa: 467. 1922; S.K. Varma, Fl. Bhagalpur: 207. 1981; M.P. Singh, Fl. Patna: 206. 1986; S. Kumar in Hajra *et al.*, Fl. India 13: 150. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 382. 1998; N.P. Singh *et al.*, Fl. Bihar: 272. 2001.

Fl. & Fr.: December – March.

Distrib.: Bhagalpur, Champaran and Patna.

2. **Laggera crispata** (Vahl) Hepper & Wood in Kew Bull. 38: 83. 1983; S. Kumar in Hajra *et al.*, Fl. India 13: 151, f. 47. 1995; N.P. Singh *et al.*, Fl. Bihar: 272. 2001. *Conyza crispata* Vahl, Symb. Bot. 1: 71. 1790. *Laggera pterodonta* (DC.) Sch.-Bip. ex Oliver in Trans. Linn. Soc. London 29: 94. 1873; Hook.f., Fl. Brit. India 3: 271. 1881; Haines, Bot. Bihar Orissa: 466. 1922.

Fl. & Fr.: December – April.

Distrib.: Patna.

39. LAUNAEA Cass.

About 45 species distributed in S.E. Asia, C. Asia, Europe and Africa (Mabberley, 2017); 09 in India (Mangain & R.R. Rao, 1995) and 03 species in Bihar (N.P. Singh *et al.*, 2001).

Key to the species

1a. Achenes blackish, muricate; pappus persistent.....**L. intybacea**

1b. Achenes pale yellow or pale brown, rugose or rugulose; pappus deciduous.....**2**

2a. Herbs with thick rootstocks; pappus without disk.....**L. asplenifolia**

2b. Herbs with creeping stolons; pappus with disk**L. procumbens**

1. **Launaea aspleniifolia** Hook.f., Fl. Brit. India 3: 415. 1881; Mangain & R.R. Rao in Hajra *et al.*, Fl. India 12: 306. 1995; Haines, Bot. Bihar & Orissa: 497. 1922; N.P. Singh *et al.*, Fl. Bihar: 273. 2001.

Fl. & Fr.: January – April

Distrib.: Bhagalpur, Patna.

2. **Launaea intybacea** (Jacq.) Beauverd, Bull. Soc. Bot. Genève, ser. 2, 2: 114. 1910. *Lactuca remotiflora* DC. in Wight, Contrib. Bot. Ind.: 26. 1834; Hook.f., Fl. Brit. India 3: 403 1881; Mangain & R.R. Rao in Hajra *et al.*, Fl. India 12: 283. 1995; N.P. Singh *et al.*, Fl. Bihar: 271. 2001.

Fl. & Fr.: September – December

Distrib.: Bihar

Notes. Jeffrey (1966) has treated both *Lactuca runcinata* DC. and *Lactuca remotiflora* DC. as synonyms of *Launaea intybacea*. *L. remotiflora* is a small and more delicate plant than *L. runcinata*. It has nearly entire (rarely sparsely dentate at margin), glabrous, usually orbicular or obovate leaves and less

branched flowering stems, whereas in *L. runcinata* the leaves are usually pinnatifid or runcinate-pinnatifid, large (usually sharply cut with spinous and white cartilaginous teeth), usually pubescent, oblanceolate, oblong or oblanceolate with deeply cut lobes and usually much branched flowering stems.

3. **Launaea procumbens** (Roxb.) Ramayya & Rajagopal in Kew Bull. 23: 465. 1969; Roxb., Fl. Ind. (Ed. Carey) 3: 404. 1832. *Prenanthes procumbens* Roxb., Hort. Bengal. 60. 1814; Haines, Bot. Bihar Orissa: 496. 1922; N.P. Singh *et al.*, Fl. Bihar: 273. 2001. *Launaea nudicaulis*. (L.) Hook.f., Fl. Brit. India 3: 416. 1881 *non* Less., 1832; M. P. Singh, Fl. Patna: 206. 1986; Mamgain & R.R. Rao in Hajra *et al.*, Fl. India 12: 309. 1995. *Fl & Fr.*: March – September
Distrib.: Bhagalpur, Champaran, Patna, Purnia.

