

Flora of India
Series 2

FLORA OF RAJASTHAN

VOLUME 2

Edited by

B.V. SHETTY & V. SINGH



BOTANICAL SURVEY OF INDIA
FLORA OF RAJASTHAN

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Cover Photo : A fruiting twig of *Millettia tomentosa*

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71. CAMPANULACEAE

(V. Singh)

Corolla white or purple. Capsules laterally dehiscent

at the base or sides below the calyx - teeth. .. . 1. Campanula
 Corolla blue. Capsules locuticidatly dehiscent by 2 S
 valves in upper region. ... 2. Wahlenbergla

1. CAMPANULA L.

1a. Capsules dehiscing by valves at the base :
 2a. Annual herbs. Calyx - lobes 2.0 - 3.5 mm long. Corolla 5
 - 6 mm long. Seeds much compressed,
 margined. ... 1. C. benthamil
 2b. Perennial herbs. Calyx • lobes S -6 mm long.
 Corolla 1.0 - 1.5 cm long. Seeds subcompressed. ...1b. 2. C. colorata
 Capsules dehiscing by valves on the sides or towards
 the apex. ... 3. C. fulgens

1. *Campanula benthamii* Wall. ex Kitamura, Fl. Afgh. 377. 1960 ;
 Raizada. Supple Duthie, Fl. Gangetic Plain 138. 1976. *C. canescens*
 Wall. ex DC. Prodr. 7 : 473. 1839, non Roth, 1827 ; Clatkc in Hook. f.
 Fl. Brit. India 3 : 439. 1881 ; Duthic, Fl. Gangetic Plain I : 499. IYO). *C.*
wautenu Babu in Journ. Bomb. Nat. Hist. soc. 65 : 808. 1968.

Erect, multicaulinc, annual herbs, 10 - 20 cm high. Basal leaves in
 rosette, 1.5 2.0 X 0.8 1.5 cm, obovate spatulatc, narrowed into a petiolc
 ; upper ones sessile, 1.0 - 1.5 x 0.2 0.5 cm, linear lanceolatc to oblong.
 subacute. Flowers 5 8 mm long, solitary. sessile, forming a sppciform
 panicle. Calyx lobcs linear - lanceolatc, hairy. Corolla dividcd less than
 half way down. Capsules hemisphcric, 3 • celled, hairy.

Fl. & Fr. : January • April.

Rare. in wet and shady habitats, particularly in the gardens and
 forests in the east of Aravalli.

Selected specimens : Bundi : Kota Dam, Singh 74403 (LWG) ; Jhalawar
 •. Verma 3427 (BSA) ; Kota : Darah, Singh 74437 (LWG) ; Sirohi : Mt. Abu,
 Meh:a 410 (JAC).

Leave} not perfoliate. Calyx glandular, 5 - nerved but not winged between the nerves. 2. Plumbago

1. DYEROPHYTUM O. Ktze.

Dyerophytum indicum (Gibs. ex Wt.) O. Ktze. Rev. Gen. Pl. 3 : 394. 1891. *Vogelia indica* Gibs. ex Wight, Ic. 3(4) : 5. t. 1075. 1846 & in cal. Journe nat. Hist. 7 : 17. 1847 ; Clarke in Hook. f. Fl. Brit. India 3 : 481. 1882 ; Duthie, Fl. Gangetic Plain 2 : 2. 1911.

Undershrubs, 1.2 m high, with terete branches. Leaves 3.5 - 8.0 X 2.0 - 5.5 cm, ovate or ovate - elliptic to suborbicular. obtuse or apiculate, undulate, coriaceous, more or less covered with scurfy scales. Flowers golden yellow, in 2 - 10 cm long, bracteate, branched spikes. Calyx teeth about half the length of tube, acute. Corolla lobes obovate oblong. emarginate. Capsules 5 - 8 mm long, glabrous, 5 - valved. Seeds pyriform, smooth, brown.

Fl. & Fr. : October - January.

Common in wastelands and open forests, particularly on dry rocky hill slopes.

Selected specimens : Ajmer : Mowa Bir, Duthie 6661 (DD) ; Barmer: Haldeshwar, Tiwari 1178 (BSJO) ; Jaipur : Ramgarh, Sharma 1810 (RUBL) ; Sirohi : Mt. Abu, Rai:ada 20771 (DD) ; Udaipur : Parkar 3383 (DD).

2. PLUMBAGO L.

Plumbago zeylanica L. Sp. Pl. 51. 1753 ; Clarke in Hook. f. Fl. Brit. India 3 : 480. 1882 ; Duthie, Fl. Gangetic Plain 2 : 2. 1911 ; Mahesh. Illus. Fl. Delhi f. 166. 1966. 'Chitrak, Chitraval' (Hindi).

Erect or straggling undershrubs. Leaves 2.5 - 10.0 x 1.5 - 6.0 cm, ovate - lanceolate or oblong, acute, contracted at the base into a petiole, undulate - crispy, glabrous, white punctate beneath. Flowers white, in axillary and terminal, 5 - 30 cm long racemes combined into leafy panicles. Corolla - lobes oblong, apiculate. Styles glabrous. Capsules 5 - 6 mm long, oblong, longitudinally furrowed, enclosed within the persistent calyx. Seeds oblong, smooth.

Fl. & Fr. : Most part of the year.

Common in wastelands and open forests among bushes.

Selected specimens : Ajmer : Nagpahar, Sharma 1136 (LWG) ; Banswara : Garhi, Kanodia 7554 (BSA) ; Jaipur : Amer, Sharma 247 (RUBL) ; Kota : Singh 90102 (LWG) ; Sirohi : Mt. Abu, Jain 62177 (BSI).

CULTIVATED SPECIES

Plumbago auriculata Lam. Shrubs, with alternate or subverticillate, obovate leaves and blue flowers in panicles. Native of S. Africa ; cultivated for ornamental purposes.

Plumbago indica L. • Shrubs, with rosy - scarlet flowers. Native of Sikkim and Khasia hills ; cultivated for ornamental purposes.

74. PRIMULACEAE

(V. Singh)

Ia. Leaves alternate or opposite. Flowers solitary.

axillary.

t. Anagallis

Ib. Leaves in a basal rosette, often also alternate in upper region. Flowers in racemes or umbels •

2a. Leaves in a basal rosette only. Flowers in umbels which are borne on several, leafless scapes. Ovary superior.

2. Primula

2b. Leaves in rosette at base and alternate above. Flowers in axillary and terminal racemes. Ovary half - inferior.

3. Samolus

1. ANAGALLIS L.

Leaves 3 nerved. Corolla blue. Filaments hairy. ... 1. *A. arvensis*

Leaves 1 nerved. Corolla white. Filaments glabrous. ... 2. *A. pumila*

1. *Anagallis arvensis* L. sp. Pl. 148. 1753 Hook. f. Fl. Brit. India ³ : 506. 1882 ; Dulhie, Fl. Gangetic Plain 2 : 6. 1911 ; Mahesh. Illus. Fl. Delhi f. 117. 1966. 'Neel' (Hindi).

Annual herbs, upto 60 cm high. Stem and branches 4 • angular. Leaves opposite, sessile, 1.5 2.0 X 0.5 1.5 cm, ovate - lanceolate, 8Uacute, glabrous. Flowers axillary, solitary ; pedicels longer than leaves, recurved in fruits. Calyx deeply 5 • lobed ; lobes lanceolate,

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acuminate, crenulate. Corolla • lobes fringed with minute glands. Filaments hairy. Capsules 4 6 mm in diam., globose, circumsciss, many seeded. Seeds flattened, subtrigonous.

Fl. & Fr. : December - March.

Native of Europe and Mediterranean region ; naturalized as a weed in cultivated fields and gardens during winters.

Selected specimens : Banswara : Pipalkhunt, Singh 4221 (BSJO) ; Ganganagar : 15 A, Roy 4080 (BSJO) ; Kota : Atru, Singh 90350 (LWG) ; Sirohi : Mt. Abu, Mc Cann 10 (BLAT).

2. *Anagallis pumila* Sw. Prodr. I : 40. 1788. *Centrunculus pentandrus* R. Br. Prodr. 427. 1810 ; Duthie, Fl. Gangetic Plain 2 : 6. 1911. *C. tenellus* Duby in DC. Prodr. 8 : 72. 1844 ; Wight, Ic. 6 : 14. t. 2000. 1853 ; Hook. f. Fl. Brit. India 3 : 506. 1882.

Erect, annual herbs, 5 - 15 cm high. Stems slightly margined. Leaves alternate, rarely opposite, 0.5 1.0 X 0.4 0.5 cm, ovate or obovate to suborbicular, acute or obtuse, cuneate at base, glabrous. Flowers axillary, solitary. Calyx divided upto base ; lobes 2 3 mm long, lanceolate oblong, acute or mucronate. Corolla - lobes ovate - lanceolate, apiculate, eglandular. Filaments glabrous. Capsules as long as calyx. subglobose. Seeds trigonous, solid.

Fl. & Fr. : September February.

Qnre weed enTtivnteti Gerrie nna **nearby localities.**

Selected specimen : Banswara : Kushalgarh, Kanodia 5708 (BSA).

2. PRIMULA L.

Primula umbellata (Lour.) Benth. Fl. Males. ser. 1. 6 : 191. 1962. *Drosera umbellata* Lour. Fl. Cochinch. 186. 1790. *Androsace saxifragifolia* Bunge in Mem. Acad. Sci. Petersb. 2 : 127. 1835 ; Hook. f. Fl. Brit. India 3 : 496. 1882 ; Duthie, Fl. Gangetic Plain 2 : 4. 1911.

Scapigerous, annual herbs, 3 - 20 cm high. Petioles narrowly winged ; leaves 1 - 3 cm in diam., orbicular - subreniform or broadly elliptic, subcordate or truncate at base, crenate - dentate • margined. Scapes 3 20

glandular hairy ; umbels 2 to 6 - flowered ;

unequal, glandular hairy. Bracts ovate • lanceolate, acute. Calyx - lobes elliptic, enlarged after anthesis. Corona white. Capsules globose, 5 - valved. Seeds angular, pitted.

Fl. & Fr. : December March.

Rare, in wet and shady habitats in the forests. After the disappearance of radical leaves, the plant looks rather bare.

Selected specimen : Kota : Atru, Singh 90958 (LWG).

3. SAMOLUS L.

Samolus valerandi L. Sp. Pl. 171. 1753 ; Hook. f. Fl. Brit. India 3 : 506. 1882 ; Duthie, Fl. Gangetic Plain 2 : 7. 1911 ; Singh in Journ. Bomb. Nat. I-list. soc. 77 (2) : 360. 1981.

Glabrous, decumbent or ascending, annual or perennial herbs, upto 50 cm high. Leaves spatulate or obovate elliptic, apiculate, entire. Flowers white ; pedicels geniculate at the insertion of bracts or above the middle. Calyx hemispheric ; lobes triangular. Corolla - lobes imbricate. Stamens alternating with 5 scaly staminodes. Ovary inferior. • Capsules shorter than calyx. Seeds rugose.

Fl. & Fr. : January - March.

Rate, in moist and shady habitats on rocky grounds. So far known from Bhilwara alone.

Selected specimen : Bhilwara : Mandalgarh forest, Singh 7164 (BSJO).

75. SAPOTACEAE

(V. Singh)

- | | |
|--|--------------|
| 1a. Corolla 6 lobed. Fertile stamens 6. | 2. Manilkara |
| 1b. Corolla more than 6 lobed. Stamens more than 6 : | |
| 2a. Petals with 2 - fid appendages on the back. | |
| Calyx 8 - lobed. Stamens 8, alternating with | |
| 8 staminodes. | 3. Mimusops |
| 2b. Petals not appendaged. Calyx 4 lobed. | |
| Stamens 16 or more ; staminodes absent. | 1. Madhuca |

1. MADHUCA Ham. ex J. F. Gmelin

Madhuca indica J. F. Gmelin, syst. Nat. 2 (1) : 799. 1791. *Bassia latifolia* Roxb. Pl. Cor. 1 : 20. t. 19. 1795 ; Bedd. Fl. sylv. 1 : 41. pl. 41. 1870 ; Clarke in Hook. f. Fl. Brit. India 3 : 544. 1882 ; Duthie, Fl. Gangetic Plain 2 : 11. 1911. *Madhuca longifolia* (Koen.) Macbr. var. *latifolia* (Roxb.) Chevalier in Rev. Int. Bot. Appl. 23 : 149. 1943. 'Mahua' (Hindi).

Large, deciduous trees. Leaves crowded at the end of branches, 7.20 X 5.10 cm, elliptic obovate, obtuse or subacuminate. Stipules caducous. Flowers white or cream coloured, tomentose, in 3 to 5 flowered axillary clusters at the end of branches. Calyx tomentose, 4 lobed. Corolla tube succulent. Stamens 20-30, roughly in 2-3 series. Style exserted. Berries ovoid, fleshy, 1 to 4 seeded, tomentose.

Fl. : March-April ; Fr. : May-June.

Fairly common in the forests and wastelands, particularly in the ~~southern and south~~ **eastern parts of the state.**

Selected specimens : Banswara : Ghatol, Singh 4202 (BSJO) ; Jhalawar : Akiera, Verma 3450 (BSA) ; Kota : Wadhwa 9223 (BSA) ; Pali : Lapi, Pandey 4668 (BSJO) ; Sirohi : Mt. Abu, Mehta 994 (JAC) ; Udaipur : Jaismand, Verma 37 (BSA).

2. MANILKARA Adans. nom. cons.

Manilkara hexandra (Roxb.) Dub. in Ann. Inst. Bot. Geol. Colon. Marseille ser. 3. 23 : 9. f. 2. 1915. *Mimusops hexandra* Roxb. Pl. Cor. 1 : 16. t. 15. 1795 ; Clarke in Hook. f. Fl. Brit. India 3 : 549. 1882 ; Duthie, Fl. Gangetic Plain 2 : 13. 1911. *Mimusops indica* A. DC. in DC. Prodr. 8 : 205. 1844 ; Wight, Ic. 4(4) : 13. t. 1587. 'Khirni' (Hindi).

Evergreen trees, 10-20 m high, with blackish grey, deeply furrowed bark. Leaves 7-10 x 3.5-6.0 cm, elliptic obovate or oblong, obtuse or emarginate, entire. Flowers white, in axillary fascicles of 2-6. Calyx 6 lobes, ciliolate. Corolla 6 lobes, 16 or 24, in 2 or 3 series ; outer ones linear ; inner ones oblanceolate. Stamens 6 or 8. Berries ovoid, reddish-yellow, 1-seeded, edible.

Fl. & Fr. : October-April.

Wild or self sown near villages ; also planted along the roads.