40. MIKANIA Willd.

About 300 species, distributed in United States through Mexico, central America and W. Indies to S. America, few species in E. Hemisphere (Mabberley, 2017); 2 species in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Mikania micrantha Kunth, Nov. Gen. Sp. 4: 105. 1818; B.P. Uniyal in Hajra *et al.*, Fl. India 12: 357. 1995; N.P. Singh *et al.*, Fl. Bihar: 273. 2001. *Mikania scandens* sensu Hook, f., Fl. Brit. India 3: 244. 1881, *non* (L.) Willd., 1803.
Fl. & Fr.: December – March.
Distrib.: Bhagalpur, West Champaran.

41. PARTHENIUM L.

About 16 species distributed in N. America & West Indies (Mabberley, 2017); 1 species in India (Karthikeyan *et al.*, 2009) including Bihar.

Parthenium hysterophorus L., Sp. Pl.: 988. 1753; R.S. Rao in J. Bombay Nat. Hist. Soc. 54: 218. 1956; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 403, f. 113. 1995; N.P. Singh *et al.*, Fl. Bihar: 273. 2001.
Fl. & Fr.: July – March.
Distrib.: Patna, West Champaran.

42. PENTANEMA Cass.

About 18 species distributed in Turkey & Central

Asia to Sri Lanka (Mabberly, 2008); 03 species in India (Kumar, 1995 and Karthikeyan *et al.*, 2009); 02 species in Bihar.

Key to the species

1a. Involucral bracts glabrous, erect, acute; ligules lanceolate; ray florets epappose.....**P. indicum**
1b. Involucral bracts hairy, acuminate with recurved tips; ray florets pappose.....**P. vestitum**

1. **Pentanema indicum** (L.) Ling, Acta Phyt. Sin. 10: 179. 1965; S. Kumar in Hajra *et al.*, Fl. India 13: 28, f. 9. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 385. 1998; N.P. Singh *et al.*, Fl. Bihar: 274. 2001. *Inula indica* L., Sp. Pl. ed. 2: 1236. 1763. *Vicoa auriculata* Cass., Ann. Sci. Nat. (Paris) 17: 418. 1829; Hook.f., Fl. Brit. India 3: 297. 1881. *Vicoa indica* (L.) DC. in Wight, Contr. Bot. India: 10. 1834; Haines, Bot. Bihar Orissa: 476. 1922.

Fl. & Fr.: October – February.

Distrib.: Bhagalpur, Gaya, Patna and West Champaran.

2. **Pentanema vestitum** (Wall. ex DC.) Ling in Acta Phyt. Sin. 10: 180. 1965; S. Kumar in Hajra *et al.*, Fl. India 13: 30, f. 10. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 385. 1998; N.P. Singh *et al.*, Fl. Bihar: 274. 2001. *Inula vestitum* Wall. ex DC., Prodr. 5: 470. 1836. *Vicoa vestita* (Wall. ex DC.) Benth. ex Hook.f., Fl. Brit. India 3: 297. 1881; Haines, Bot. Bihar Orissa: 477. 1922.

Fl. & Fr.: February – May.

Distrib.: Bhagalpur, Muzaffarpur, Patna and West Champaran.

43. PLUCHEA Cass.

About 80 species distributed in warm regions of world (Mabberly, 2008); 6 in India (Kumar, 1995); 08 species in India (Karthikeyan, 2009); 01 species in Bihar.

Pluchea lanceolata (DC.) C.B. Clarke, Comp. Ind.: 94. 1876; S. Kumar in Hajra *et al.*, Fl. India 13: 155, f. 48. 1995; N.P. Singh *et al.*, Fl. Bihar: 274. 2001. *Berthelotia lanceolata* DC., Prodr. 5: 376. 1836; Hook.f., Fl. Brit. India 3: 272. 1881.

Fl. & Fr.: February – June.

Distrib.: Muzaffarpur.

44. PSEUDELEPHANTOPUS Rohr.

About 2 species distributed in Neotropics (Mabberley, 2017); 1 in India (B.P. Uniyal in Hajra *et al.*, 1995), 1 species found in Bihar (N.P. Singh *et al.*, 2001).

Pseudelephantopus spicatus (Juss. ex Aubl.) C.F. Baker in Trans. Acad. Sci. St. Louis 12: 55. 1902. *Elephantopus spicatus* Juss. ex Aubl, Hist. Pl. Guiane 2: 808. 1775; B.P. Uniyal in Hajra *et al.*, Fl. India 13: 346. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 385. 1998; N.P. Singh *et al.*, Fl. Bihar: 274. 2001.

Fl. & Fr.: December – April

Distrib.: West Champaran

45. PULICARIA Gaertn.

About 77 species distributed in temperate region & warm Eurasia (Mabberly, 2008); 11 in India (Kumar, 1995); 12 in India (Karthikeyan, 2009); 02 in Bihar.

Key to the species

- 1a. Ray florets ligulate.....**P. crispa**
1b. Ray florets tubular.....**P. foliolosa**

1. **Pulicaria crispa** (Forssk.) Benth. in Benth. & Hook.f., Gen. Pl. 2: 336. 1873; Hook.f., Fl. Brit. India 3: 299. 1881; Haines, Bot. Bihar Orissa: 478.1922; S.K. Varma, Fl. Bhagalpur: 211. 1981; M.P. Singh, Fl. Patna: 207. 1986; S. Kumar in Hajra *et al.*, Fl. India 13: 33, f. 11. 1995; N.P. Singh *et al.*, Fl. Bihar: 275. 2001. *Aster crispus* Forssk., Fl. Aegypt.-Arab.: 150. 1775.

Fl. & Fr.: January – March.

Distrib.: Bhagalpur, Bhojpur, Gaya and Patna.

2. **Pulicaria foliolosa** DC., Prodr. 5: 480. 1834; Hook.f., Fl. Brit. India 3: 298. 1881; Haines, Bot. Bihar Orissa: 477. 1922; M.P. Singh, Fl. Patna: 207.1986; S. Kumar in Hajra *et al.*, Fl. India 13: 35, f. 12.1995; N.P. Singh *et al.*, Fl. Bihar: 275. 2001.

Fl. & Fr.: February – May.

Distrib.: Patna and Sasaram.

46. SAUSSUREA DC.

About 403 species, distributed in temperate Asia, Australia, Europe and N. America (Mabberley, 2017); 69 species & 7 varieties in India (Karthikeyan *et al.*, 2009); 1 species in Bihar.

Saussurea heteromalla (D. Don) Hand.-Mazz., Symb.Sin.7: 1152. 1936; Hajra in Hajra *et al.*, Fl.

India 12: 202. 1995; N.P. Singh *et al.*, Fl. Bihar: 275. 2001. *Cnicus heteromallus* D. Don, Prodr. Fl. Nepal.: 166. 1825. *Saussurea candicans* (DC.) Sch.-Bip. in Linnaea 19: 330. 1846; Hook.f., Fl. Brit. India 3: 373. 1881; Haines, Bot. Bihar Orissa: 491. 1922.

Fl. & Fr.: March–May.

Distrib.: West Champaran.

47. SIGESBECKIA L.

About 12 species distributed in tropical countries (Mabberly, 2008); 1 in India (Chowdhery, 1995 and Karthikeyan, 2009).

Sigesbeckia orientalis L., Sp. Pl.: 900. 1753; Hook.f., Fl. Brit. India 3: 304. 1881; Haines, Forest Fl. Chota Nagpur: 517. 1910 & Bot. Bihar Orissa: 479.1922; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 407, f. 115. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 386.1998; N.P. Singh *et al.*, Fl. Bihar: 277. 2001.

Fl. & Fr.: April – December.

Distrib.: Throughout the state.

48. SONCHUS L.

About 50 species, distributed throughout the world (Mabberly, 2017); 5 species, 1 subspecies & 1 variety in India (Karthikeyan *et al.*, 2009); 1 species in Bihar (N.P. Singh *et al.*, 2001).

Sonchus asper (L.) Hill in Herb. Brit. 1: 47. 1769; Hook.f., Fl. Brit. India 3:414. 1881; Haines, Bot. Bihar Orissa: 498. 1922; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 387. 1998; N.P. Singh *et al.*, Fl. Bihar: 277. 2001. *Sonchus oleraceus* var. *asper* L., Sp. Pl.: 794. 1753.

Fl. & Fr.: April – September.

Distrib.: Bhagalpur, Patna, West Champaran.

49. SPHAERANTHUS L.

About 40 species distributed to old World tropics to Iran and Egypt (Mabberly, 2008); 4 in India (Kumar, 1995); 02 in Bihar.