Selected specimens : Banswara : Ghatol, Majumdar 10220 (BSA) ; Jaipur : Chaumu, Wadhwa 8343 (BSA) ; Jhalawar : Jhalrapatan,

car & mi.snra LUU".) ; mOL4 ; mampura, v crnta U.3JtiJ.

3. MIMUSOPS L.

Mimusops L. sp. Pl. 349. 1753 ; Wight, lc. 4(4) : 13. t. 1586. 1850 ; Clarke in Hook. f. Fl. Brit. India 3 : 548. 1882 : Duthic, Fl. Gangetic Plain 2 : 13. 1911. 'Morsali' (Hindi).

Evergreen trees, with ringed, grey bark and milky sap. Leaves 5 15 X 3 7 cm, elliptic - oblong, acute or acuminate. Flowers white with pinkish tinge, axillary, solitary or fascicled, sweet - scented. Calyx deeply 8 lobed ; lobes in two series. Corolla 8 lobed. Stamens 8. Staminodes ovate lanceolate, acute or acuminate, hairy on the back. Fruits X cm- elliptic - oblong. Edible - Seed small, oblong, black.

Fl. : February March ; Fr. : April June.

Kate, in the forests, usually common in cities.

Selected specimens : Banswara : Anand Sagar Forest, Singh 4611 (BSJO) ; Jaisalmer : Mool Sagar, Wadhwa 5242 A (BSA) ; Kota : Chhabra, Singh 90942 (LWG) ; Sawaimadhopur : Bayana, Saran 41869 (LWG) ; Tonk : Tordi, Pandey 4804 (BSJO).

CULTIVATED SPECIES

Manilkara sapota (L.) P. Royen (Sapota achras Mill., Achras zapota L.) 'Cheeku'(Hindi). - Evergreen trees, with oblong- lanceolate to elliptic, acute leaves, white flowers and globose fruits. Staminodes absent. Native of S. America ; cultivated in orchards for edible fruits.

76. EBENACEAE

(V. Singh)

DIOSPYROS L.

1. Stamens at the most upto 18 :

2a. Anthers awnless. Staminodes 8. 16 :

3a. Leaves subopposite and alternate. Corolla of male flowers tubular. Albumen of seeds ruminant.

3. D. melanoxylon

3b. Leaves alternate only. Corolla of male

flowers urceolate or campanulate. Albumen

of seeds not ruminant.

...

t. D. cordifolia

2b. Anthers awned. Staminodes 4.

..

4. D. montana

1b. Stamens always more than 20.

...

2. D. malabarica

I. *Diospyros cordifolia* Roxb. Pl. Cor. I : 38. t. 50. 1795 & Fl. Ind. 2 : 538. 1832 ; Duthie, Fl. Gangetic Plain 2 : 17. 1911. *D. montana* Clarke in Hook. f. Fl. Brit. India 3 : 555. 1882, pro parte. 'rendu' (Hindi).

Large shrubs or small trees, 3 • 4 m high, with smooth bark. Leaves alternate, 2.5 9.0 x 1.5 - 3.0 cm, oblong, ovate - oblong or ovate lanceolate, glabrous. Flowers creamy - white, axillary ; males in 3 flowered cymes ; female ones solitary. Stamens in opposite pairs, united at the base ; anthers awnless, pubescent. Calyx of female flowers reflexed in fruits. Fruits 2.0 - 2.5 cm in diam., globose or ovoid, yellow when ripe.

Fl. & Fr. : Summer and rainy season.

Rare, in wastelands and forests, particularly in the east of Aravalli.

Selected specimens : Chittorgarh : Fort, Majumdar 10399 (BSA) ; Jaipur : Bairat forest, Wadhwa 8377 (BSA) ; Kota : Singh 74741 (LWG) ; Udaipur : Banki forest, Nautiyal & Raizada 25444 (DI).

2. *Diospyros malabarica* (Desr.) Kostal. Med. Pharmac. Fl. 3 : 1099. 1834. *Garcinia malabarica* Desr. in Lam. Encycl. 3 : 701. 1789. *Diospyros embryopteris* Pers. Syn. Pl. 2 : 624. 1807 ; Clarke in Hook. f. Fl. Brit. India 3 : 556. 1882 ; Duthie, Fl. Gangetic Plain 2 : 18. 1911.

Medium • sized trees, with spreading branches and smooth bark flaking off in large pieces. Leaves distichously spreading, 10 • 15 x 2.5 10.0 cm, oblong or oblong lanceolate, obtuse at base. Male flowers in axillary, 2 to 7 - flowered cymes ; female flowers axillary, solitary. Calyx of female flowers dilated and subcordate at the base. Stamens 24 64, in pairs ; anthers with a line of hairs upto the middle. Fruits globose, 8 - celled, clothed with rusty scurfiness. Seeds 4 - 8, flattened, reddish brown.

Fl. & Fr. : March - June.

Very rare ; included on the authority of Ramdeo (1969) from Udaipur and Sharma (1958) from Ajmer.

3. *Diospyros melanoxylon* Roxb. Pl. Cor. I : 36. t. 46. 1795 ; Clarke in Hook. f. Fl. Brit. India 3 : 564. 1882. *D. tupru* Buch. - Ham. in Trans. Linn. Soc. 1 : 563. v. *tomentosa* sensu Duthie, Fl. Gangetic Plain 2 : 15. 1911, non Roxb. 1832. 'rendu, Timru' (Hindi).

Deciduous trees, 4 8 m high. Bark exfoliating in 4 • angular scales. Leaves 5 17 X 4 12 cm, ovate elliptic or oblong, coriaceous, pubescent, acute at base. Male flowers in subsessile, drooping cymes. Anthers 4 - 16, linear • lanceolate, not awned. Female flowers solitary. Sepals of fruiting calyx fulvous tomentose with recurved and wrinkled margins. Ovaries 4 to 8 - celled, hairy. Fruits 2 - 4 cm in diam., globose or ovoid, glabrous, yellow when ripe. Seeds obovate oblong, blackish.

Fl. : April - May ; Fr. : June - November.

Fairly common in the forests and wastelands, particularly on and in the east Aravalli.

Selected specimens : Ajmer : Todgarh, Duthie 4730, 4730 A (DD) ; Banswara : Rowal Hindvcla forest, Singh 2875 (BSJO) ; Jaipur : Sogar : Sharma 1059 (RUBL) ; Kota : Shahabad, Verma 614 (BSA) ; Sirohi : Mt. Abu. Mc Cann 5854 (BLAT).

4. *Diospyros montana* Roxb. Pl. Cor. I : 37. t. 48. 1795 ; Wight, Ic. 4(1) : 10. t. 1225. 1848 ; Clarke in Hook. f. Fl. Brit. India 3 : 555. 1882, pro parte ; Duthie, Fl. Gangetic Plain 2 : 15. 1911. 'Timru' (Hindi).

Shrubs or trees, with hairy twigs. Leaves 3.10 x 2 - 5 cm, ovate elliptic, acute, cuneate or cordate at base, pubescent beneath, chartaceous. Male flowers in cymes ; female ones solitary. Calyx lobes 4, flat in fruiting stage. Corolla lobes 5, ovate, acute, pubescent. Stamens 15 ; staminodes present in female flowers. Pistillode conical. Fruits 2.0 - 2.5 cm in diam., globose, glabrous.

Fl. & Fr. : Summer and rainy seasons.

Occasional, in wastelands. Plants resemble closely *D. cordifolia* Roxb.

Selected specimens : Banswara : Bagidora. Kanodia 75630 (BSI) ; Bhilwara : Parvatipur, Singh 6595 (BSJO) ; Kota : Bara - bagh, Singh 74081 (LWG) ; Pali : Ranakpur, Shelly 1493 (BSJO) ; Udaipur : Kanodia 82310 (Bsn).

DOUBTFUL TAXON

Diospyros tomentosa Roxb. Fl. Ind. 2 : 532. 1832,

Moderate sized tree, closely resembling *D. melanoxylon* Roxb. except that leaves are rounded or obtuse at the base and staminodes are

Duthie (l.c.) considered *D. tomentosa* Roxb. & *D. melanoxylon* Roxb. as conspecific. Hiern (Trans. Camb. Philos. Soc. 12 : 147, 158, 159. 1873) considers them as distinct species. Enough material is not available in the hands of authors, therefore, it is not possible at this moment to comment with certainty on the taxonomy of these two taxa. However, there are possibilities of the occurrence of *D. tomentosa* Roxb. too in Rajasthan, if it is a distinct species.

77. OLEACEAE

(V. Singh)

1a. Fruit a capsule :

2a. Shrubs, with simple leaves. Capsules flattened...2. *Nyctanthes*

2b. Trees, with imparipinnate leaves. Capsules obovoid, turgid. 3. *Schrebera* lb.
Fruit a berry. 1. *Jasminum*

I. JASMINUM L.

~~*Smilax*~~ *humile* L. sp. Pl. 7. 1753 ; Clarke in Hook. f. Fl. Brit. India 3 : 602. 1882 ; Duthie, Fl. Gangetic Plain 2 : 24. 1911. 'Pili Chamell' (Hindi).

Semi evergreen, erect shrubs. Leaves alternate, 2 - 10 cm long, sometimes revolute ; leaflets 3 • 7, elliptic, ovate or lanceolate, acute or obtuse, paler beneath. Flowers in terminal corymbose cymes. Bracts small, linear. Calyx • tube c. 3 mm long ; tube short. Corolla yellow ; tube 1.0 - 2.5 cm long ; lobes broadly ovate - obtuse, reflexed in open flower. Berries simple or didymous, globose • ellipsoid, 4 • 6 mm long, black when ripe ; juice crimson.

Fl. & Fr. : August - October.

Rare, found on Mt. Abu in wild state. Usually cultivated ornamentally in the gardens.

Selected specimen : Dundi : PWD Dak Banglow, Singh 74724
(LWG).

Nyctanthes arbor tristis L. Sp. Pl. 6. 1753 ; Beddome, Fl. Sylv. 2 : 240. t. 240. 1872 ; Clarke in Hook. f. Fl. Brit. India 3 : 603. 1882 ; Duthie, Fl. Gangetic Plain 2 : 24. 1911 ; Kundu & Anima in Bull. Bot. Surv. India 10 : 397. 1969. 'Harsingar» Tamat' (Hindi).

Large shrubs, with 4 angled branches. Leaves opposite, 4 - 11 x 2.7 cm, ovate or ovate - lanceolate, acute or acuminate, distantly serrate, scabrous with unicellular, warty trichomes and glandular hairs. Flowers white to orange, fragrant, sessile, 3 to 5 together on axillary, solitary or fascicled peduncles or in terminal 3 cymose cymes. Bracts ovate. Ovule basal. Capsules 1.3 - 2.0 x 1.2 - 2.0 cm, orbicular, compressed, 2 celled, separating into 2, 1 seeded pyrenes.

Fl. & Fr. : August - November.

Abundant in the forests, often so densely that even movement becomes difficult ; also cultivated in the gardens for ornamental purposes.

Selected specimens : Banswara : Loharia forest, Singh (BSJO) ; Chittorgarh : Pra(argarh, Majumdar 12313 (BSA) ; Kota : Shahabad, Majumdar & Muni 10864 (BSA) ; Pali : Kan Pahar, Pandey 10380 (BSJO) ; Sirohi : Mt. Abu, Mehta 997 (JAC).

3. SCHREBERA Roxb. nom. cons.

Schrebera swietenoides Roxb. Pl. Cor. 2 : 1. t. 101. 1799 ; Clarke in Hook. f. Fl. Brit. India 3 : 604. 1882 ; Duthie, Fl. Gangetic Plain 2 : 25. 1911. 'Mokha' (Hindi).

Deciduous trees, 10 - 20 m high, with scabrous, ash - coloured bark. Leaflets 7 - 9 pairs, opposite, 5 - 9 x 3.5 - 5 cm, ovate, abruptly acuminate, entire. Flowers white, in cymes. Calyx irregularly 4 to 6 - toothed. Corolla with brown glandular dots on the inner surface. Capsules 4.5 x 2.5 - 3.0 cm, pendulous, pear - shaped, woody, 2 valved, with white lines on the surface. Seeds winged.

Fl. & Fr. : February - May.

Occasional, in mixed forests on the hills. Trees appear beautiful when in full bloom.

Selected specimens : Bundi : Kota - Dam, Singh 74720 (LWG) ; Jhalawar : Verma 3397 (BSA) ; Sirohi : Mt. Abu, Blatler 18105 (BLAT). Also reported from Kota (Jain and Kotwal, 1960) and Udaipur (Vyas, 1965).

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CULTIVATED SPECIES

Jasminum arborescens Roxb. 'Chameli, Bana'cunda' (Hindi) Scandent shrubs, with simple leaves and white flowers in lax cymes. Cultivated for ornamental purposes.

Jasminum auriculatum Vahl Scandent shrubs, with 1 to 3 foliolate leaves and white flowers in cymes. Cultivated for ornamental purposes.

Jasminum azoricum L. - Scandent or climbing shrubs, with 3 foliolate leaves and white flowers in axillary and terminal cymes or panicles. Cultivated ornamentally.

Jasminum grandiflorum L. 'Chameli' (Hindi) - Scandent or climbing shrubs, with imparipinnate leaves having 4-7 pairs of leaflets and white flowers in lax panicles. Cultivated ornamentally.

Jasminum multiflorum (Burm. f.) Andrews (*Nyctanthes multiflora* Burm. f.) 'Gulcharia' (Hindi) - Scandent shrubs, with simple leaves and white flowers in dense capitate cymes. Cultivated ornamentally.

Jasminum odoratissimum L. - Climbing shrubs, with pinnate leaves and yellow flowers. Cultivated for ornamental purposes.

Jasminum officinale L. 'Chameli' (Hindi) - Climbing shrubs, with pinnate leaves and white flowers. Cultivated ornamentally.

Jasminum rottlerianum Wall. ex A. DC. - Scandent shrubs, with simple leaves and white flowers in terminal capitate cymes. Cultivated ornamentally.

Jasminum roxburghianum Wall. ex DC. 'Chameli' (Hindi) - Climbing shrubs, with simple leaves and white flowers in trichotomous cymes.

Jasminum sambac (L.) Ait. (*Nyctanthes sambac* L.) 'Mogra' (Hindi) Scandent or climbing shrubs, with simple leaves and white flowers which are solitary or in 3-flowered cymes.

78. SALVADORACEAE

(V. Singh)

SALVADORA L.

Leaves ovate-lanceolate, more than 1.5 cm in diameter. Flowers *dicellate. Fruits red when **ripe**. 2. *S. persica*

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Leaves linear - lanceolate, upto 1.3 cm in diameter.
Flowers sessile. Fruits yellow when ripe.

. *S. oleoides*

1. *Salvadora oleoides* Decne. in Jacq. Voy. Bot. 140. t. 144. 1844 ; Clarke in Hook. f. Fl. Brit. India 3 : 620. 1882 ; Duthie, Fl. Gangetic Plain 2 : 29. 1911 ; Mahesh. Illus. Fl. Delhi f. 119. 1966. 'Pilu, Khara, Jai' (Hindi).

Evergreen trees, 3-5 m high, with short, twisted trunks and drooping branches. Leaves 6.5-10.0 x 0.7-1.3 cm, entire, coriaceous. Flowers greenish-white, in axillary, panicled spikes. Bracts ovate, acute, deciduous. Calyx-lobes 4, rounded. Stamens exserted, epipetalous. Drupes globose, 1-seeded.

Fl. & Fr. : February-June.

Common in dry sandy and saline soils, often on hard rocky grounds.

Selected specimens : Barmher : Rao : 66868 (BSA) ; Bundi : Mangli river, Verma 1661 (BSA) ; Jaipur : Amer, Sharma \$UUI (RUBL) ; Jodhpur : Mandore, Verma 594 (BSJO) ; Sirohi : Vadakheda, Jain 60448 (BSI).

2. *Salvadora persica* L. sp. Pl. 122. 1753 ; Wight, [c. 4(4) : 18. t. 1 621. 1850 ; Clarke in Hook. f. Fl. Brit. India 3 : 619. 1882 ; Duthie, Fl. Gangetic Plain 2 : 28. 1911. 'Pilu, Dhalu, Mitha Jai' (Hindi).

Evergreen trees, 4-7 m high, with drooping branches. Bark greywhite. Leaves 3-8 x 1.5-3.5 cm, fleshy, acute. Flowers dull yellow, in compound panicles longer than leaves. Bracts ovate, shorter than pedicels, deciduous. Calyx-lobes rounded. Stamens exserted, epipetalous. Drupes globose, 1-seeded.

Fl. & Fr. : December - June.

Common in dry wastelands, often forming compact clumps.

Selected specimens : Banswara : Loharia, Singh 4240 (BSJO) , Bikaner : Shivbari, Roy 2394 (BSJO) ; Jaipur : Amer. Parker 5953 (DD) ; Kota : Barm, Singh 90494 (LWG) ; Sirohi : Abu Road, Kaul 9386 (LWG).

79. APOCYNACEAE

(V. Singh)

Ia. Plants armed with spines. Fruit an indehiscent berry. *Cari'sa*

Ib. Plants unarmed. Fruit of dehiscent follicles .

- | | | |
|---|-----|-----------------|
| 2a. Erect herbs. Seeds not comose. | ... | 2. Catharanthus |
| 2b. Trees, shrubs or shrubby climbers. Seeds comose | | |
| : | | |
| 3a. Anthers conniving in a cone and adhering to the stigma : | | |
| 4a. Corolla - throat villous or with fimbriate scales inside : | | |
| 5a. Trees. Corolla - lobes overlapping | | |
| to the left. | | 6. Wrightia |
| 5b. Shrubby climbers. Corolla - lobes overlapping to the right. | . | 4. Ichnocarpus |
| 4b. Corolla - throat naked. | | 5. Vallaris |
| 3b. Anthers free, not adhering to the stigma. | ... | 3. Holarrhena |

1. **CARISSA** r mnm pnme-

- | | | |
|--|-----|-----------------------|
| Spines paired. Berries about 1.5 cm in diameter. | ... | 1. <i>C. congesta</i> |
| Spines solitary. Berries about 7 mm in diameter. | ... | 2. <i>C. spinarum</i> |

1. *Carissa congesta* Wight, Jc. 4(2) : 1. t. 1289. 1848. *C. carandus* auct. plur. non L. 1767 ; Hook. f. Fl. Brit. India 3 : 630. 1882, pro parte ; Duthie, Fl. Gangetic Plain 2 : 31. 1917, pro parte. 'Karaunda, Jal' (Hindi).

Erect or scandent shrubs, armed with straight, paired, horizontal spines. Leaves 2 - 6 X 1.5 - 4.0 cm, elliptic-oblong to ovate, acute, mucronate. Flowers white, in corymbose cymes. Calyx lobes acute. Corolla tube 10 - 15 mm long ; lobes 5 - 7 mm long. Berries 1.3 - 2.5 X 1.0 - 1.5 cm, elliptic-oblong, fleshy, 2 - celled, 4 seeded.

Fl. : January - April ; Fr. : May - Junco

Usually met with in the forests and 'evastclands' ; abundant at Sitabari (Kota) ; also cultivated in the gardens for its edible fruits.

Selected specimens : Banswara : Anand Sagar, Singh 4614 (BSJO) ; Churu : Roy 4022 (BSJO) ; Jaipur : Raj. College, R. Singh Acc. No. 10479 (RUBL) ; Kota : Shahabad, Singh 91042 (LWG) ; Sirohi : Mt. Abu, Blatter 21982 (BLAT).

2. *Carissa spinarum* L. Mant. Pl. 2 : 559. 1771 ; Hook. f. Fl. Brit. India 3 : 631. 1882 ; Duthie, Fl. Gangetic Plain 2 : 32. 1911. 'Karaunda' (Hindi).

Large, thorny, evergreen shrubs. Leaves 1.3 - 3.0 x 1.0 - 2.5 cm, elliptic or broadly ovate-suborbicular, acute or mucronate, entire, often revolute -

margincd. Flowers whitc or tinged with pink, scented, in terminal and axillary, corymbose cymes. Calyx dividcd ncarly to the base ; lobes acuminate. Berries subglobose, dark - purple at maturity, 4 scedcd. Sceds ovate.

Fl. : January April ; Fr. : May - August.

Rarc ; in dry stony grounds in wastelands and open forests.

Selected specüens : Jhalawar : Aklera, Majumdar & Mishra 10035 (BSA) ; Kota : Chhabra Gaugor, Singh 90948 (LWG) ; Sirohi : Mt. Abu, Mehta 896 (JAC).

2. CATHARANTHVS G. Don

Catharan(hus pusillus (Murr.) G. Don, Gen. Hist. 4 : 95. 1837 ; Mahesh. Illus. Fl. Delhi f. 120 1966. Vinca pusilla Murr. Novi Comm. soc. Reg. sci. Gotting. 3 : 66. t. 2. f. 1. 1773 ; Hook. f. Fl. Brit. India 3 : 640. 1882. Lochnera pusilla (Murr.) K. Schum. in Engl. & Prantl, Pflanz.

4(2) : IRO' • Dltth;e Gangetic Pin;n 9 . 34. 1911. 'Hingmu' (Hindi).

Erect, glabrous, annual herbs, 15 - 50 cm high. Leaves 3.7 x 0.7 - 2.0 cm, lanceolate, acute, entire. Flowers 1.0 - 1.5 cm long, white, sessile, axillary, solitary or paired. Corolla - tube upto 1 cm long. dilated at the top. Filaments short ; anthers exserted. Carpels 2, free, glabrous or pubescent. Follicles 3.5 - 5.0 cm long, linear, pointed, many - ribbed. Seeds oblong, black, longitudinally muricately ribbed.

Fl. & Fr. : July - September.

Common and abundant in the fields, gardens, wastelands and forests.

Selected specimens : Banswara : Palda, Singh 2829 (BSJO) ; Jaipur :

F - neoz Sirchi : Mt. Kathoon, Abu, 2290 (BLAT) ; Tonk • Niwai, Shelly 1247 (BSJO).

3. HOLARRHENA R. BC.

Holarrhena pubescens (Buch. Ham.) Wall. ex G. Don. Gen. Kist. 4 : 78. 1837. Echites pubescens Buch. Ham. in Trans. Linn. Soc. 13 : 521. 1821. Nerium antidysentericum L. Sp. Pl. 209. 1753, nom. ambig. Echites antidysentericum (L.) Roxb. ex Flemm. in Asiat. Res. 2 : 166. 1810, pro parte. Holarrhena antidysenterica (L.) Wall. ex A. DC. in DC. Prodr. 8 : 413. 1844. pro parte ; Hook. f. Fl. Brit. India 3 : 644. 1882 ; Duthie, Fl. Gangetic Plain 2 : 35. 1911. "Inderjo, Dudhie, Akariyo' (Hindi).

Shrubs or small trees, 3 - 6 m high, with blackish brown bark. Leaves 5 - 30 x 5 - 15 cm, ovate elliptic, abruptly acuminate. Flowers white, in

corymbose cymes. Corolla tube pubescent. Stamens inserted near the base of corolla tube. Follicles 20 40 x 0.5 - 1.0 cm, cylindrical, lenticelled. Seeds linear oblong, compressed, comose.

Fl. : May June ; Fr. : June September.

Common in the forests in hilly tracts. Often confused for *Wrightia tinctoria* R. Br.

Selected specimens : Banswara : Chhatripoda forest, Singh 2977 (BSJO) ; Jaipur : Daosa, Wad/nca 8124 (BSA) ; Kota : Verma 3301 (BSA); Pali : Paras Ram Mahadco, Shetty 1904 (BSJO) : Udaipur : Jaisamand _____ Kanodia 82247 (BSD).

4. ICHNOCARPUS R. Br. nom. cons.

Ichnocarpus frutescens (L.) R. Bro Mem. Wern. Nat. Hist. Soc. I : 62. 1811 et in Ait. f. Hort. Kew. cd. 2. 2 : 69. 1811 ; Wight, lc. 2 (2) : 2. t. 430. 1840 43 ; Hook. f. Fl. Brit. India 3 : 669. 1882 ; Duthie, Fl. Gangetic Plain 2 : 41. 1911. *Apocynum frutescens* L. Sp. Pl. 213. 1753. 'Kali Dudhi' (Hindi).

Large twining shrubs. Leaves 4 10 X 3.5 cm, elliptic oblong or ovate lanceolate, acute to acuminate, entire. Flowers greenish white, rarely rose coloured, in trichotomous cymes. Corolla • tube narrow below, globular in the middle and constricted in upper part with white hairs inside. Follicles 7 15 cm long, straight, cylindrical, rusty pubescent when young, glabrous at maturity. Seeds linear, black.

Fl. & Fr. : September • February.

Common among bushes in the forests, on the boundaries of fields and gardens. Plants prefer moist and shady localities in the east of Aravalli.

Selected specimens : Alwar : Siligarh, Hiralal 34522 (LWG) ; Jaipur : Jo!ana hills, Sharma 1366 (RUBL) ; Jhalawar : Asnawar, Verma 6888 (BSA) ; Kota : Darah, Jain 28759 (BSA).

5. VALLARIS N.C. Burman

Vallisneria spiralis (L.) Kuntze, Rev. Gen. Pl. 2 : 447. 1891. *Peltanthera solanacea* Roth, Nov. Pl. Sp. 132. 1821. *Vallisneria heynei* Spreng. syst. veg. I : 635. 1825 ; Duthie, Fl. Gangetic main 2 : 37. 191 1. *Echites dichotoma* Roxb. Fl. Ind. 2 : 19. 1832. *Vallisneria dichotoma* (Roxb.) Wall. ex G. Don, Gen. Hist. 4 : 79. 1837 ; Wight, lc. 2 (2) : 2. t, 438. 1840-43. 'Dudhi bel' (Hindi).

Twining or straggling shrubs. Bark light grey. Leaves 5

2.5 cm, elliptic or ovate oblong, glabrous, gland-dotted. Flowers white, in lax, axillary cymes. Calyx glandular. Anthers exerted, glandular, inserted

near the base of tube. Follicles 10 • 15 cm long, cylindric. Seeds ovoid, beaked ; coma silvery white.

Fl. & Fr. : December - April.

Rare, in valleys among bushes, often on the boundaries of fields and gardens ; also cultivated for ornamental purposes.

Selected specimens : Jaipur : Maheshwari 67 (DD) ; Kota : Shaha^bad, Wadhwa 9254 (BSA) ; Sirohi : Mt. Abu, Jain 62086 (BSI). Also reported from Alwar and Udaipur (Vyas, 1967 ; Ramdeo, 1969).

6. WRIGHTIA R. Br,

Follicles smooth, paired, cohering at the apex only
i.e. two fruits produced by each flower.

2. *W. tinctoria*

Follicles rough with white tubercles, solitary due to complete fusion of two follicles i.e. one fruit produced by each flower. *W. arborea*

1. *Wrightia arborea* (Dennst.) Mabb. in *Taxon* 26 : 533. 1977. ^{Periploca} *arborea* Dennst. *Schluscl Hort. Malab.* 13, 23 & 25. 1818 & in *Fort. Allg. Teut. Gort. - Mag.* 3 : 32, 41 & 83. 1818. *Wrightia tomentosa* Roem. & Schult. *syst. veg.* 4 : 414. 1819 ; Wight, *lc.* 2 (2) : 2. t. 443. 1841 ; Hook. f *Fl- nrit. India* 3 : 653. 1882 ; Duthie. *Fl. Gangetic Plain* 2 : 39. 1911. 'Kala Kunda' (Hindi).

Trees, 6 - 15 m high, with ash - coloured bark. Leaves 3 - 11 X 1.5 - 5.0 cm, elliptic or ovate oblong, acute or obtuse. tomentose.

Flowers creamy - white, in terminal, tomentose cymes. Corona scales, oblong. Anther apex not ciliate. Follicles 15 - 20 x 1 - 2 cm, stout, Cylendric, not ribbed. Seeds linear • oblong ; coma longer than seeds.

Fl. : December July ; Fr. : January September.

Frequent in the forests in hilly tracts ; often planted in the gardens.

Selected specimens : Bhilwara : Banera, Singh 6018 (BSJO) ; Jaipur : JaJana hills, Sharma 981 (RUBL) ; Kota : Bara - bagh, Singh 74711 (LWG) ; Pali : Ghanerao forest, Pandey 4648 (BSJO) ; Sirohi : Mt. Abu, Mehta 645 (JAC) ; Tonk : Toda Rai Singh Forest, Shelly 552 (BSJO).

2. *Wrightia tinctoria* (Roxb.) R. Br. in Mem. Wern. Soc. 1 : 74. 1811 ; Wight, lc. 2. (2) : 2. t. 444. 1841 ; Hook. f. Fl. Brit. India 3 : 653. 1882 ; Duthic, Fl. Gangetic Plain 2 : 38. 191 1. *Nerium tinctorium* Roxb. Orient. Reprt. I : 39. 1791, cum. tab. 'Dudhi, Koru, Kerni' (Hindi).