Key to the species

- 1a. Leaves double-dentate and with stalked glands.....**S. indicus**
1b. Leaves single-dentate and with sessile glands.....**S. senegalensis**

1. **Sphaeranthus indicus** L., Sp. Pl.: 927. 1753; Hook.f., Fl. Brit. India 3: 275. 1881; S.K. Varma, Fl. Bhagalpur: 205. 1981; S. Kumar in Hajra *et al.*, Fl. India 13: 160. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 387. 1998; N.P. Singh *et al.*, Fl. Bihar: 277. 2001.

Fl. & Fr.: January – April.

Distrib.: Throughout the state.

2. **Sphaeranthus senegalensis** DC., Prodr. 5: 370. 1836. *S. indicus* auct. non L. (1753); Hook.f., Fl. Brit. India 3: 275. 1881, p.p.; S. Kumar in Hajra *et al.*, Fl. India 13: 162. 1995; N.P. Singh *et al.*, Fl. Bihar: 277. 2001.

Fl. & Fr.: January – April.

Distrib.: Bihar

50. TRIDAX L.

About 26 species distributed in America (Mabberly, 2008); 1 in India (Chowdhery, 1995 and Karthikeyan *et al.*, 2009) including Bihar.

Tridax procumbens L., Sp. Pl.: 900. 1753; Hook.f., Fl. Brit. India 3: 311. 1881; Haines, Bot. Bihar Orissa: 486. 1922; Mooney, Suppl. Bot. Bihar Orissa: 79. 1950; S.K. Varma, Fl. Bhagalpur: 214. 1981; M.P. Singh, Fl. Patna: 209. 1986; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 418, f. 119. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran 388. 1998; N.P. Singh *et al.*, Fl. Bihar: 279. 2001.

Fl. & Fr.: July – February.

Distrib.: Throughout the state.

51. VERNONIA Schreb.

About 1000 species, distributed in tropical and mostly American (Mabberley, 2017); 54 species, 01 subspecies & 07 varieties in India (Karthikeyan *et al.*, 2009); 52 species in India (B.P. Uniyal in Hajra *et al.*, 1995), 04 species in Bihar (N.P. Singh *et al.*, 2001).

Key to the species

- 1a. Outer phyllaries foliose.....**V. anthelmintica**
- 1b. Outer phyllaries not foliose**2**
- 2a. Stem basally glabrescent**V. aspera**
- 2b. Stem basally pubescent**3**
- 3a. Capitula sessile or subsessile**V. squarrosa**
- 3b. Capitula distinctly peduncled**V. cinerea**

1. **Vernonia aspera** Buch.-Ham. in Trans. Linn. Soc. London 14: 219. 1824. *Vernonia pyramidale* (D. Don) S.N. Mitra in Indian Forester 99: 100. 1973; Fl. Brit. India 3: 232. 1881; Haines, Bot. Bihar Orissa: 459.1922; N. P. Singh *et al.*, Fl. Bihar: 280. 2001.

Fl. & Fr.: September – January

Distrib.: Champaran.

2. **Vernonia anthelmintica** (L.) Willd., Sp. Pl. 3: 1634. 1803; Hook. f., Fl. Brit. India 3: 236. 1881; Haines, Bot. Bihar Orissa: 460. 1922. *Conyza anthelmintica* L., Sp. Pl. 2. 1207. 1763.; N.P. Singh *et al.*, Fl. Bihar: 279. 2001.

Fl. & Fr.: September – January

Distrib.: Champaran.

3. **Vernonia cinerea** (L.) Less., Linnaea 4: 291. 1829; Hook.f., Fl. Brit. India 2: 233. 1881; Haines, Bot. Bihar Orissa: 460. 1992; S.K. Varma., Fl. Bhagalpur: 201. 1981; Mooney, Suppl. Bot. Bihar & Orissa: 73. 1950. *Conyza cinerea* L., Sp. Pl.: 862. 1753. *Cyanthillium cinereum* (L.) H. Rob., Proc. Biol. Soc. Washington 103(1): 252. 1990; Uniyal in Hajra *et al.*, Fl. India 13: 367. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 388. 1998; N.P. Singh *et al.*, Fl. Bihar: 279. 2001; Karthik. *et al.*, Fl. Pl. India Dicotyl. 1: 223. 2009.

Fl. & Fr.: Almost throughout the year.

Distrib.: Bhagalpur, Champaran, Hazaribagh.

4. **Vernonia squarrosa** Less. in Linnaea 6: 678. 1831; P. K. Bhattach. & K. Sarkar, Fl. W. Champaran 388. 1998; N. P. Singh *et al.*, Fl. Bihar: 280. 2001.

Fl. & Fr.: October – January

Distrib.: Champaran.

52. WEDELIA Jacq.

About 70 species, distributed in tropical and warm temperate regions of the world (Mabberley, 2017); 6 species & 2 varieties in India (Karthikeyan *et al.*, 2009); 02 species in Bihar.

Key to the species

- 1a. Leaves subsessile, spatulate-lanceolate, margins entire or feebly serrate.....**W. chinensis**
- 1b. Leaves distinctly petioled, ovate, acuminate, margins serrate.....**W. urticaefolia**

1. **Wedelia chinensis** (L.) Merr. in Phillip. J. Sci. 12: 111. 1917; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 424. 1995; N.P. Singh *et al.*, Fl. Bihar: 281. 2001. *Verbesina chinensis* L., Sp. Pl.: 901. 1753. *Wedelia*

calendulacea (L.) Less., Syn. Gen. Compos. 222. 1832, non Pers., 1807; Hook.f., Fl. Brit. India 3: 306. 1881; Haines, Bot. Bihar Orissa: 481. 1922.
Fl. & Fr.: March – September.
Distrib.: Bhagalpur, Patna, West Champaran

2. ***Wedelia urticaefolia*** DC. in Wight, Contr. Bot. India 18. 1834; Hook.f., Fl. Brit. India 3: 306. 1881; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 426. 1995; N.P. Singh *et al.*, Fl. Bihar: 281. 2001.
Fl. & Fr.: Throughout the year.
Distrib.: Throughout the state.

53. XANTHIUM L.

About 3 species, cosmopolitan (Mabberly, 2008); 3 in India (Chowdhery, 1995); 01 species in Bihar.

Xanthium strumarium L., Sp. Pl.: 987. 1753, p.p.; Hook.f., Fl. Brit. India 3: 303. 1881. (excl. syn. *X. strumarium* Boiss.); S.K. Varma, Fl. Bhagalpur: 219. 1981; M.P. Singh, Fl. Patna: 211. 1986; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 389. 1998. *Xanthium indicum* Koenig in Roxb., Fl. Ind. 3: 601. 1832; H.J. Chowdhery in Hajra *et al.*, Fl. India 12: 427. 1995; N.P. Singh *et al.*, Fl. Bihar: 281. 2001.
Fl. & Fr.: March – December.
Distrib.: Throughout the state.

54. YOUNGIA Cass.

About 35 species, distributed in Himalayan region eastwards to Japan from tropical to alpine regions (Mabberley, 2008); 12 species & 2 subspecies in India (Karthikeyan *et al.*, 2009); 1 species in Bihar (N.P. Singh *et al.*, 2001).

Youngia japonica (L.) DC., Prodr. 7 (1): 194. 1838; Koster in Blumea 23: 166. 1976; Hook.f., Fl. Brit. India 3: 395. 1881; Haines, Bot. Bihar & Orissa 2: 519. 1922. *Prenanthes japonica* L., Mant. Pl.: 107. 1767. *Youngia japonica* subsp. *genuina* (Hochr.) Babcock. & Stebbins in Cam. Inst. Wash. Publ. 484: 95. 1937; Mamgain & R. R. Rao in Hajra *et al.*, Fl. India 12: 329. 1995; P.K. Bhattach. & K. Sarkar, Fl. W. Champaran: 389. 1998; N.P. Singh *et al.*, Fl. Bihar: 282. 2001.
Fl. & Fr.: October – April
Distrib.: Bhagalpur, Champaran, Purnia.