Deciduous trees or large shrubs, 5-10 m high. Bark fissured, greyish black. Leaves 4.5 - 15.0 x 2.5-7.0 cm, elliptic lanceolate or oblong, glabrous or pubescent. Flowers white, in dichotomous cymes. Corolla corona of many lacinate scales. Anther apex ciliate. Follicles 15-50 x 0.6 cm, cylindrical, drooping, longitudinally striated, black. Seeds brown ; coma longer than seeds.

Fl. : March-May ; Fr. : June-October.

Common in the forests, particularly in hilly tracts.

Selected specimens : Banswara : Daga Bowji, Singh 2859 (BSJO) ; Barmar : Balotra, Shetty 2258 (BSJO) ; Jaipur : Moti Dungri, Sharma 1599 (RUBL) ; Kota : Shahabad, Majumdar 10491 (BSA) ; Sirohi : Mt. Abu, Jain 62075 (BSI).

CULTIVATED SPECIES

Allamanda cathartica L. - Trailing shrubs, with bright yellow flowers in terminal cymes. Native of Brazil ; cultivated for ornamental purposes,

Alstonia scholaris (L.) R. Br. (*Echile scholaris* L.) Trees, with oblanceolate leaves in whorls and greenish yellow flowers in cymes. Planted for ornamental purposes.

Baumontia grandiflora Wall. - Evergreen climbers, with elliptic-ovate leaves and white flowers in cymes. Native of E. Himalaya ; cultivated for ornamental purposes.

Catbarantbus roseus (L.) G. Don (*Vinca rosea* L.) 'Sadaphuli' (Hindi) - Perennial herbs, with white or rosy, solitary, axillary flower'. Native of Tropical America ; cultivated for ornamental purposes.

Ersatamia divaricata (L.) Durkill (*Nerium divaricalum* L.) 'Chandni' (Hindi) • Evergreen shrubs, with white flowers in dichotomous cymes. Native of Tropical Asia ; cultivated for ornamental purposes,

Nerium oleander L. 'Kaner' (Hindi) Evergreen shrubs, with white or red flowers in cymes. Native of Mediterranean region ; cultivated for

ornamental purposes.

Plumeria rubra L. - Small trees, with obovate - lanceolate leaves and white flowers with yellow eye. Native of America ; cultivated for ornamental purposes.

Rauvolfia serpentina (L.) Benth. ex Kurz (*Ophioxylon serpenlinum* L.) Woody shrubs, with elliptic leaves in whorls of 3 and white or pink flowers in corymbose cymes.

Thevetia peruviana (Pers.) Mere. (*Cerbera peruviana* Pers.) 'Pili Kaner' (Hindi) Shrubs or small trees, with linear leaves, yellow flowers and subglobose fruits. Native of Tropical America ; cultivated for ornamental purposes.

80. ASCLEPIADACEAE

(P.J. Parmar)

Ia. Plants succulent :

28. Twining shrubs, Stem jointed, cylindric.

Corolla pale yellowish.

...

13. *Sarcoslemma*

2b. Erect or ascending herbs. Stem not jointed, quadrangular. Corolla purplish.

2. *Caralluma*

Ib. Plants not succulent :

3a. Erect herbs or shrubs (except *Leptadenia reticulata*)

:

4a. Follicles echinate.

...

8. *Odonlanthera*

4b. Follicles smooth ;

Sa. Anthers with a membranous appendage.

Pollen - masses pendulous. Follicles in pairs.

1. *Calotropis*

5b. Anthers incumbent on the stigma. without a membranous appendage

Pollen masses erect. Follicles solitary :

6a. Calyx turbinate, 5 lobed. Corolla pale.

E r e c t

Anther - tips

pendiculate.

.

6. *Leptadenia*

6b. Calyx 5 partite. Corolla dull •

brown. Anther • tips inappendiculate. ...

9. *Orthanthera*

3b. Plants climbing or scrambling :

OF

- 7a. All leaves deeply cordate '
 8a. Cymes dichasially branched, sessile or shortly peduncled. 7. Marsdenia
- 8b. Cymes umbellate or racemose, not dichasially branched, long peduncled :
 9a. Corolla salver-shaped ; lobes densely pilose within. Follicles echinate. 12. Pergularia
- 9b. Corolla rotate or shallowly campanulate ; lobes glabrous. Follicles smooth :
 IOa. Peduncles shorter than the petioles. Corolla purplish-crimson. .. 5. Holostemma
- 10b. Peduncles equalling or exceeding the petioles. Corolla greenish. . 16. Wattakaka
- 7b. Leaves not or very shallowly cordate or only the lower ones cordate :
 J la. Flowers in lax, dichasially branched or in dense umbellate cymes, but in latter case cymes paired at the nodes :
 i2a. Calyx - lobes acute. Corolla rotate. ... **15.** rylophora
- 12b. Calyx • lobes obtuse. Corolla campanulate. 4. Gymnema
- I lb. Flowers in umbellate or racemose cymes. Cymes solitary at the nodes :
 13a. Flowers greenish - yellow :
 14a. Cymes sub - sessile. Corolla divided to the base. **ii** . Pentatropi\$
- 14b. Cymes peduncled. Corolla tubular ; lobes twice as long as the tube. 14. Telosma
- 13b. Flowers white, often purplish • red within .
 158. Corolla tubular ; lobes connate with their tips. , 3. Ceropegja
- 15b. Corolla rotate ; lobes not

coherent with their tips. .. 10. Oxystelma

1. CALOTROPIS R. Bre

Corolla buds ovoid ; corona • lobes hairy, shorter than the staminal column, with two obtuse auricles just below the apex. t. *C. gigantea*

Corolla - buds hemispherical ; corona lobes glabrous, equalling or longer than staminal column, without auricles. 2. *C. procera* subsp.

hamiltonii

1. *Calotropis gigantea* (L.) R. Bro in Ait. Hort. Kew. ed. 2. 2 : 78, 1811 ; Hook. f. Fl. Brit. India 4 : 17. 1883 ; Duthie, Fl. Gangetic Plain 2 : 48. 1911. *Asclepias gigantea* L. Sp. Pl. 214. 1753. 'Shiv Aak' (Hindi).

Erect shrubs or small trees, with ash coloured bark, clothed with white pubescence all over. Leaves sessile, 6 - 18 X 3 • 10 cm, elliptic - oblong or obovate oblong, acute to acuminate at apex, semi amplexicaul at base. Flowers in terminal and lateral umbellate cymes. Corolla 2 - 4 cm in diam., purplish or white. Follicles 7 10 x 3 4 cm, glaucous green, recurved. Seeds 5 6 mm long, broadly ovate, flat, comose.

Fl. & Fr. : Almost throughout the year.

Not common, found in wastelands.

Selected specimens : Bundi : Baijnath Mahadev temple, Singh 74732 (LWG) ; Jodhpur : Near Umaid Garden, Roy 2459 (BSJO) ; Sirohi : Mt. Abu. Mehta 647 (JAC) ; Udaipur : Sharma Acc. No. 12052 (RUBL). Also reported from Ajmer (Sharma, 1958), Jaipur (Bajpai & Verma, 1964), Jhunjhunu (Nair, 1956, 1961) and Bikaner (Sarup, 1958).

2. *Calotropis procera* (Ait.) Ait. f. subsp. *hamiltonii* (Wight) Ali in Notes Roy. Bot. Gard. Edinburgh 38 (2) : 287 - 290. f. 1 C D. 1950. *C. hamiltonii* Wight, Contrib. Bot. Ind. 53. 1834, *C. procera* auct. non (Ait.) Ait. f. 1811 ; Wight, l.c. 4 17. t. 1278. 1848 ; Hook. f. Fl. Brit. India 4 : 18. 1883 ; Duthie, Fl. Gangetic Plain 2 : 48. 1911. 'Madar, Aak' (Hindi).

Erect shrubs or small trees, covered with white pubescence; branches many from the base. Leaves 5 - 12 x 1.5 8.0 cm, broadly ovate, ovate - oblong, elliptic or obovate, acute at apex, cordate at the base. Flowers in umbellate, lateral cymes. Corolla c. 2.5 cm in diam., pure white to whitish - purple. Follicles 6.5 • 9.5 X 3 - 5 cm, ellipsoid or ovoid, recurved, tip not invaginated in the fruit. Seeds 6 - 8 mm long, flat, broadly ovate ; coma silky, upto 5 cm long. Fl. & Fr. : Throughout the year.

Fairly common throughout the state in wastelands.

Selected specimens : Ajmer : Taragarh, Duthie 4739 (DD) ; Alwar : Malarwa, Parmar 9662 (BSJO) ; Banswara : Ghatol, Singh 2896 (BSJO) ; Bikaner : Near Charkara, Rby 1648 (BSJO) ; Jaisalmer : Sam, Pandey 7802 (BSJO) ; Jhalawar : Akiera, Verma 3453 (BSA) ; Sirohi : Mt. Abu, Raul 9577 (LWG).

2. CARALLUMA R. Br.

Caralluma edulis (Edgew.) Benth. & Hook. gen. PI, 2' : 1876 i Hook. f, Fl. Brit. India 4 : 76. 1883 ; Bhandari, Fl. Ind. Desert 220. t 70. 1978. *Boucerosia edulis* Edgew. in Journ. Linn. Soc. Bot. 6 : 205. t. 1 . f. 1 • 8. 1862. (Hindi).

Erect. succulent herbs, 15 60 cm high ; branches subteret 4 angled. Leaves 0.6 1.3 cm long, linear or ovate - lanceolate, acute, caducous. Flowers I ' 3, in the axils of leaves, all along distal nodes. Corolla campanulate, c. 7 mm long, purplish inside ; lobes ovate lanceolate, acute, glabrous within. Corona in two rows ; outer cupbdate 5 - lobed, each lobe produced into 2 distinct, subulate teeth inqer one linear- snhacute Follic Tee R - 1 ' cm lone- landébtate. tetéte. sM06tN.%Seedn brown, winged on the margins ; coma g. 2.5 gm long,

Fl. & Fr. : February September.

Rare. in desertic habitats.

Seleled specimens : Jainlmer : Bhandart 2141 (JAC) ; Mohadnâ, B'adhwa 5071 (BSA).

3. CEROPEOJA L.

'a. Ereee.

... 1. *C. attenuata*

1b. Twining herbs :

2a. Leaves usby :

477 3a. Lacvoo oâiculu •r ovate, omcrainow or

apicuJaI\$, long petioled.

... 2. *C.* var. bylbpsa

3b. Loaws Unear to lancöoiae, subs—silo.

... *C.* in!Dasa are

2b. Leaves membranous:

48. Corolla • equal br ~~unser~~ neuh

... *C.* smefolta

FLORA OF RAJASTHAN

4b. Corolla lobes shorter than the tube :

5a. Plants glabrous.

4. *C. eandelabrum*

5b. Plants pubescent.

V. nitrifida

1. *Ceropegia attenuata* Hook. Ic. Pl. ser. 2 : 5. t. 867. 1852 ; Hook. f. Fl. Brit. India 4 : 67. 1883 ; Sharma & Tiagi, Fl. North - East Rajasthan 237. 1979 ; Ansari, Fasc. Fl. India 16 : 9. 1984.

Tall, tuberous herbs. Stem usually one, rarely two or three from same tuber, hairy above. Leaves subsessile, 4.8 x 0.7 - 1.0 cm, linear, acute, tapering at base. Cymes axillary or extra-axillary, shortly peduncled, 1 to 2 flowered. Corolla tube inflated in lower part, narrowed above, enlarge near the mouth, yellowish green outside, striated with purple inside. Outer corona of 5, bifid, ciliate lobes. Follicle c. 7.5 cm long, straight, tapering to a fine point. Seeds 4.0 x 1.5 mm, ovate-oblong, comose.

Fl. & Fr. : July - October.

Rare, in exposed rocky grounds.

Selected specimen : Jaipur : Gaita, Sharma 2270 (RUBL).

mentioned

Rajasthan.

2. *Ceropegia bulbosa* Roxb. Pl. Cor. I : 11. t. 7. 1795 ; Wight, Ice 3(2) : 4. t. 845. 1844 - 1945 ; Hook. f. Fl. Brit. India 4 : 67. 1883 ; Duthie, Fl. Gangetic Plain 2 : 66. 1911 ; Ansari, Fasc. Fl. India 16 : 10. 1984, var. *bulbosa*

Twining, perennial herbs, with an underground, tuberous stem, Leaves 2.5 - 4.5 x 3.5 cm, glabrous. Cymes peduncled, 6 to 10 flowered. Corolla 1.5 - cm long ; tube inflated at base, funnel-shaped at the mouth, glabrous within ; lobes linear, hairy within, Follicles 8.5 x 9.0 cm long, glabrous, terete. Seeds linear-oblong, with membranous wings.

Fl. & Fr. : July - December.

Rare, in exposed rocky habitats, particularly on hillocks.

Selected specimen : Jodhpur : Mandore, Tiwari 625 A (BSJO).

3. var. *lusbii* (Grah.) Hook. f. Fl. Brit. India 4 : 68. 1883 ; Coote, Fl. Bombay 2 : 176. 1904 ; Ansari, Fasc. Fl. India 16 ll. 1984. *Ceropegia lushii* Grah. in Dot. Mag, t. 3300. 1834. C. Edgew. in J. Linn.

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OF

Soc. 5 : 204. 1862. *C. bulbosa* Roxb. var. *esculenta* (Edgew.) Hook. f. l.c. 4 : 68, 1883.

Very similar to the type, but can be easily distinguished by its linear to lanceolate, subsessile leaves.

BOTANICAL SURVEY INDIA

Fl. & Fr. : July - December.

Frequent among bushes on the outskirts of forests.

Selected specimens : Barmer : Bhandari 1543 (JAC) ; Jaipur : Ramgarh, Sharma 1343 (RUBL) ; Jhalawar : Lotiajhil, Wadhwa 5499 (BSA) ; Jodhpur : Mandore (on hills), Tiwari 625 B (BSJO) ; Udaipur : Kanodia 82209 (BSI).

4. *Ceropegia candelabrum* L. sp. Pl. 211. 1753 ; Hook. f. Fl. Brit. **India** 4 : 70. 1883 ; Cooke, Fl. Bombay 2 : 176. 1904 ; Ansari, Fasc. Fl. India 16 : 12. 1984. *C. elliotii* Hook. f. l.c. 4 : 70. 1883.

Glabrous twiners. Leaves variable, petioled, linear to orbicular. Flowers many, in lateral umbellate cymes ; pedicels shorter than peduncles. Corolla 3.0-4.0 cm long ; tube inflated in lower half ; lobes truncate or narrowed into a beak, 5-8 mm long, hairy within. Outer corona of 5 truncate hairy lobes ; the inner corona linear • spatulate.