Discussion

At global level the family Asteraceae are represented by c. 1590 genera and 23,600 species, distributed in temperate and subtropical zones (Mabberley, 2017). It is the fourth largest family of India represented by 950 species and 167 genera (Arisdason and Lakshminarasimhan, 2017). In present communication, 84 species, 02 varieties under 53 genera for the state have been enumerated. It has been observed that members of Asteraceae are very common in neighboring states i.e. West Bengal has 108 genera, 239 species, 02 subspecies and 10 varieties (Ranjan *et al.*, 2016), Uttar Pradesh has 88 genera, 152 species and 05 varieties (Khanna, 2017), Odisha has 53 genera and 102 species (Saxsena and Brahmam, 1995).

In the family Asteraceae 58 genera and 197 taxa are endemic to various parts of the country, out of them 25 taxa are endemic to gangetic plains (Singh *et al.* 2015). Furthermore, 43 species are restricted to only one district of Jharkhand. It has been observed that *Glossocardia bidens* under the Genera *Glossocardia* have also been reported from Patna, it seems to have extended migration route through Africa to Australia (Singh *et al.* 2015). The most diversified genus is *Blumea* represented by 10 species, other prominent genera were as follows: *Gnaphalium* (07 species), *Conyza* (06 species), *Vernonia* (04 species) and *Launaea* (03 species), *Eupatorium* (03 species), one species of *Glossocardia* (*G. bidens*) is found in Bihar where as two species of *Glossocardia* (*G. bidens* and *G. bosvallea*) are reported from Jharkhand. Similarly, 04 taxa of *Wedelia* (*W. biflora*, *W. chinensis*, *W. montana* var. *wallichii* and *W. urticaefolia*) reported from Jharkhand, while from Bihar two taxa of *Wedelia* (*W. chinensis* and *W. urticaefolia*) are reported. *Pulicaria* is represented by two species (*P. angustifolia* and *P. foliolosa*) in Jharkhand and from Bihar *Pulicaria foliolosa* and *P. crispa* are reported. Four species of *Vernonia* (*V. anthelmintica*, *V. aspera*, *V. squarrosa* and *V. cinerea*) are reported from Bihar whereas 08 species (*Vernonia patula*, *V. anthelmintica*, *V. albicans*, *V. aspera*, *V. saligna*, *V. squarrosa*, *V. divergens* and *V. cinerea*) are reported from Jharkhand.

Out of 84 taxa, 52 species flowered in winter season and 21 species in summer (Fig. 1). Most of the Asteraceae species follows similar flowering phenology mainly due to the optimization of pollination and seed dispersal (Torres and Galetto, 2011). It has been observed that mostly herbaceous

taxa are dominant in Asteraceae of Bihar except one or two shrubby taxa like *Wedelia*, *Eupatorium* etc.

Many ornamental and cultivated species of Asteraceae have been introduced in the state. Since they are not naturalised, we have not included in the checklist, these are: *Calendula officinalis* L., *Chrysanthemum*

coronarum L., *Chrysanthemum indicum* L., *Cichorium endivia* L. *Cosmos bipinnatus* Cav., *Cynara scolymus* L., *Glebionis coronaria* (L.) Cass. ex Spach, *Helianthus annuus* L., *Helianthus argophyllus* Torr. and Gray, *Helianthus tuberosus* L., *Tegetes erecta* L., *Zinnia elegans* Jacq. and *Zinnia violacea* Cav.