Fl. & Fr. : August • March.

This species is a denizen of South India and included here on the authority of Nair (1956, 1961) and Nair & Nathawat (1957) who reported it from Jhunjhunu and Sikar districts respectively.

5. *Ceropegia hirsuta* Wight & Arne in Wight, Contrib. 30. 1834 ; Hook. f. Fl. Brit. India 4 : 71. 1883, include all vars. except var. *vincaefolia* (Hook.) Hook. f. ; Cooke, Fl. Bombay 2 : 177. 1904 ; Ansari, Fasc. Fl. India 16 : 16. pl. 3. f. 7. 1984. 'Khilara' (Hindi).

Coarse, tuberous twiners, hirsute all over except the corolla. Leaves variable, 5 - 6 x 3.5 - 3.8 cm, linear - lanceolate or ovate - cordate, acuminate. Flowers few, in lateral umbellate cymes. Corolla 2.5 - 6.0 cm long ; tube depressedly inflated at the base, funnel shaped above, yellow, striated with green at the base ; lobes purple, hairy inside. Outer Corona of 5, bifid lobes ; inner corona erect, linear. Follicles 10.0 X 0.5 cm, finely pointed. Seeds narrowly oblong.

Fl. & Fr. : July - October.

Fairly common at Mt. Abu than elsewhere.

Selected specimens : Sirohi : Mt. Abu (Kaylas Walk), Mehta 1057 (JAC) ; Near Hanumanji's temple, Mehta 558, 101 (JAC).

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K *Ceropegia* v;noaornlf. **Hook. in Bot. Mag. t. 3740. 1819 ; emend.**

Ansari in Bull. Bot, Surv. India 13 : 187. 1974 et Fasc. Fl. India 16 : 31. 1984. *Ceropegia hirsuta* Wt. & Arne var. *vincaefolia* (Hook.) Hook. f. Fl. Brit. India 4 : 72. 1883 ; Cooke, Fl. Bombay 2 : 177. 1904.

Coarse, tuberous climbers ; branches glabrous. Leaves 5 - 10 cm long, variable, narrowly lanceolate or ovate cordate, obtusely acuminate to acute. Flowers in few flowered umbellate cymes ; peduncles hirsute, pedicels glabrous. Corolla 3-8 cm long, greenish, blotched with purple ; tube inflated at base, funnel shaped at mouth ; lobes pubescent inside. Outer corona of 5,

FLORA OF RAJASTHAN

erecto • patent, emarginate, fleshy lobes tipped with long hairs ; the inner one ligulate oblanceolate, glabrous. Follicles linear • lanceolate, finely pointed, glabrous.

Fl. & Fr. : July - October.

Rare, in the forests among clumps of shrubs at Mt. Abu.

Selected specimens : Sirohi : Mt. Abu, Carl 6625, 6626, 6628, 6627 (BLAT), McCann 6010 (BLAT).

4. GYMNEMA R. Br.

Gymnema sylvestre (Retz.) R.

Br. ex Schulte in Roem. & **3. t. 349. 1840 ; Hook. & Fl. Brit.**

Schulte Syst.

V V • , VV • India 4 : 29. 1883 ; Dutbie, Fl. Gangetic main 2 : 53. 1911. *Periploca sylvestris* Retz. Obs. Bot. 2 : 15. 1781.

Much branched, twining shrubs. Leaves 3.5 5.5 x 2.5 - 3.5 cm, ovate, elliptic or oblong, acute or apiculate, rounded at base, sub coriaceous. Flowers minute, spirally arranged in lateral pedunculate or nearly sessile cymes, greenish - yellow. Corolla - lobes imbricate. Ridges Of corona protruding beyond the mouth of corolla. Follicles usually solitary, 6 8 x 0.8 cm, straight or slightly curved, terete, lanceolate, tapering, glabrous. Seeds c. 1.2 x 0.5 cm, narrowly ovoid • oblong,

glabrous, brown.

Fl. & Fr. : April - January.

Frequent in the deciduous forests in the east of Aravalli.

Selected specimens : Banswara : Shergarh forest, Singh 3084 (BSJO) ; Jaipur : Jain 49627 (BSI) ; Jhalawar : Asnawar, Verma 6876 (BSA) ; Rota : Verma 422 (BSA) ; Sawaimadhapur : Ranthambhore, Sharma 3240 (RUBL).

OP

5b HOLOSTEMMA R. Bm

Holosemma ..d8•kodieu Schulte in Roem. & Sphult. Syst. Veg. **6. :95. 1820. H. rhe.,dii** Wall. Pl. As. Rar. 2 : 51, 1831 ; Wight, lc. 2 (3) : **7**

t. 597. 1842 ; Hook. f. Fl. Brit. India 4 : 21. 1883. *Asclepias annularia* Roxbe Fl. Ind. 2 : 37. 1832. *Holostemma amulare* (Roxb.) K. Schum. in Engl. & PflÄn. 4(2) : 250, t. 51 J^D K, 1895. H, rheedianwn ~~auct.~~non Spteng. 1825 ; Duthiej Fl. Gangetic Plain 2 : 50. 1911.

Extensive, perennial twinners ; stem terete, sparingly branched. Leaves 7 • 17 x 5 - 15 cm, broadly ovate, acuminate, cordate at base, With gland -

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pit on the midrib beneath, glaucous. Flowers in axillary, few flowered lax cymes. Corolla fleshy, white, purple inside. Anthers completely connate, with membranous appendages and One pendulous pollen mass in each cell i.e. 10 in all. Follicles 10 - 12 x 5 - 6 cm, turgid, boat - shaped, green, linear - oblong, glabrous. Seeds 0.7 X 0.5 cm, ovate, compressed, glabrous ; coma c. 3 cm long. Fl. & Fr. : June - October.

Rare, in deciduous forests on the outdiRO.

Selected specimens : Banswara : Shergarh forest, Singh 3082 (BSJO)
; Misc.

Locality : Mehibir forest, Purl 3755) (BSI). Also reported from Jodhpur by Sarup (1954).

6. LEPTADENIA R. Br.

Erect, bushy shrubs, leafless or nearly so.

L. pyrotechnica

Twining shrubs. Leaves well **developed**,

2. *L. reticulata*

i. *Leptadenia pyrotechnica* (Forsk.) Decoe. in Ann. Sci. Nat. Ger. 2. 9 ; 29. (838 ; Fl. mhit. 128. 1966. *Cynanchum pyrotechnica* Forsk. Fl. Aegypt. - Arab. 53. 1775. *Zepladenia spartiunj* Wt. & Aen. in Wight, Contrib. 48. 1834 Hook. f. Fl. Brit. India 4 : 64. 1883 ; Duthie, FL Gangetic Plain 2 ; 63. 1911. 'Rhimp, Rhtmpar10Q Thaliawar' (Hindi).

Erect, much - branched bushy shrubs, upto 1.5 m high, with watery sap. Leaves when present, 2.5 - 6.5 x 0.2 - 0.3 cm, sessile, narrowly linear to linear - lanceolate, caducous. Flowers in lateral umbellate cymes, greenish - yellow. Corolla lobes valvate. Outer corona of 3 small ribs ; staminal corona of raised, undulate, fleshy ring. Follicles 7.0 - 14.0 X 0.5 - 0.8 cm, terete, lanceolate, tapering to a slender beak glabrous. Seeds 5 - 7 mm long, ovate - lanceolate, glabrous ; coma 2.5 - 3.5 cm long.

481 Fl. & Fr. : August - January.

Common throughout the state in dry habitats, particularly in the desertic zone.

Selected specimens : Alwar : Khoh - Dariba, Parmar 9638 (BSJO) ; Barmer : Sheo, Tiwari 927 (BSJO) ; Banswara : Paloda, Singh 2809 (BSJO) ; Jaisalmer : Devkot, Shetty 3358 (BSJO) ; Tonk : Rajmahal, Shetty 456 (BSJO).

2. *Leptadenia reticulata* (Retz.) Wt. & Arn. in Wight, Contrib. 47. 1834 ; Wight, lc. 2(1) : 4. t. 350. 1840 ; Hook. f. Fl. Brit. India 4 : 63. 1883 ; Duthie, Fl. Gangetic Plain 2 : 63. 1911. *Cynanchum reticulatum* Retz. Obs. Bot. 2 : 15. 1781. 'Jhumka' (Hindi).

FLORA OF RAJASTHAN

Twining shrubs, with watery sap and corky deeply cracked bark. Leaves 3.0 17.5 X 1.5 7.0 cm, broadly ovate to ovate - lanceolate, acute at apex, rounded at base, sub coriaceous. Flowers in lateral, many flowered umbellate cymes. greenish. Corolla lobes villate. Outer corona of 5, fleshy quadrate • truncate lobes ; staminal corona annular. Anthers without terminal appendages. Follicles 5 - 9 x 2 • 3 cm, oblong or broadly lanceolate, with a thick curved beak. Seeds c. 1 cm long, narrowly ovoid ; coma 3 4 cm long.

Fl. & Fr. : Almost throughout the year.

Common in wastelands, open forests and on the edges of fields and gardens, particularly in the east of Aravalli.

Selected specimens : Banswara : Paloda, Singh 2845 (BSJO) ; Dungarpur : Majumdar & Mishra 10337 (BSA) ; Kota : Rampura, Verma 1788 (BSA). Also reported from Jodhpur by Sarup (1954).

MARSDENIA R. Br.

Marsdenia tenacissima (Roxb.) Moon, Cat. Pl. Ceylon 21. 1824 ; Wight. Jc. 2(3) : 7. t. 590. 1842 ; Hook. f. Fl. Brit. India 4 : 35. 1883 ; Duthic, Fl. Gangetic Plain 2 : 57. 191 1. *Asclepias tenacissima* Roxb. Pl. Cor. 3 : 35. t. 240. 1815. *Marua bel'* (Hindi).

Extcn.SIVC, WOOuy (WJ11Cib, W JUL **thick root - stock and sticky latex.**

Leaves 7 - 20 x 5.5 12.0 cm. broadly ovate cordate, acuminate, densely hairy. Flowers in large drooping panicles composed of alternate drooping branches of umbellate cymes, yellowish green. Staminal corona basal, of linear flattened lobes. Follicles 6 15 X 2.0 4.5 cm, ovoid lanceolate, acute, longitudinally rugose, velvety pubescent. Seeds 1.2 X 0.8 cm,

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OF

broadly ovate - oblong. margined ; coma of white silky hairs, 3 4 cm long.

Fl. & Fr. : May August.

Common on the edges of fields and gardens, in the wastelands and open forests, particularly in the east of Aravalli.

Selected specimens : Banswara : Shergarh forest, Singh 3085 (BSJO) ; Bharatpur : Ghana Bird Sanctuary, Parmar 8616 (BSJO) ; Jhalawar : Ghotdi, Wadhwa 7555 (BSA) ; Pali : Kotra village, Shelly 1452 (BSJO) ; Sirohi : Mt. Abu, Mehta 889 (JAC) ; Tonk : Maheshwari 52986 (LWG).

8. ODONTANTHERA Wight

Odontanthera varians (Stocks) Mabblerley in Manilal Bot. Hist. Hort. Malab. 89. 1980. *Mastostigma varians* Stocks in Hook. Ice Pl. 9 : t.

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863. 1852. *Glossonema varians* (Stocks) Hook. f. Fl. Brit. India 4 : 16. 1883 ; Cooke, Fl. Bombay 2 : 150. 1904 ; Bhandari, Fl. Ind. Desert 222.

1978. '*Dodha*' (Hindi).

Small, erect, annual or perennial herbs, 10 - 15 cm high. Leaves opposite, 2.5 - 7.0 x 1.8 - 5.0 cm, lower rotund ovate, sub cordate, obtuse or retuse ; upper ones elliptic, acuminate, hairy on both sides. Flowers in subsessile, umbellate, 2 to 8 - flowered cymes, white or yellow. Corona • lobes c. 0.25 cm long, entire or bifid. Follicles 2.5 - 5.0 cm long, ellipsoid, covered with soft scattered spines. Seeds 4 - 6 mm long, broadly ovate, acute, flat with papery margins, sinuate dentate at the broader end.

Fl. & Fr. : August - December.

Rare, in the rocky habitats in western desertic zones of the state.

Selected specimens : Barmer : Bhandari • 1608 (JAC) ; Jaisalmer : Bojka, Shetty 3350 (BSJO) ; Range Management area, Ttwari 823 (BSJO) ; Pokaran Lavan, Jain 4946 (BSI) ; Kuri. Storer B 40 (BSI) ; Vinjorai, Wadhwa 5308 A (BSA) ; Budhi Naia, Wadhwa 4987 (BSA) ; Mohangarh, Wadhwa 5075 (BSA).

9. ORTHANTHERA Wight

Orthantbera viminea Wight, Contrib. 45. 1834 ; Hook. f. Fl. Brit. India 4 : 64. 1883 ; Duthie, Fl. Gangetic main 2 : 65. 1911. '*Mahurghas*' (Hindi).

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Small, erect, leafless shrubs ; young branches pubescent. Flowers in compact woolly cymes, dull brown ; peduncles 0.8 - 2.5 cm long. Sepals **as long as corolla - tube. Corolla villous outside, glabrous within, salver -** shaped. Follicles erect, 7.0 - 12.5 cm long, linear, compressed, smooth, with thin pericarp. Seeds 0.25 - 0.35 cm long, dark brown, flat, comose.

Fl. & Fr. : March - July.

Included on the authority of Sarup (1954) from Jodhpur. Duthie (l.c.) also mentioned its distribution in Rajasthan, but authors could not trace any specimen of it from Rajasthan in Indian herbaria.

10. OXYSTELMA R. Br.

Oxystelma esculenta (L. f.) R. Br. ex Schultes, Syst. Veg. 6 : 89. 1820 ; Hook. f. Fl. Brit. India 4 : 17. 1883 ; Duthie, Fl. Gangetic Plain
• 11011 *Periploca* T 1781. *Oxystelma* secamone auct. non (L.) Karst. 1880 83 ; sensu Sant. & Irani in Univ. of Bombay Bot. Mem. 4 : 67. 1960 ; Mahesh. Illus. Fl. Delhi f. 125. 1966. '*Dudhi - ki - bel*' (Hindi).

FLORA OF RAJASTHAN

Twining, glabrous herbs or undershrubs. Leaves 4 - u.4 - 0.8 cm. linear lanceolate, acute or acuminate at apex and acute or rounded at base. Flowers in drooping, few flowered, lateral, subumbellate cymes. Corolla rotate, white outside, pink inside, with purplish reticulations, Outer staminal corona cupular, adnate to the base of column ; inner of 5, free lobes, 2 keeled within. Follicles 4 - 7 x I cm, ovoid - lanceolate, acute. Seeds ovate or sub orbicular ; coma upto 2 cm long.

Fl. & Fr. : May February.

Common in marshy habitats, particularly in the east of Aravalli in association with *Typha angustata* Bory & Chaub.

Selected specimens : Banswara : On the way to Kushalgarh, Singh 3026 (BSJO) ; Bharatpur : Ghana Bird Sanctuary, Parmar 8634 (BSJO) ; Jaipur : Ramgarh, Singh Acc. No. 8172 (RUBL) ; Jaisalmer : Mas)'a dam, Jain 40565 (BSA, BSI).

11. PENTATROPIS Wight & Arnott

Peatatropis spiralis (Forsk.) Decne. in Ann. Sci. Nat. ser. 2. 9 : 327. t. 11. 1838 ; Hook. f. Fl. Britf India 4 : 19. 1883. *Asclepias spiralis* Forsk. Fl. Aegypt. • Arab, 4.9. 1775. *Pentatropis cynanchoides* R. Bro in Salt. Voy, Abyss. App, 64. 1814 ; Duthie, Fl. Gangetic Plain 2 : 52. 1911.

Slender, twining undershrubs, with watery sap. Leaves 1.5 x 0.6-1.8 cm, thick, ovate-lanceolate or elliptic-oblong, acute to obtuse at apex, mucronate, rounded or subcordate at base, glabrous. Flowers in 3 to 7 flowered, lateral umbellate cymes, yellowish-green with a reddish eye. Corolla lobes with long, linear tails. Follicles 7-9 x 1.5 cm, lanceolate, tapering to a beak, glabrous. Seeds ovate, flattened; coma 2.0-2.5 cm long.

Fl. & Fr. : January-October.

Fairly common throughout the state, preferably in loamy soils.

Selected specimens : Bharatpur : Achanera, Parmar 8665 (BSJO) ; Bikaner : Kolayat, Roy 2053 (BSJO) ; Jaipur : Amber, H. Lal 34626 (LWG) ; Jaisalmer : Devkot, Wadinva 5302 (BSA) ; Tonk : Tordi sagar, Shelly 1104 (BSJO).

12. PERGULARIA L.

Pergularia daemia (Forsk.) Chiov. in Result. Sci. Miss. Stefan. Paoli Somal. Ital. : 115. 1916. *Asclepias daemia* Forsk. Fl. Aegypt. Arab. 51. 1775. *Cynanchum exiense* Jacq. Misc. Aust. Bot. 2 : 353. 1781. *Daemia extensa* (Jacq.) R. Br. in Mem. Wern. Soc. I : 50. 1811 ; Wight, re. 2(3) : 7. t 596. 1842 ; Hook. f. Fl. Brit. India 4 : 20. 1883 ; Duthé, Fl. Gangetic Plain 2 : 52. 1911. 'Gadaria ki bel' (Hindi).

Hispid, twining undershrubs. Leaves 3-9 x 2.5-6.0 cm, ovate, acuminate, cordate at base. Flowers in drooping, lateral corymbose cymes, pale yellowish green. Basal staminal corona of 5-lobed membrane ; upper of 5, laterally compressed lobes adnate to the anthers. Follicles in pairs, 5-8 x 1.0-1.5 cm, reflexed, slightly curved, lanceolate, tapering to a point, pubescent, softly chinate all over. Seeds 7 x 5 mm, ovate, truncate at apex, dentate margined, densely velvety pubescent ; coma 3-4 cm long. white, hairy.

Fl. & Fr. : March-December.

Common among bushes on the edges of fields, gardens, fringes of forests and wastelands.

Selected specimens : Alwar : Sariska Tiger Reserve, Parmar 9593 (BSJO) ; Banswara : Paloda, Singh 2848 (BSJO) ; Bikaner : Kundal, Pando 8024 (BSJO) ; Jaipur : Road to Amber. Sharma 313 (RUBL) ; Kota : Wadhwa 1990 (BSA) ; Pali : Rajpurndam, Shetty 1502 (BSJO).

OP

13. SARCOSTEMMA R. Br.

1a. Flowers in terminal and lateral umbels. Style-apex oblong-fusiform, much exserted. 1. *S. intermedium*

1b. Flowers in terminal umbels only. Style-apex conical, not exserted •

2a. Follicles 10-12 cm long, lanceolate, tapering at both ends, slightly divergent. *S. viminale* subsp.

viminale

2b. Follicles 5.5-8.5 cm long, cylindrical not tapering toward* base but little towards the apex. 3. *S. viminale* subsp. *stocksii*

1. *Sarcostemma intermedium* Decne. in DC. Prodr, 8 : 538. 1844 ; Wight. Ic. 4(1) : 17. t. 1281. 1848 ; Hook. f. Fl. Brit. India 4 : 27. 1883 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 155. 1976.

1

Leaness, penultimate or scanum. Flowers in terminal and lateral sessile umbels, whitish. Inner processes of corona oblong. Stigma fusiform, simple or bifid. Follicle 7-10 cm long, broad at the base and narrowed at the tip, thinly coriaceous, slightly divergent. Seeds 5-6 x 2-3 mm- oblong- flattened. rounded at the base. truncate at the apex • coma c. 1.8 cm long.

Fl. & Fr. : June - September.

Rare, in dry rocky habitats. Reported from Ajmer district only.

Selected specimen : Ajmer : Laurie 191 (DD).

2. *Sarcostemma viminale* (L.) R. Br. in Mem. Wern. Soc. I : 51. 1811. *Euphorbia viminale* L. Sp. Pl. 452. 1753. *Cynanchum viminale* (L.) L. Mant. Pl. Alt. 2 : 392. 1771. *Asclepias acida* Roxb. Fl. Ind. 2 : 31. 1832. *Sarcostemma brevistigma* Wt. & Arne in Wight, Contrib. 59. 1834 ; Wight, Ic. 2(S) : 7. t. 595. 1842 ; Hook. f. Fl. Brit. India 4 : 26. 1883. *S. acidum* (Roxb.) Voigt, Hort. sub. calc. 542. 1845 ; Raizada, suppl. Duthie, Fl. Gangetic Plain 154. 1976.

subsp. *viminale*

Much-branched, leafless, straggling shrubs. Flowers sweet-scented, in sessile, many-flowered, terminal umbels. Bracts lanceolate, puberulous. Pedicels 1.0-1.5 cm long. Pubescent. Corolla rotate, glabrous. Lobe greenish-white, divided nearly to the base ; lobes ovate or oblong, obtuse. Follicles usually solitary, 10-13 X 0.7-1.0 cm. Seeds 3-6 mm long, flattened, ovate ; coma c. 1.8 cm long. Fl. & Fr. : June - October.

Fairly common throughout the state, particularly west of Aravalli, in dry rocky habitats.

Selected specimens : Ajmer : Puri 37585 (BSI) ; Barmer : Haldeswar Mahadev R.F., Pandey 7944 (BSJO) ; Bhilwara : Amarpura, Singh 6234 (BSJO) ; Jaisalmer : Bhandari 1052 (JAC) ; Jodhpur : Kailana, Singh 4490 (BSJO) ; Pali : Jawai, Sherty 1448 (BSJO).

3. subsp. *stocksii* (Hook. f.) Ali, Fl. W. Pakistan 150 : 31. 1983.

Sarcostemma stocksii Hook. f. Fl. Brit. India 4 : 27. 1883 ; Cooke. Fl. Bombay 2 : 159. 1904.

Very similar to subsp. *viminale*, but can be distinguished by its smaller divericac follicles which are cylindric, straight and rod - like. Seeds 6 7 mm long, narrowly oblong, with truncate apex ; coma c. 2.5 cm long.

FL & Fr. : June October.

Rare, in rocky habitats ; so far reported from Jodhpur district only.

Selected specimen : Jodhpur ; Chopasni, Puri 23268 (BSI).

14. *TELOSMA* Coville

Telosma cordata (Burm. f.) Merrill in Philipp. J. Sci. 19 : 372. 1912. *Asclepias cordata* Burm. f. Fl. Ind. 72. t. 27. f. 2. 1768. *A. pallida* Roxb. Fl. Ind. 2 : 48. 1832. *Pergularia pallida* (Roxb.) Wt. & Arn. in Wight, Contrib. 42. 1834 ; Wight, lc. 2(3) : 6. t. 585. 1840 1843 ; Hook. f. Fl. Brit. India 4 : 38. 1883 ; Duthic, Fl. Gangetic Plain 2 : 59. 1911.

Twining undershrubs ; branches pale, möre or less pubescent. Leaves 5 9 x 3.5 6.0 cm, membranous, ovate, shortly acuminate, cordate at base. Flowers in many • flowered umbellate cymes, pale creamish to white. Pollen masscs clavate or subcylindric. Follicles 10 X 2 cm, woody, lanceolatc, shortly acuminate. Seeds ovate oblong, strongly margined, glabrous, comose.

Fl. & Fr. : August Dcccember.

Occasional, found in open dry wastclands and foot of Aravalli.

Selected spccimens : Ajmer : Tiagi 19 (DD) ; Banswara : Kushalgarh, Singh 3754 (BSJO) ; Bhilwara : Bhilon ki Jhopari (along Bcawar Road), Singh 6213 (BSJO) ; Jaipur : URF, Sharma 2138 (RUBL) ; Pali : Near Desuri, Shelly 1865 (BSJO).

15. TYLOPHORA R. Br.

Tylophora hirsuta (Wall.) Wt. & Arn. in Wight, Contrib. 49. 1834 ; Hook. f. Fl. Brit. India 4 : 43. 1883 ; Duthie, Fl. Gangetic Plain 2 : 61. 1911. *Gymnema hirsutum* Wall. Tent. Fl. Nap. 50. 1824 ; Wight, lc. 4(1) : 16. t. 1272. 1848.

Twining undershrubs, often clothed with spreading hairs. Leaves 4.5-12.5 x 1.5-8.0 cm, ovate to ovate lanceolate, acute to acuminate at apex, rounded to subcordate at base, glabrous or pubescent. Flowers in umbelloid cymes, white to pale green. Calyx segments hirsute. Corolla pubescent within. Follicles 3.5-7.5 x 0.5-0.7 cm, usually solitary, tapering upwards. smooth. Seeds c. 6 mm long, compressed, truncate, dark brown. comose.

Fl & Fr. : May November.

Rare, in the interior forests, in shady habitats.

Selected specimen : Banswara : Punapathar forest, Singh 2927 (BSJO).

16. WATTAKAKA Hassk.

Wattakaka volubilis (L. f.) Stapf in Curtis, Bot. Mag. sub. t. 8976. 1923. *Asclepias volubilis* L f. Suppl. 170. 1781. *Hoya viridiflora* R. Br. in Mem. Wern. Nat. Hist. soc. I : 27. 1811 ; Wight, lc. 2(3) : 6. t. 586. 1840¹ 843. *Dregea volubilis* (L. f.) Benth. ex Hook. f. Fl Brit. India 4 : 46. 1883, incl. var. *lacuna*. *Marsdenia volubilis* (L. f.) Cooke, Fl. Bombay 2 . 166. 1904 ; Duthie. Fl. Gangetic Plain 2 : 56. 1911.

Large twining shrubs. Leaves 6.0-15.5 x 4.0-11.5 cm, broadly ovate or suborbicular, acuminate, glabrous or softly pubescent, with a few small glands just above the petiole, rounded or cordate at base. Flowers in lateral, drooping umbellate cymes, yellowish-green. Follicles 5-10 x 2.0-4.5 cm, slightly tapering to a blunt point, rugosely striate. Seeds ovate ; coma 4-5 cm long.

Fl. & Fr. : April September.

Common in wastelands, forests and edges of fields and gardens.

Selected specimens : Ajmer : Jain 49686 (BSI) ; Alwar : Sariska, Parmar 10206 (BSJO) ; Barmer : Haldeshwar Mahadev forest, Pandey 7973 (BSJO) ; Dungarpur : Sagwara, Kanodia 82175 (BSI) ; Jaipur : Doasa, Wadhwa 8242 (BSA) ; Kota : Wadhwa 9226 (BSA) ; Pali : Ghanerao forest, Pandey 4640 (BSJO) ; Udaipur : Jaisamand, Kanodia 82258 (BSI).

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CULTIVATED SPECIES

Asclepias curassavica L. Erect undershrubs, Flowers showy, bright crimson or light orange in extra-axillary umbellate cymes. Commonly cultivated in the gardens for ornamental purposes.

81. PERIPLOCACEAE

(P.J. Parmar)

1a. Corolla 5.6 cm long, dark-violet or purple ; tube much longer than the calyx-lobes.

...2. *Cryptosregia*

1b. Corolla 0.3-1.5 cm long, brownish-yellow. pale yellow, creamy-white or greenish outside and purplish within ; tube about as long as or shorter than the calyx-lobes :

20. Leafy twining shrubs. Corona-lobes 5, free:

3a. Flower-buds produced into a slender beak.

Corolla 5-6 mm long, yellowish-white. ... 1. *Cryptosregia*

3b. Flower-buds ovoid, not beaked. Corolla

5.0-6.5 mm long, dull purplish-brown. ... 3. *Hemidesmus*

2b. Leafless erect shrubs ; leaves, when present, small. Corona-lobes 5, connate.

4. *Periploca*

1. *CRYPTOLEPIS* R. Br.

Cryptolepis buchananii Roem. & Schult. Syst. Veg. 4 : 409. 1819 ; Wight, lc. 2(2) : 6. t. 494. 1841 ; Hook. f. Fl. Brit. India 4 : 5. 1883 ; Duthie, Fl. Gangetic Plain 2 : 45. 1911. 'Kamala ki bel' (Hindi).

Twining shrubs, with lenticelled stems. Leaves 5-15 X 2.5-8.0 cm, elliptic to oblong-ovate, acute to shortly acuminate, glabrous, green above, whitish beneath. Flowers in axillary paniced cymes. Corolla-lobes linear to linear-lanceolate, acute. Coronal-scales 5, clavate. Stamens at the base of the corolla-tube ; filaments free. Follicles 5-12 X 1.2-2.5 cm, tapering at the apex, glabrous. Seeds 6-7 mm long, ovate-oblong, compressed, black ; coma 3-4 cm long, white.

Fl. & Fr. : May - August.

Rather common in dry deciduous scrub forests, especially in the eastern parts of the state.

Selected specimens : Ajmer : Todgarh, Duthie 4749 (DD) ; Banswara : Singh 2874 (BSJO) ; Jhalawar : Bakani, Wadhwa 9525 (BSA) ; Kota : Shahabad,

Verma 612 (BSA) ; Sirohi : Mt. Abu, Jain 46592 (BSI) Udaipur : Majumdar 11666 (BSA).