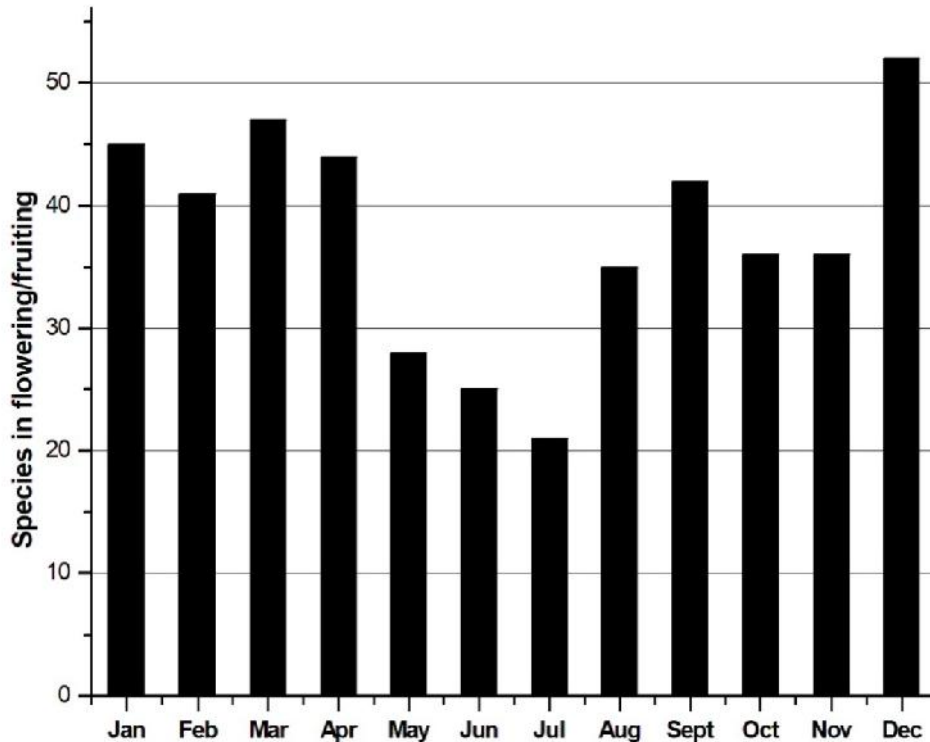


Fig. 1: Flowering/fruiting months of the taxa

Conclusions

The checklist of Asteraceae of Bihar includes 54 genera and 84 species, 2 varieties and identification keys to the taxa. In addition, distribution at global and national for each genus has been given. Phenology and distribution at district level for each species/verities is mentioned. The diversity assessment data will work as ready references to the Asteraceae in the state of Bihar. The study will also help in development of strategies for the management of wild plants and their conservation.

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References

- Anderson, T. 1863. On the Flora of Bihar and the mountains of Parasnath with a list of species collected by Messrs Hooker, Edgeworth, Thomson and Anderson. *J. Asiat. Soc. Bengal.* 32: 187–218.
- Arisdason, W. and Lakshminarasimhan, P. 2017. *Status of Plant Diversity in India: an Overview.* ENVIS centre of floral diversity, BSI, Kolkata