2 CRYPTOSTEGIA R. Br.

Cryptostegia grandiflora R. Br. in Edwards, Bot. Reg. 5. t. 4351820 ; Wight, rc. 3(2) : 3. t. 832. 1844 ; Hook. f. Fl. Brit. India 4 : 6. 1883 ; Raizada, suppl. Duthie, Fl. Gangetic Plain 152. 1976. 'Rubber ke bel, Rubber - gugli' (Hindi).

Large, evergreen, glabrous, straggling shrubs with milky sap. Leaves opposite, 5 II X 3 6 cm, coriaceous, elliptic oblong, obtuse or retuse, acute at base. Flowers in 2 to 3 - chotomous cymes, pale purple or pink. Calyx 5 - lobed. Corolla funnel - shaped. Corona - lobes divided into filiform segments. Stamens short, at the base of the corolla. Follicles woody, 8 - 13 x 2.0 3.8 cm, sharply 3 angled or winged, ovoid oblong, tapering to the apex. Seeds numerous, 8 9 mm long, ovate oblong, compressed ; coma 2.5 cm long, silky - white.

Fl. & Fr. : April - September.

Native of Madagascar ; commonly naturalized in wastelands ; also cultivated in the gardens for ornamental purposes.

Selected specimens : Banswara : Pipalkunt, Singh 2919 (BSJO) ; Bharatpur : Ghana Bird Sanctuary, Parmar 8708 (BSJO) ; Ganganagar : Nohar, Roy 6447 (BSJO) ; Jaipur : Amber, Sharma 465 (RUBL) ; Jodhpur : Birai dam, Singh 3565 (BSJO) ; Kota : Wadhwa 9493 (BSA) ; Udaipur : Nathdawara, Kaul 8582 (LWG).

3. HEMIDESMUS R. Br.

Plants glabrous.	...	1. <i>H. indicus</i> var. <i>indicus</i>
Plants pubescent.	...	2. <i>H. indicus</i> var. <i>pubescens</i>

1. *Hemidesmus indicus* (L.) R. BC. in Ait. f. Hort. Kew. ed. 2. 2 : 75. 1811 ; Wight, rc. 2(3) : 7. t. 594. 1842 ; Hook. f. Fl. Brit. India 4 : 5. 1883 ; Duthie, Fl. Gangetic Plain 2 : 45. 1911. *Periploca indica* L. Sp. Pl. 211. 1753. 'Dudhli' (Hindi).

var. *indicus*

Scandent undershrubs, with woody root-stock. Leaves opposite, 4 15 x 0.8 - 2.5 cm, elliptic - oblong to leaf-lanceolate, acute to obtuse and apiculate at apex, acute or rounded-truncate at base. Flowers in axillary,

subsessile cymes, dull yellow with purple eye. Follicles 10 15 x 0.5 1.0 cm, tapering to a point, slightly falcate, glabrous. Seeds 6 8 mm long, ovate-oblong, compressed, black ; coma upto 4 cm long,

Fl. & Fr. : Almost throughout the year.

Common in the scrub forests in the east of Aravalli.

Selected specimens : Banswara : Ghatol, Kanodia 75473, 75239 (BSI) ; Dungarpur : Sagwara, Kanodia 82152 (BSI) ; Jhalawar : Aklera, Wadhwa 1939 (BSA) ; Tonk : Maheshn,ari 52980 (LWG).

2. var. pubescens (Wt. & Arn.) Hook. f. Fl. Brit. India 4 : 5. 1883. *Hemidesmus pubescens* Wt. & Arn. in Wight, Contrib. 63. 1834 ; Wight, lc. 4(2) : 6. t. 1320. 1848.

Very similar to type variety, but can be distinguished by its pubescent branchlets, leaves beneath and inflorescence. Fl. & Fr. : Throughout the year.

Rare, in wastelands and open forests.

Selected specimen : Jhalawar : Lotia Jhil, Wadhwa 5378 (BSJO).

4. PERIPLOCA L.

Periploca aphylla Decne. in Jacq. Voy. Bot. 109. t. 116. 1844 ; Hook. f. Fl. Brit. India 4 : 12. 1883 ; Duthic, Fl. Gangetic Plain 2 : 46. 1911.

Erect, branched, generally leafless shrubs, with milky juice. Leaves, when present, 6 8 x 3 - 4 mm, ovate-oblong, thick, acute. Flowers in c. 2.5 cm long, axillary and terminal cymes. Calyx-segments with scarious margins. Corolla greenish out side, purplish within. Follicles 4 - 10 x 0.5 - 0.6 cm, rigid, woody, cylindrical•conical, beaked. Seeds 5 • 6 mm long, oblong, compressed, reddish•brown, glabrous ; coma about 2.5 cm long.

Fl. & Fr. : July October.

Included on the authority of Sarup (1951 & 1954), Blatter & Hallberg (1918 - 1921) and Bhandari (1978) from Jodhpur and Jaisalmer districts,

82. SPIGELIACEAE

(P.J. Parmar)

MITREOLA L.

Mitreola petiolata (J.F. Gamel.) Torr. & Gray, Fl. North Amer. 2 : 45. 1845. *Ophiorrhiza mitreola* L. Sp. Pl. 150. 1753. *Cynoctonum petiolatum* J.F. Game). systo Nat. ed. 13. 2 : 443. 1791. *Mitreola paniculata* Wall. ex G. Don, Gen. Hist. 4 : 171. 1837 ; Wight, lc. 4(4) : 14. t 1600. 1850. *M. oldenlndioides* Wall. ex DC. Prodr. 9 : 9. 1845 ; Clarke in Hook. f. Fl. Brit India 4 : 79. 1883 ; Duthie, Fl. Gangetic Plain 2 : 68. 1911.

Erect, annual herbs, 10 - 50 cm high. Stem 4-angled, narrowly winged. Leaves 2.7 x 0.8-3.0 cm, ovate-lanceolate or ovate-elliptic to deltoid, acute, glabrous. Stipules interpetiolar, deltoid or ovate. Flowers terminal or axillary, in dichotomous cymes on cincinniform branches, white. Bracts and bracteoles linear, persistent. Capsules 4-5 mm broad, wedge-shaped, deeply emarginate, two horned. Seeds ellipsoid, 3-angled, with a ventral cavity.

Fl. & Fr. : September - December.

Common in wet and shady habitats in the forests. So far reported from Banswara district only.

Selected specimens : Banswara : Punapather forest, Singh 3675 (BSJO) ; Bhapor, Kanodia 75222 (BSA) ; Kaling Wadhvasi Khora - naia, Kanodia 75639 (BSA) ; on the way to Hudiani Dongri (Ghatol), Kanodia 75472 (BSA).

83. BUDDLEJACEAE

(P. J. Parmar)

BUDDLEJA L.

Flowers white, in drooping spikes.

1. *B. asiatica*

Flowers orange, in terminal panicles.

2. *B. madagascariensis*

1. *Buddleia asiatica* Lour. Fl. Cochinch. I : 72. 1790 ; Clarke in Hook. f. Fl. Brit. India 4 : 82. 1883.

Evergreen, perennial, straggling shrubs. Leaves lanceolate or oblong, entire or serrulate, obtuse to acuminate, white tomentose beneath. Flowers

in drooping spikes, densely tomentose outside, white. Capsules ovoid, enclosed in the persistent calyx. Seeds not tailed.

Native of China ; usually cultivated in the gardens for ornamental purposes. It flowers from January - April.

2. *Buddleia madagascariensis* Lam. *Encycl.* I : 513. 1785 ; Leenh. in van Steenis, F). *Males.* 1. 6 : 340. 1962.

Large, scrambling, evergreen shrubs. Leaves ovate-oblong, entire or serrulate, densely white tomentose beneath. Flowers orange, in large terminal panicles. Capsules ovoid, enclosed in the calyx.

Native of Madagascar ; occasionally cultivated in the gardens for ornamental purposes. It also flowers during winters.

84. GENTIANACEAE

(P.J. Parmar)

1a. Corolla regular. Stamens all perfect :

2a. Ovary 2-celled.

4. *Exacum*

2b. Ovary 1-celled :

38. Corolla with one or two glandular nectaries at the base of each lobe, 6.
Swertia

3b. Corolla-lobes eglandular :

4a. Flowers white, in sessile axillary
clusters.

3. *Enicostema*

4b. Flowers pink, in dichotomous cymes...2. *Centaurium*

1b. Corolla irregular. Only 1 stamen perfect :

Sa. Flowers yellow. Stigma subtended.

5. *Hoppea*

5b. Flowers pink or white. Stigma distinctly

2-10bed. *Canseora*

1. *CANSCORÅ* Lam.

1a. Calyx-tube winged. Long stamens appendaged.

Stigma hispidulous...2. *C. decuoata*

1b, **Calyx-tube** striate or keléd. nbt Winpd. **Long**...
stamens not **appendaged**. Stigma glabrous :

2a. Leaves decurrent along the whole length of the internode. *C. decurrens*

Leaves not decurrent along the stem :

3a. Stem and pedicels winged.

4. *C. heteroclita*

3, *C. diffusa*

3b. Stem and pedicels terete or 4 - angled.

1. *Canscora decurrens* Dalz. in Kew Journ. Bot. 2 : 136. 1850 ; Clarke in Hook. f. Fl. Brit. India 4 : 103. 1883 ; Cooke, Fl. Bombay 2 : 192. 1904.

Erect, annual herbs, upto 30 cm high. Stem 4 winged ; branches opposite and alternate. Leaves sessile, 3.5 X 1.0-2.5 cm, oblong, attenuated towards the base, acute at apex, membranous : upper leaves much smaller than the lower, ovate or lanceolate, acute. Flowers solitary or in few flowered, sub trichotomous cymes, pale rose or white. Calyx not winged. Stigma 2 lobed. Capsules cylindric, 2 valved. Seeds reticulate, rugose.

Fl. & Fr. : September-December.

Rare, in wet and shady habitats in the east of Aravalli.

Selected specimens : Banswara : Jhola, Kanodia 51148 (BSI) ; Jhalawar : Shyamgarh, Verma 10087 (BSA) ; Kharagpura, Verma 6821 (BSA) ; Kota : Rapi stream, Wadhwa 9331 (BSA) ; Udaipur : Kalighati, Jain 48538 (BSI).

2. *Canscora decussata* (Roxb.) Schultes & Schultes f, Mant. Syst. veg. 3 : 229. 1827 ; Clarke in Hook. f. Fl. Brit. India 4 : 104. 1883 ; Duthie, Fl. Gangetic Plain 2 : 77. 1911. *Pladera decussata* Roxb. Fl. Ind. 1 : 418. 1820.

Erect, annual herbs, upto 60 cm high. Stem and branches 4 • winged. Leaves 1.2-4.0 x 0.4-1.5 cm, narrowly ovate to oblong-lanceolate, acute, sub-cordate to rounded at base, 3 nerved. Flowers solitary or in lax, few flowered cymes, white. One stamen longer than others. Capsules 6-3 mm linear-oblong, obtuse at apex) tipped by persistent style, shorter than calyx.

Fl. & Fr. : September - December.

Rare, in wet and shady habitats in the forests along Aravalli range.

Selected specimens : Banswara : Wadita Hillage forest, Singh 3690 (BSJO) ; Bari Ghata forest, Kanodia 75403 (BSI) ; Pali : Kanpahar Bijapur forest, Pandey 19443 (BSJO).

3. *Canscora diffusa* (Vahl) R. Br. Prodr. Fl. Nov. Holl. 451. 1810 ; Clarke in Hook. f. Fl. Brit. India 4 : 103. 1883 ; Duthie, Fl. Gangetic Plain 2 : 76. 1911. *Gentiana diffusa* Vahl, symb. Boy. 3 : 47. 1794. *Canscora teneosa* Wight, lc. 4(2) : 7. t. 1327. f. 3. 1848.

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Much branched, erect, c. 30 cm high, annual herbs. Leaves sessile, 1.5 X 0.8-2.5 cm, ovate lanceolate, acute, truncate or cuneate at the base. Flowers in diffuse paniculate cymes, pink. Pedicels filiform. Anthers dimorphic, oblong sagittate. Capsules narrowly oblong, as long as the calyx, membranous.

Fl. & Fr. : October-March.

Common in wet and shady places along Aravalli range.

Selected specimens : Banswara : Punapathar forest, Singh 3660 (BSJO) ; Bhilwara : Bijolia, Singh 7159 (BSJO) ; Pali : Goramghat, Pandey 4685 (BSJO) ; Kota : Kunda Khoh, Wadhwa 9244 (BSA) ; Sirohi : Mt. Abu, Jain 46560 (BSI).

4. *Canscora heteroclita* (L.) Gilg in Engl. & Prantl, Nat. Pflanzen.

~~4(2) : 76. 1895. *Gentiana heteroclita* L. Mant. Pl. Alt. 560. 1771. *Canscora* sessiliflora Schultes & Schultes f. Mant. Syst. Veg. 3 : 230. 1827 ; Clarke in Hook. f. Fl. Brit. India 4 : 104. 1883 ; Sharma & Tiagi, Fl. North East Raj. 243. 1979.~~

Erect herbs, upto 20 cm high ; branches short and broadened towards the base. Leaves few, in rosette ; lower ones 0.6 - 1.5 X 0.5 - 1.2 cm, broadly ovate, obtuse, truncate and 3 nerved at base ; upper ones c. 3 x 1 mm. linear-lanceolate, one nerved. Flowers in dichasial cymes. Bracts linear-lanceolate. Corolla pinkish-red ; tube c. 8 mm long ; lobes of upper lip slightly spreading. Capsules linear-cylindric, brownish. Seeds irregularly rhomboid.

Fl. & Fr. : October - March.

Rare, in wet and shady habitats. So far collected only from Jaipur district.

Selected specimen : Jaipur : Baragaon, Sharma 2019 (RUBL).

2. CENTAURIUM Hill

Centaurium centaurioides (Roxb.) Rolla Rao & Hemadri in Journ. Bomb. Nat. Hist. Soc. 67 (2) : 357. 1970. *Chironia centaurioides* Roxb. Fl. Ind. I : 585. 1832. 'centaurioides', non *Erythraea centaurioides* Horn Gotting ex Griseb. 1839. *Erythraea roxburghii* D. Don in Lond. & Edin.