- Bhattacharya, P.K. and Krishnendu S. 1998. *Flora of West Champaran district Bihar*. Botanical Survey of India, Calcutta.
- Bhattacharya, R.P., Pal, D.C. and Patil, B.R. 2011. Aquatic and wetland Monocotyledons of Bihar and Jharkhand states. *J. Econ. and Taxon. Bot.* 35(3):486-496.
- Buchanan-Hamilton, F. 1928. *An account of the districts of Bihar and Patna in 1811–1812*. The Bihar and Orissa Research Society. Calcutta Oriental Press, Calcutta.
- Champion, H.G. and Seth, S.K. 1968. *A revised forest types of India*. Govt. of India Publications, New Delhi.
- Haines, H.H. 1921 – 1925. *The Botany of Bihar and Orissa: An account of all the known indigenous plants of the province and of the most important or most commonly cultivated exotic ones with maps and introduction*. 6 parts: 1 (1925), 2 (1921), 3(1922), 4 (1922), 5 (1925) and 6 (1925). Adlard and Son, London, Govt., of Bihar and Orissa. (Repr. BSI, Calcutta, 1961).
- Jain, S.K., Banerjee, D.K. and Pal, D.C. 1975. Grasses of Bihar, Orissa and West Bengal. *J. Bombay Nat. Hist. Soc.* 72: 758–773.
- Karthikeyan, S., Sanjappa, M. and Moorthy, S. 2009. *Flowering plants of India (dicotyledons), Vol. 1*. Botanical Survey of India, Kolkata.
- Khanna, K.K. 2017. Angiospermic plants of Uttar Pradesh—A checklist. *Geophytology* 47 (1): 69–110.
- Mabberley, DJ. 2017. *Mabberley's plant book: A portable dictionary of plants, their classification and uses, 4th ed*. Cambridge University Press, Cambridge. Cambridge University Press, UK.
- Mishra, K.K. 1985. New plant record from Bihar. *J. Econ. Taxon. Bot.* 6:410–412.
- Mishra, A. 1969. *Angiosperm flora of Darbhanga (Mithila, North Bihar) – I*. *Bull. Bot. Surv. India* 11: 322–329.
- Mishra, A. 1970. *Angiosperm flora of Darbhanga (Mithila, North Bihar) – II*. *Bull. Bot. Surv. India*, 12: 132–138.
- Mishra, A. 1971. *Angiosperm flora of Darbhanga (Mithila, North Bihar) – III*. *Bull. Bot. Surv. India*, 13: 212–216.
- Mishra, K.K. 1985. New plant record from Bihar. *J. Econ. Taxon. Bot.*, 6: 410–412.
- Misra, S.K. and Jha, D. 1972. Floristic in Darbhanga. *Planta* 2: 136–143.
- Mooney, H.F. 1941. Some additions to the Botany of Bihar and Orissa. *Indian For. Rec.* 3:63–119.
- Mooney, H.F. 1950. Supplement to the Botany of Bihar and Orissa. Catholic Press, Ranchi.
- Pant, P.C. 1995. Asteraceae (subtribe Angiantheae DC.)– *Flora of India (eds. Hajra et al.)*, vol. 13, Botanical Survey of India, Kolkata.
- Paul, S.R. 1966. Rice field weed flora of Bhagalpur district (Bihar). *Proceedings of Bihar Academy of Agriculture Sciences*, 15: 15–24.
- Paul, S.R. 1967. Studies on the grasses of Bhagalpur district (Bihar). *Indian Forester* 93: 169–179.
- Paul, S.R. 1973. On the Aquatic and Marsh Flora of Monghyr, Bihar. *Botanique* 4: 143–152.
- Ranjan V, Lakshminarasimhan, Dash S.S. and Chowdhery H.J. 2016. *Flora of west Bengal*, vol. 3. Botanical Survey of India, Kolkata,
- Sanyal, A. 1957. Additional notes on the Botany of Bihar and Orissa by H.H. Haines and its supplement by Dr. H.F. Mooney. *Indian Forester*. 83:230–235.
- Saxena, H.O. 1976. Notes on the Flora of Bihar and Orissa. *Indian Forester*, 192: 195–197.
- Saxena, H.O. 1978. Additions to the Flora of Bihar and Orissa. *Journal of the Bombay Natural History Society*, 75(3): 941–942.
- Saxena HO and Brahmam M. 1995. *The flora of Orissa*, Vol. 2. Orissa Forest Department corporation Limited, Bhubneshwar.
- Singh, M.P. 1986. *Flora of Patna (Dicotyledones)*. International Books and Periodicals Supply Service, New Delhi.
- Singh, N.P., Mudgal, V., Khanna, K.K., Srivastava, S.C., Sahoo, A.K., Bandapadhyay, S., Aziz, N., Das, M., Bhattacharya, R.P. and Hajra, P.K. 2001. *Flora of Bihar Analysis*. Botanical Survey of India, Calcutta.
- Singh, P., Karthikeyan, K., Laxminarasimhan, P., Dash, S.S., 2015. Endemic Vascular Plants of India, Botanical Survey of India, Calcutta.
- Srivastava, J.G. 1955. Vegetation of Purnea. In: the Gazetteer for the district Purnea, Patna.
- Srivastava, D.P., Paul, S.R. and Sinha, B.C. 1966. Weed of wheat fields in Bihar. *Proceedings of Bihar Academy of Agriculture Sciences*, 15: 1–10.
- Thakur, V. 1963. *The weed flora of Darbhanga I*. Paddy field weeds. 40th Proceedings of the Indian Science Congress. III. Abst. 315.
- Torres, C. and Galetto, L., 2011. Flowering phenology of co-occurring Asteraceae: a matter of climate, ecological interactions, plant attributes or of evolutionary relationships among species? *Organisms Diversity Evol.*, 11(1): 9–19.

Thothathri, K. 1965. A Contribution on some Plants from Champaran District, North Bihar. *Indian Forester*, 91: 743–746.

Thothathri, K., Shetty, B.V. and Hajra, P.K. 1966. A contribution to the Flora of Udaipur forest in Champaran District, North Bihar. *Bull.Bot.Surv. India*, 8: 133–141.

Uniyal, B.P. and Datta, R. 1984. Additional to the grasses of Bihar, Orissa and West Bengal. *Journal of the Bombay Natural History Society*, 80: 262.

Varma, S.K. 1981. *Flora of Bhagalpur* (Dicotyledones). Today and Tomorrow's Printers & Publishers, New Delhi.

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