Phil. Mag, & Jour. sci. 8 : 77. 1836 ; Wight, 4(2) : 7. t. 1325, 1848 ;
 Clarke in Hook. f. Fl. Brit. India 4 : 102. 1883 ; Duthie, Fl. Gangetic
 Dln:— 1011

Small, erect, annual herbs, 5 20 cm high. Radical leaves in rosette, 0.5 2.5 X 0.2 0.6 cm, obovate or oblong, obtuse ; cauline ones smaller, linear oblong. Flowers in dichotomous cymes, with a long pedicelled flowers in each fork, pink. Calyx segments linear subulate. Corolla lobes elliptic, acute, glabrous. Capsules linear oblong. Seeds many, faintly reticulate.

Fl. & Fr. : December March.

Weed in and around cultivated fields, particularly in the east of Aravalli.

Selected specimens : Ajmer : Gravelly raised ground around lake, Sharma 1579 (LWG) ; Bharatpur : Katipura village, Parmar 8650 (BSJO) ; Chittorgarh : Saran 65191 (LWG) ; Jaipur : Baragaon, Sharma 2019 (RUBL) ; Sirohi : Mt. Abu, Kanodia 62228 (BSI).

3. ENICOSTEMA Blume nom. cons,

Enicostema axillare (Lam.) Raynal in *Adansonia* 9 : 75. 1969.
Gentiana verticillata L. Syst. Nat. ed. 12. 200. 1767, pro part, non L. 1760. *G. axillaris* Lam. Ill. Gen. 1(2) : 487. 1793. *Exacum hyssopifolium* Willd. Sp. Pl. I : 640. 1798. *Enicostema littorale* auct., non Blume, 1826 ; Clarke in Hook. f, Fl. Brit. India 4 : 101. 1883 ; Duthie, Fl. Gangetic Plain 2 • 73. 1911. *E. verticillatum* (L.) Engl. Pflanz. Ostaf. C. 313. 1895, non Baill. 1891. *E. hyssopifolium* (Willd.) Verdoorn in *Bothalia* 7 : 462. 1961 ; Mahesh. Illus. Fl. Delhi f. 129. 1966. (Hindi).

Perennial herbs, with many quadrangular branches from the base. Leaves sessile, 1.7 X 0.6 1.3 cm, linear to linear - lanceolate, obtuse. amplexicaulic. Flowers subsessile, many, in axillary, capitate, opposite fascicles, white. Capsules 3 5 mm long, ellipsoid - oblong, glabrous, septically 2 valved. Seeds many, minute, sub - globose, foveolate, brown.

Fl. & Fr. : June December.

Common in open plains, forests, grasslands and in cultivated fields.

Selected specimens : Banswara : Dagia - Bowji hills, Singh 2864 (BSJO) ; Barmer : Pachpadra salt basin, Shetty 2244 (BSJO) ; Bhilwara : Badnor, Singh 6487 (BSJO) ; Bundi : Manghi river bed, Verma • 1868 496 OF

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(BSA) ; Jalore : Malwara, Vyas 6392 (BSJO) ; Tonk : Siras forest, Shetty 1022 (BSJO).

4 EXACUM L.

Leaves ovate. Calyx not winged.

1. *E. lawii*

Leaves elliptic • lanceolate. Calyx winged. 2. *E. pedunculatum* L. *Exacum lawii* Clarke in Hook. f. *Fl. Brit. India* 4 : 98. 1883.

Erect herbs, 10 15 cm high, with quadrangular stem. Leaves sessile, c 6 x 6 mm, ovate. Flowers in few - flowered, lax, terminal or subterminal, pedunculate cymes ; pedicels mostly elongate. Calyx lobes 3 - 5 mm long, ovate, strongly nerved, not winged. Corolla • lobes 5 10 mm long. elliptic or round, purple blue. Capsules 3 5 mm long ovoid.

Fl. & Fr. : September - March.

Rare, in wet and shady localities at high altitude. Closely allied to *E. sessile* L., but flowers are larger and inflorescence altogether different.

Selected specimens : Sirohi : Mt. Abu, Mehta 398, 1239, 1240 (JAC).

2. *Exacum pedunculatum* L. *Sp. Pl.* 112. 1753 ; Wight, *Ic.* 2(1) : 2, t. 336. 1840, 'pedunculare' ; Clarke in Hook. f. *Fl. Brit. India* 4 : 97. 1883 ; Duthie, *Fl. Gangetic Plain* 2 : 72. 1911. *E. pedunculare* Arn. in *Ann. Sci. Nat. ser. 2. II* : 176. 1836.

Erect, annual, glabrous herbs, 15 30 cm high. Leaves sessile to subsessile, 3 5 x 0.3 1.0 cm, elliptic or lanceolate, obtuse, tapering at the base, 3 nerved. Flowers in terminal, much branched paniced cymes, bluish purple. Calyx tube cup - shaped ; lobes 4, ovate, acute, with a wedge - shaped wing extending from apex to the base on the outer surface. Anthers sagittate at base, not spirally twisted after anthesis. Capsules globose, membranous, surrounded by persistent, winged calyx. Seeds minute, glabrous, pale brown.

Fl. & Fr. : September - March.

Common in wet places in the forests, particularly east of Aravalli.

Selected specimens : Banswara : Jhola, Kanodia 42 (BSI) ; Bhilwara : Meja dam, Singh 6044 (BSJO) ; Jhalawar : Shyam ghat, Majumdar & Uishra IC086 (BSA) ; Looda, Majumdar 10265 (BSA).

5. *HOPPEA* V, illd.

Hoppea dichotoma Heyne ex Willd. in Ges. Naturf. Fr. Berlin Neue Schr. 3 : 435. 1801 ; Clarke in Hook. f. Fl. Brit. India 4 : 100. 1883 ; Duthie, Fl. Gangetic Plain 2 : 76. 1911. 'Ramjetta' (Hindi).

Small, annual, glabrous herbs ; stem and branches quadrangular, more or less winged. Leaves sessile, 0.2-0.6 cm long, ovate, acute, glabrous. Flowers in terminal, dense, dichotomous cymes, pale yellow. Capsules c. 0.25 cm long, ellipsoid, enclosed in persistent calyx. Seeds numerous, oblong or subglobose, pale to dark green, muriccate.

Fl. & Fr. : September-January.

Common in moist places, particularly in the east of Aravalli.

Selected specimens : Ajmer : Clayey river bed, Sharma 1247 (LWG) ; Banswara : Khora forest, Singh 3725 (BSJO) ; Bhilwara : Bijolia, Singh 5704 (BSJO) ; Jalor : Sunda hills, vyas 6857 (BSJO) ; Jhalawar: Kyasara, Verma 6807 (BSA).

6. SWERTIA L.

Swertia minor (Griseb.) Knobl. in Bot. Centralbl. 60 : 321. 1894 ; Cooke, Fl. Bombay 2 : 193. 1904. *Ophelia minor* Griseb. in DC. Prodr. 9 : 126. 1845 ; Wight, Jc. 4(2) : 8. t. 1332. 1848. *Pleurogyne minor* (Griseb.) Clarke in Hook. f. Fl. Brit. India 4 : 120. 1883.

Small, erect, annual herbs, upto 15 cm high. Stem 4-winged. Leaves sessile, 1.2 x 0.5-1.2 cm, ovate, acute, 3-nerved, membranous. Flowers 4-merous, in leafy paniculate cymes, bluish-purple. Calyx enlarged in fruit ; segments ovate. Each corolla lobe with 2 triangular pocket-shaped nectaries at the base. Capsules 4-6 mm long, ovoid. Seeds suborbicular, compressed.

Fl. & Fr. : November-March.

Rare, on hills in wet, springly grounds ; so far reported only from Mt. Abu.

Selected specimen : Sirohi : Mt. Abu. Jain 46607 (BSI).

85. MENYANTHACEAE

(P. J. Parmar)

NYMPHOJDES Seguir

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- 1a. Leaves floating only, 3.5-22 cm broad. Flowers nearly 15-24 in a fascicle. Corolla - lobes 5-7, more than 1.5 cm across. Seeds smooth or tuberculate.
- 2a. Corolla lobes densely fimbriate on inner surface. Style heterostylous. Capsules 15 or more - seeded. Seeds smooth. 2. *N. indica*
- 2b. Corolla - lobes with a median longitudinal crest on inner surface, not fimbriated. Style homostylous. Capsules 5 to 10 - seeded. Seeds tuberculate. *N. hydrophylla*
- 1b. Leaves both floating and radical ; floating leaves 1-3 cm broad. Flowers 4-8 in a fascicle. Corolla lobes 4, not more than 1.2 cm across. Seeds muricate. 3. *N. paryiflora*

1. *Nymphoides hydrophylla* (Lour.) Kuntze, Rev. Gen. Pl. 2 : 429. 1891. *Menyanthes hydrophylla* Lour. Fl. Cochinch. I : 129. 1790. *M. crisfata* Roxb. Pl. Cor. 2 : 3. t. 105. 1798. *Nymphoides cristata* (Roxb.) Kuntze, Rev. Gen. Pl. 2 : 429. 1891. *Limnanthemum cristatum* (Roxb.) Griseb. Gen. Sp. Gent. 342. 1839 ; Clarke in Hook. f. Fl. Brit. India 4 : 131. 1883 ; Duthie, Fl. Gangetic Plain 2 : 79. 1911. 'Kumudini' (Hindi).

Attached or floating perennial herbs ; rhizome short, erect or oblique, bearing scaly leaves from the axils of which petiole like branches develop and come above the water surface. Floating leaves 4-13 x 3-11 cm, elliptic orbicular, deeply cordate hastate at base, with rounded lobes, faintly crenate, greenish above, purplish beneath. Flowers white with yellow centre. Sepals obtuse. Capsules 7-10 x 3-5 mm, broadly ovoid - oblong. Seeds 2-3 mm in diam., yellowish white.

Fl. & Fr. : October-March, sometimes almost throughout the year.

Common in the east of Aravalli in ponds, pools, tanks, lakes and other stagnant water sources.

Selected specimens : Alwar : Baran Viar, Parmar 9748 (BSJO) • Banswara • Lamarao talao, Singh 3632 (BSJO) ; Bhilwara : Banera Singh 6021 (BSJO) ; Jhalawar : Anawar - Akiera, 7534 (BSA) ; Sirohi : Mt. Abu, Mehta 342 (JAC), matter 21491 (BLAT).

2. *Nymphoides indica* (L.) Kuntze, Rev. Gen. Pl. 2 : 429. 1891. *Menyanthes indica* L. Sp. Pl. 145. 1753. *Limnanthemum indicum* (L.) Griseb. Gen. sp. Gent. 343. 1839 ; emend. Thw. Enum. Pl. zeyl. 205. 1860, includ. vars. : Clarke in Hook. f. Fl. Brit. India 4 : 131. 1883 ; Duthie, Fl. Gangetic Plain 2 : 79. 1911. •'Kumudini' (Hindi).

Attached or floating perennial herbs ; rhizome oblique, thick ; scale like leaves numerous. ovate. Petioloid branches long, simple, flexible. Floating leaves 4.5-22.0 x 3.5-22.0 cm, nearly orbicular, deeply cordate at base,

coarsely crenate. Flowers whitc, throat yellow. Sepals acute. Capsules obovoid or oblong ovoid. Seeds globose, shining, yellow.

Fl. & Fr. : Most part of the year.

Common in the east of Aravalli in stagnant water in tanks, ponds, lakes, rivers etc.

Selected specimens : Banswara : Verma 218 (BSA) ; Bhilwara : Bijolia, Singh 6100 (BSJO) ; Kota : Lachhamipuria tank, Wadhwa 9483 (BSA) : Sirohi : Mt. Abu, Mehta 337 (JAC) ; Tonk : Bisalpura, Shetty 544 (BSJO).

3. *Nymphoides parviflora* (Griseb.) Kuntze, Rev. Gen. Pl. 2 : 429. 1891. *Limnanthemum parvifolium* Griseb. in DC. Prodr. 9 '2 141. 1845 ; Clarke in Hook. f. Fl. Brit. India 4 : 132. 1883, incl. var. *moonii* ; Cooke, Fl. Bombay 2 : 106. 1904.

Perennial, aquatic or terrestrial, rhizomatous herbs. Leaves radical & floating ; radical leaves 0.7 1.1 X 0.6 1.1 cm, spatulate or deltoid, cuneate at base, obtuse ; floating leaves 1.0 - 4.2 X 1.0 3.0 cm, broadly oval to cordate orbicular or obovate, with deep triangular sinus. Flowers in axillary clusters. Calyx lobes oblong lanceolate, faintly 3 nerved. Corolla white ; lobes 4, subacute. Capsules 4 x 2 mm, oblong, 15 or more - seeded. Seeds lenticulate, muriculate, white.

Fl. & Fr. : May December.

This species is included on the authority of Blatt. & Hallb. (1918 21), who collected it from Badaka, W. Rajasthan.

CULTIVATED SPECIES

Nymphoides peltatum Kuntze (*Limnanthemum nymphoides* Link)
Perennial, aquatic herbs with creeping rhizomes. Stem long, floating, rooting at nodes. Leaves 2.5 - 5.0 cm in diam., deeply cordate. Flowers in
500 OF

axillary umbels, yellow. Reported to be grown in Jodhpur district (Puri et al., 1964).

86. HYDROPHYLLACEAE

(P. J Parmar)

HYDROLEA L. nom. cons.

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Hydrolea zeylanica (L.) Vahl, Symb. Bot. 2 : 46. 1791 ; Wight, Ic. 2(3) : 8. t. 601. 1842 ; Clarke in Hook. f. Fl. Brit. India 4 : 133. 1883 ; Duthie, Fl. Gangetic Plain 2 : 80. 1911. *Nama zeylanica* L. sp. Pl. 226. 1753.

Erect or procumbent, annual, glandular hairy herbs at least younger parts, rooting at the lower nodes. Leaves 2 - 5 x 0.5 - 1.5 cm, oblong to narrowly lanceolate. Flowers solitary or in condensed, glandular hairy racemes, lilac blue. Bracts and sepals lanceolate, acute, glandular.

Capsules 4 - 6 mm long, ovoid — oblong or ellipsoid, enclosed in persistent calyx. Seeds many, minute, oblong, glabrous.

Fl. & Fr. : September February.

Common in moist low lying areas, rice fields, ponds etc., particularly in south & south eastern parts of the state.

Selected specimens : Banswara : Kushalgarh, Singh 3751 (BSJO) ; Bhilwara : Bijolia, Singh 6052 (BSJO) ; Jhalawar : Singh 83721 (LWG).

87. BORAGINACEAE

(P. J. Parmar)

Ia. Style arising from between the carpels :

28. Anthers connivent into a cone ; connectives much produced, twisted together at the apex...8. *Trihodesma*

2b. Anthers not connivent into a cone ; connectives obtuse or apiculate, not twisted together :

3a. Faucal appendages (scales) present :

4a. Corolla 2 • S mm long, limb divided nearly to the base, pale purple to blue: