CHAPTER 3
SYSTEMATIC TREATMENT

MURDANNIA Royle (nom. cons.)

The genus Murdannia was first established by Royle in 1839 (Ill. Bot. Himal. Mts. vol 1: 403. t. 95, f. 3) to include a single species M. scapiflora Roxb. (=M. edulis (Stokes) Faden). However, three earlier names were available for this genus viz., Ditelesia Raf. (1837) based on D. nudiflora (L.) Raf. = M. nudiflora (L.) Brenan.).

Most of the species of Murdannia were earlier placed under Commelina L. or Aneilema R. Br. (Hasskarl, 1870; Clarke, 1874, 1881; Hooker, 1892; Fischer, 1932 etc.). Brown’s Aneilema was heterogenous and included species currently recognized under other genera such as Aneilema s.str., Murdannia Royle, Pollia Thunb., etc. Wight (1853) segregated Dictyospermum and Dichoeespermum from Aneilema. Dichoespermum is, however conspecific to Murdannia. Brückner (1926), recognised the unsatisfactory nature of the genus Aneilema and divided it in to Aneilema s. str. and Phaeneilema, but later he recognized (1930) that his Phaeneilema was synonymous with Murdannia Royle and accepted the name. Brenan (1952) transferred many of the African and Asian species of Aneilema into Murdannia and drew attention to the marked differences in capsule, flower and staminode characters between these two genera. Morton (1956) restricted the name Aneilema to the African species and segregated the remaining Asiatic species under Tricarpelema.

The name ‘Murdannia’ commemorates Murdan Aly, a plant collector and keeper at Saharanpur herbarium, whom Royle found to be
acknowledgeable owing to his remarkable tact and quickness in detecting new plants.


Type: Murdannia edulis (Stokes) Faden


Ditelesia  Raf., Fl. Tellur. 3: 69. 1837.

Dilasia  Raf., Fl. Tellur. 4: 122. 1838.

Streptylis  Raf., Fl. Tellur. 4: 122. 1838.


Prionostachys  Hassk., Flora 49: 212. 1866.


Small to medium sized perennial or annual herbs. Stem erect to ascending to decumbent; branched or unbranched. Roots thin fibrous or thick fibrous to tuberous. Leaves basal or cauline; alternate to distichous to spirally arranged with a sessile lamina. Sheath mostly fused along the margin with a line of cilia. Lamina ovate, elliptic, oblong to linear lanceolate. Inflorescence terminal or axillary thyrses or variously reduced to fascicles of cincinni. Flowers bisexual or bisexual and male, actinomorphic or zygomorphic. Sepals 3, free, sepaline, equal to subequal. Petals 3, free, petaline, equal to subequal; yellow or white to purple or violet. Stamens 3–2 fertile and antesepalous, 3–4 staminoidal and antepetalous; filaments glabrous or bearded; antherodes 3–lobed to hastate. Ovary sessile, trilocular; style slender, central in male flowers, deviates away from stamens in bisexual flowers; stigma papillate. Capsules trilocular, trivalved, dehiscent. Dehiscence longitudinal. Seeds 1–many per locule, variable in size and shape; testa smooth or foveolate reticulate or ridged or furrowed; hilum dotted, elliptic, oblong to linear; embryotega dorsal to semidorsal or lateral.

*Murdannia* is principally an Asiatic genus with 52 species in the world. Twenty six species (50%) occur in India.

**Terminology used for describing Reproductive Morphology**

The terminology used for describing inflorescence and flower follows Faden (1991) with slight modification. The upper most leaf of flowering shoot is termed the inflorescence bract in this account. Peduncle is treated as the distance between the node of the inflorescence bract and the lowermost cincinnus. The basic unit of inflorescence in *Murdannia*, as in all Commelinaceae, is the cincinnus. The cincinnus is usually considered as a scorioid or helicoid cyme. Each cincinnus is subtended by a persistant bract, the cincinnus bract. The cincinnus consists of a sympodial axis with two ranks of bracteoles.
The basal internode on cincinnus *i.e.*, the distance between inflorescence axis and first bracteole of cincinnus is called cincinnus peduncle. The remaining internodes collectively constitute the cincinnus axis.

The number of flowers produced by each cincinnus is indeterminate, but it is few or even one in axillary flowered species. Persistant, pedicel opposed bracteoles are present in all *Murdannia* species. In some species the cincinnus lack a peduncle and have a contracted cincinnus axis. The term secondary inflorescence is given to an additional inflorescence shoot arising from the inflorescence bract. Flowers are borne in two ranks along the cincinnus.

The flowers are pedicellate, pentacyclic, trimerous, actinomorphic to zygomorphic. Flower consists of 3 sepaline sepals and 3 petaline petals. Stamens 3 or 2 and are opposite to sepals (antesepalous). Staminodes or the sterile stamens are 3 or 4 depending on the species. When 3 all in opposite to petals (antepetalous) and when 4, 1 antesepalous all others antepetalous. Sterile anthers or the antherodes are trilobed to hastate. Style straight, central in male flowers or deviates away from stamens in bisexual flowers.
Plate 2. Inflorescence Morphology
Plate 3. Floral Morphology

- Antesepalous stamen
- Sepal
- Petal
- Pedicel
- Style deviating from stamens
- Antepetalous staminode
- Median petal
- Lateral petal
- Antesepalous staminode
Plate 4. Capsule & Seed Morphology

- Persistent sepal
- Trilocular capsule
- Pedicel

Seed arrangement in a locule
Uniseriate
Biseriate

Seed-dorsal view
Terminal seeds
- Embryotega
- Hilum

Seed-ventral view
- Ventral pit

Median seeds
- Embryotega
- Hilum

Seed from one seeded locule
- Embryotega
The terminology used for describing the seed follows Faden (1991): ventral: the surface bearing hilum; dorsal: the surface opposite the ventral; apical and basal: the surfaces facing the apex and base of capsule, respectively; lateral: the surfaces, one of which bearing the embryotega, directed towards the dorsal and ventral surfaces of the capsule. Seed length is the distance between apical and basal surfaces; width, the distances between the lateral surfaces; and thickness: the distance between the ventral and dorsal surfaces. Seed shape is the linear outline viewed from the dorsal surface (Plate 2, 3 & 4).

**Key to species**

1. Leaves all in basal rosette; inflorescence scapose .........................2
2. Flowering shoot mostly > 25 cm long; cincinnus bracts perfoliate, maroon dotted; seeds uniseriate .................................................. *M. edulis*
2. Flowering shoot mostly < 20 cm long; cincinnus bracts amplexicaul, pale white; seeds biseriate ...................................................... *M. fadeniana*
3. Inflorescence thyrsiform; cincinni more than 1-flowered..............4
4. Flowers with approximate bases; bracteoles caducous..................5
5. Annuals usually lacking a basal rosette; flowers < 9 mm across........6
6. Seeds 1 per locule; fruiting pedicel 1–1.5 mm long, slightly bending.................................................................. *M. assamica*
6. Seeds 2 per locule; fruiting pedicel 2.5–4.5 mm long, straight to ascending................................................................. *M. nudiflora*
7. Flowering shoot terminal in the rosette, main axis well developed;
lateral branches absent; capsule 6–10 × 4 5mm ............... M. gigantea
7. Flowering shoot lateral in the rosette, main axis reduced; lateral
   branches forming new rosettes; capsule 4–5 × 2–3 mm ........... .8
8. Roots thick fibrous from base; flowers opening afternoon ...... M. simplex
8. Roots thin fibrous from base; flowers opening forenoon.... M. loriformis
9. Seeds biseriate ........................................................................... 10
9. Seeds uniseriate .......................................................................... 12
10. Leaves filiform falcate; cincinni pseudo umbellate; bracts filiform .... 11
10. Leaves linear-lanceolate; cincinni 1 or 2 opposite or sub opposite;
   bracts never filiform .............................................................. M. lanceolata
11. Perennials, bulbous base present; seeds with hilum elliptic.. M. juncoides
11. Annuals, bulbous base absent; seeds with hilum rounded. .. M. semiteres
12. Leaves filiform falcate; bracts filiform; stamens and staminodes
   fused basally ........................................................................ M. sahyadrica
12. Leaves elliptic to lanceolate; bracts never filiform; Stamens and
   staminodes free .................................................................... 13
13. Petals clawed, seeds with tubercles ........................................ M. japonica
13. Petals never clawed, seeds without tubercles. ......................... 14
14. Cincinni alternate on the inflorescence axis.............................. 15
14. Cincinni opposite or sub opposite on the inflorescence axis....... 18
15. Plants with definite base ................................................................ 16
15. Plants without definite base....................................................... 17
16. Testa with fine flattish raised warts throughout ............. M. esculenta
16. Testa without fine flattish raised warts throughout ............ M. divergens
17. Seeds foveate, with flattish raised warts......................... M. zeylanica
17. Seeds scrobiculate, without flattish raised warts.............. M. hookeri
18. Seeds with a deep ventral pit .................................................. M. dimorpha
18. Seeds without deep ventral pit............................................... 19
19. Petals with crenulate margin, short appressed staminal hairs
present ................................................................. \textit{M. spirata}

19. Petals without crenulate margin, short appressed staminal hairs
   absent ........................................................................ \textit{M. striatipetala}

20. Seed one per locule; stamens 2; staminodes 4; pedicels enclosed in
   persistant prominently ribbed sheath; pedicel twice jointed.. \textit{M. vaginata}

20. Seeds more than one per locule; stamens 3; staminodes 3; absence of
   prominently ribbed sheath; pedicel once jointed ..........................21

21. Petals yellow to orange yellow ..............................................................22

21. Petals pink to lilac ..................................................................................25

22. Leaves ribbed; roots tuberous; whole plant covered with lanuginose
   hairs .................................................................................... \textit{M. lanuginosa}

22. Leaves not ribbed; roots fibrous; lanuginose hairs absent .................23

23. Seeds biseriate; 10 per locule .......................... \textit{M. crocea subsp. ochracea}

23. Seeds uniseriate; 4–6 per locule ............................................................24

24. Capsules narrowly elliptic, fruiting pedicel recurved. ....... \textit{M. Pauciflora}

24. Capsules oblong–elliptic, fruiting pedicel never recurved.. \textit{M. versicolor}

25. Seeds biseriate; fruiting pedicel erect ................................. \textit{M. blumei}

25. Seeds uniseriate; fruiting pedicel recurved .................... \textit{M. triquetra}.

1. \textit{Murdannia assamica} Nampy & A. Ancy

\begin{itemize}
\item \textbf{Type}: Assam, Goalpara district, Goalpara town rail station,
\item 26º07'26.73"N, 90º37'18.26"E, 50 m, 06.09.2009, \textit{Anna Ancy Antony}
\item & \textit{Santhosh Nampy} 2376 (holo, DEV!; iso, CALI!, L!).
\end{itemize}

\textbf{Plate 5, 6a; Fig. 1}

Annual ascending herb, basally 2 or 3 branched. Roots fibrous, from
base and from lower nodes in touch with soil. Stem light purple towards base;
internodes 6–10 cm long, green, glabrous with a line of hairs. Leaves cauline,
alternate, usually reduced distally on the shoot; sheath 0.3–1 cm long, green
with slight purple tinge, minutely pubescent, ciliate at apex and along the fused margin; lamina linear–lanceolate, 6–15 × 0.5–0.7 cm; base narrow rounded; margin scabrous, hyaline; apex acute–acuminate; both surfaces glabrous to puberulent. Inflorescence terminal, single pedunculate cincinnus; peduncle glabrous, 2–2.5 cm long; cincinni 2–3 cm long, c. 30 flowered; bracteoles pale green, caducous, ovate, 5–6 mm long. Flowers bisexual and male, closely placed on the cincinnus axis, opening c. 10 am, withers 12 pm; pedicel glabrous, thick, 1–1.5 × 0.5 mm, slightly bending. Sepals 3, free, elliptic, pale green, glabrous, equal to sub equal, 3.5–4 × 1–1.2 mm. Petals 3, free, elliptic, 4–5.1 × 1.5–2 mm, lilac, glabrous; margin entire. Stamens 2, antesepalous, dorsifixed; filaments hairy; hairs basally attached on the lateral sides of filaments; anthers elliptic, 0.4–0.6 mm long; dehiscence longitudinal; pollen white, elliptic. Staminodes 4, 3 antepetalous, with antherodes hastate or knob like, white; filaments glabrous to 1-3 haired; one antesepalous with antherode knob like and filaments 3–6 haired. Ovary elliptic to ovate, glabrous; style white, 1.6 mm long, glabrous; stigma papillate. Capsule widely obovate, 4.1 × 4 mm, glabrous, light brown, dehiscent, trilocular. Seed one per locule, elliptic; 2–2.2 × 1.8–2 mm; testa brown, smooth with raised white flaky material on the surface; embryotega dorsal; hilum linear.

**Chromosome number:** Not reported.

**Flowering & fruiting:** August–November.

**Flowering time:** 10.00 am–12.00 pm.
Plate 5. Type of *Murdannia assamica* Nampy & A. Ancy.
Figure 1. *Murdannia assamica* Nampy & A. Ancy. a. Habit; b. Flower; c. Bracteole; d. Sepal; e. Petal; f. Stamen; g & h. Staminodes; i. Gynoecium; j. Capsule; k. Seed-dorsal view; l. Seed-ventral view. (from Anna Ancy Antony & Santhosh Nampy 2376).
Ecology: Among woods and on wayside shades, in alluvial soil.

Distribution: Known only from Goalpara District in Assam.

Specimens examined: Assam, Goalpara District, Goalpara town rail station, 04.09.2011, Anna Ancy Antony & Santhosh Nampy 4606 (DEV); near Paikan, way to Krishnai, 04.09.2011, Anna Ancy Antony & Santhosh Nampy 4676 (DEV).

Notes: M. assamica is recently described by Ancy and Nampy (2012) from Assam. It is similar to M. nudiflora in general appearance, in their caducous bracts, inflorescence pattern, flower color and two fertile and four staminodes but can be easily differentiated from the latter by its 2–3 cm long, c. 30 flowered cincinnus; 1–1.5 mm long slightly bending pedicel; larger bracteole and sepals; hastate or knob like antherode and widely obovate capsules. The capsule locules are 1-seeded in M. assamica, but it is 2-seeded in M. nudiflora. Seeds of M. assamica measures 2–2.5 × 1.8–2 mm, smooth with raised white flaky material, dorsal embryotega and linear hilum but they are 1.3–1.7 × 1.1–1.4 mm size, foveolate–reticulate to foveolate or radiately ridged with numerous pale warts around depressions, semidorsal to lateral embryotega and oblong–elliptic hilum in M. nudiflora. A prominent to less prominent basal rosette and secondary inflorescences are sometimes found in M. nudiflora, but they are lacking in M. assamica.

(Hassk.) Bakh.f. in C.A. Backer, Bekn. Fl. Java 10a: 14. 1949. **Type**: Indonesia, near Bogor, s.die, Blume s.n. (L!)

*Callisia orientalis* Buch.–Ham. ex Wall., *Cat. n.* 5222. 1831, nom. nud.


*Dichaespermum repens* C.B. Clarke, Commelyn. Cyrtandr. Bengal.: 42. t. 28. 1874. non Wight, 1853. **Type**: India, Assam, s.loc., s.die, Masters s.n. (CAL); (lecto, designated here!)

*Aneilema hamiltonianum* var. *minus* (as *minor*) C.B. Clarke in A. DC. & C. DC., Monogr. Phan. 3: 214. 1881. **Type**: India, Assam, s.die, *Buchanan Hamilton* in Wall. *Cat. n.* 5222 (K!)


**Plate 7, 6b; Fig. 2**

Annuals, decumbent or creeping herbs with erect branches. Roots fibrous from nodes touch with soil. Internodes green, glabrous. Sheath green, 0.4–1 cm long, glabrous with a line of cilia along the fused edges; mouth ciliate. Leaves oblong–lanceolate to linear lanceolate, cauline, distichous to spirally arranged; lamina 2–8 × 0.5–1.5 cm; apex acute–acuminate; margin scabrous, hyaline, slightly wavy; base obtuse–amplexicaul; both surfaces glabrous. Inflorescence terminal and axillary cymes, hardly exerted from the sheath. Flowers bisexual, pedicellate; pedicel once jointed, glabrous. Sepals 3,
free, elliptic, c. 5.5 × 1.7 mm, pale green, glabrous; margin entire, apex curved. Petals 3, free, elliptic–obovate, 6.1 × 3.2 mm, lilac, glabrous, margin entire. Stamens 3, 2–3 mm long, antesepalous, symmetrically arranged, dorsifixed; filaments free, lilac, slightly bearded; hairs attached to the middle, lilac; anthers lilac–white; dehiscence longitudinal; pollen white. Staminodes 3, 1–2 mm long, antepetalous; filaments free, lilac, glabrous to few haired; antherodes trilobed, yellow or pale white. Ovary oblong to elliptic, trilocular, 1.5–2 × 1–1.2 mm, pale green, glabrous; style white, straight, glabrous; stigma white to papillate. Capsule oblong to elliptic, 5–6 × 1–2 mm, brown, trilocular. Seeds 14–16 per locule, biseriate, rectangular to polygonal, 0.5–0.6 × 0.5 mm; testa smooth with white flaky material, minute ridges and warts radiating down from embryotega; hilum rounded; embryotega dorsal.

**Chromosome number:** Not reported.

**Flowering & fruiting:** December–January.

**Flowering time:** 10.00 am–11.30 am.

**Ecology:** In marshy areas, plains, tanks and pools; fully exposed. It is common in the marshy plains of Assam and is largely aquatic.

**Distribution:** India, Sri Lanka, Indonesia, Eastern Tropical Africa.

**Specimens examined:** Assam, Dibrugarh district, Dibru reserve, 20.10.1960, G. Panigrahi 21621 (ASSAM). Goalpara district, near rail station, 06.09.2009, Anna Ancy Antony & Santhosh Nampy 2377 (DEV). Lakhimpur district, Lakhimpur, 01.09.2009, Anna Ancy Antony & Santhosh Nampy 2370 (DEV). Sonapur district, Sonapur, 16.11.1956, G. Panigrahi 4476 (ASSAM). District unknown, s.loc., s.die, Masters s.n. (DD, CAL); s.loc., s.die, Jenkins s.n.; s.loc., 10.1847, s.col. s.n. (CAL).
Plate 7. Type of *Murdannia blumei* (Hassk.) Brenan.
Figure 2. *Murdannia blumei* (Hassk.) Brenan. a. Habit; b. Sepal; c. Petal; d. Stamen; e. Staminode; f. Gynoecium; g. Capsule; h. Seed-dorsal view; i. Seed-ventral view. (a-d, f. from *Anna Ancy Antony & Santhosh Nampy* 2377; e, g, h & i. from Blume s.n. 1).
Notes: *M. blumei* is easily distinguished by its axillary lilac flowers hardly exserted from the sheath and biseriate arrangement of seeds in the capsule locules. In the single collection we have from Assam, the staminodes are absent, stamens are hairy, and capsule locules are 5 seeded with biseriate arrangement.


*Dichaespermum repens* Wight, Icon. Pl. Ind. Orient. 6: t. 2078. 1853. **Type**: India, Quilon, *s.loc.*, 12.1835, *Wight 1180* (K!). **Plate 8, 9, 6c; Fig. 3**

Annual, erect to ascending herbs. Roots fibrous from base and from lower nodes in touch with soil. Internodes green or with slight purple or brown tinge, glabrous with a line of cilia. Sheath green or with slight purple tinge, 0.4 mm long, glabrous with a line of cilia along the fused edges; mouth ciliate. Leaves cauline, alternate; lamina oblong–ovate-oblong, 1.5–3.7 × 0.7–1 cm; apex acute; margin minutely scabrous towards the apex; base rounded–amplexicaul; both surfaces glabrous. Inflorescence terminal and axillary cymes, 1–4 single flowered cincinni; cincinni once jointed, upper segment the pedicel. Flowers bisexual; pedicel glabrous, minutely ciliate apically. Sepals
3, free, elliptic, 2.5–3 × 0.9–1.2 mm, pale green, glabrous; margin entire. Petals 3, free, obovate–orbicular, 3–4 × 3–4 mm, yellow-orange to yellow, glabrous, margin entire. Stamens 3, 1–2 mm long, antesepalous, bending away from the style, dorsifixixed; filaments free, orange-yellow, bearded on the lower half; hairs orange yellow; anthers yellow-orange to purple; dehiscence longitudinal; pollen yellow, elliptic. Staminodes 3, 0.8–1 mm long, antepetalous; filaments free, orange-yellow, few haired; antherodes trilobed, third lobe less prominent, yellow. Ovary elliptic to obovate, trilocular, 0.7–1 × 0.5 mm, pale green, glabrous; style yellow-orange to purple, bending to one side, glabrous; stigma orange-yellow, papillate. Capsule oblong to elliptic, 2–4 × 2–2.5 mm, brown, glabrous. Seeds 9 or 10 per locule, biseriate, ovate to polygonal, 0.8 × 0.75 mm; testa smooth, scrobiculate, white flaky material on the surface; hilum elliptic to ovate; embryotega dorsal.

**Chromosome number:** Not reported.

**Flowering & fruiting:** August–December.

**Flowering time:** 9.30 am–12.00 pm.

**Ecology:** Near streams, wayside ditches, marshy places, sandy sea coasts, often in full sun to partially shady conditions.

**Distribution:** Peninsular India, endemic

Notes: Aneilema ochraceum Dalzell and A. croceum Griff. are treated separately by earlier workers. However, Faden (1977) united these two species and considered the former as a subspecies under the latter. M. croceum Griff. subsp. crocea is characterized by densely pubescent sepals and narrower capsules while subsp. ochraceum, has glabrous sepals and broader capsules. Moreover the two subspecies are allopatric in their distribution. M. crocea subsp. ochracea alone occur in India. However Panday & Diwakar (2008) in their integrated checklist reported the occurrence of subsp. crocea in my intensive survey in the islands of Andaman & Nicobar islands.

While consulting the herbaria in India, I couldn’t locate this taxon. Hence the occurrence of M. crocea subsp. ochracea in India is doubtful.
Plate 9. Type of *Murdannia crocea* (Griff.) subsp. ochracea (Dalzell) Faden.
Figure 3. *Murdannia crocea* (Griff.) Faden subsp. *ochracea* (Dalzell) Faden a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i. Seed-dorsal view; j. Seed-ventral view. (from Santhosh Nampy & Juby paul 499).

*Aneilema paniculatum* Wight, Icon. Pl. Ind. Orient. 31. t. 2075. 1853. **Type:** India, s.die, Wight s.n. (E!)

Plate 10, 11, 6d; Fig. 4

Annuals, erect to ascending to decumbent herbs. Roots fibrous from base and from nodes in touch with soil. Internodes green or rarely with purple tinge, glabrous with a line of cilia. Sheath green or purple, 1–3 cm long, glabrous with a line of cilia along the fused edges. Leaves cauline, alternate–distichous; lamina elliptic–lanceolate, 1.5–10 × 0.5–1.4 cm, sometimes with purple tinge; apex acute; margin scabrous towards the tip, ciliate towards the base; base rounded–amplexicaul; upper surface glabrous; lower sparsely pubescent to glabrous. Inflorescence terminal and axillary thyrse with 2–4 alternate, ascending cincinni or 1–2 sub opposite/pseudoumbellate cincinni; peduncle 2–5 cm long, glabrous; cincinni 2–5 cm long, c. 10 flowered; bracteole persistant, 2–4 mm long, amplexicaul. Flowers bisexual and male, pedicellate; pedicel 5–6 mm long. Sepals 3, free, oblong, 3–4.5 × 1.5–2 mm, pale green, tip slightly purple, glabrous; margin entire. Petals 3, free, obovate
with apex truncate, 3–4.5 × 2.7–4 mm, bluish to lilac–lavender, glabrous, margin entire. Stamens 3, 2.5–3 mm long, antesepalous, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments free, lilac–lavender, bearded; hairs attached to the lower half, lilac to lavender; anthers bluish to brown; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, 2–2.5 mm long, antepetalous; filaments free, lilac, bearded to glabrous; antherodes trilobed to hastate, creamy yellow. Ovary elliptic, trilocular, 1.5 × 0.5 mm, green, glabrous; style purple, bending to one side, glabrous; stigma white, papillate. Capsule oblong–elliptic, 3.5–4.5 × 1.5–2.2 mm, brown, glabrous. Seeds 3–5 per locule, uniseriate, ovate–rectangular, 0.5–0.6 × 1–1.1 mm; testa smooth with several raised flattish warts, granular; hilum linear, on side of a deep pit; embryotega semidorsal.

**Chromosome number**: n=10 (Kammathy & Rao, 1961b; Sreenath & Rama, 1984).

**Flowering & Fruiting**: September–February.

**Flowering Time**: 10.00 am–1.00 pm.

**Ecology**: In road sides, sandy soil, seashore, marshy places, rocky areas and soil pockets of rocks; in partial shades to fully exposed.

**Distribution**: Peninsular India, endemic.


Maharashtra, Mumbai district, Mumbai, s.die, Gibson s.n. (CAL). Raigarh district, 15.08.1991, B.G. Kulkarni 131686 (BSI). Satara district, Koyna, 09.09.1978, R.K. Kochhar 154138 (BSI). Tamil Nadu, Chennai district, Vannathurai, 12.09.1961, R.V. Kammathy 73934 (BSI). Coimbatore district, Aliyar submergible area, 27.07.1962, K.M. Sebastine 14651; Ibid., 21.11.1962, s.coll. s.n. (CAL); Ibid., 27.07.1962, K.M. Sebastine 15071 (CAL, MH); Anamalai, 10.10.1901, C.A. Barber 3676, 3704; Ibid., 1873, Beddome s.n.; Anamoolamalai, 20.08.1962, C.P. Sreemadhavan CP394 (MH); Attakkatti waterfalls, 05.07.1961, J. Joseph 12695 (CAL, MH); Pollachi, 05.10.1901, s.coll. s.n. (MH). Kanchipuram district, Thuraipakkam, 29.08.1913, M.S. Ramaswami 383 (CAL). Kanyakumari district,
Plate 10. Murdannia dimorpha (Dalzell) G. Bruckn. a. Habit; b. Pollinator visiting flower; c. Inflorescence; d. Flower; e. Sepal; f. Petal; g. Stamen; h & i. Staminodes; j. Gymnoecium; k. Capsule; l. Seed- dorsal view; m. Seed- ventral view (a, d-m from Ancy Antony & Shahina P.M. 2301; b & c from Ancy Antony & Divya 2325).
Plate 11. Type of *Murdannia dimorpha* (Dalzell) G.Brückn.
Notes: *M. dimorpha* is usually a robust plant with an alternate or dichotomously branched inflorescence. The smooth seeds with a deep ventral pit and several raised flattish warts throughout the surface easily distinguishes *M. dimorpha* from other species. Plants growing in rather dry conditions have thick, leathery leaves, short internodes and leaves appearing in basal rosettes. Specimens from Thikkody [Santhosh Nampy & Anna Ancy Antony 815, 818; Joby Paul & Santhosh Nampy 477 (DEV)] have a trailing and looping habit.


Plate 12, 13, 6c; Fig. 5

Perennial, erect herbs. Roots thick, fibrous from base. Internodes green, reddish in older plants, glabrous with a line of hairs. Sheath reddish or rarely green, 1–2.5 cm long, glabrous with a line of cilia along the fused edges; apex ciliate. Leaves all cauline alternate; lamina lanceolate to linear-lanceolate, 5–10 × 2–3 cm; apex acute–rarely acuminate; margin slightly undulate, minutely hyaline, ciliate towards the base; base rounded; both surfaces glabrous. Inflorescence terminal with 3–10 alternate, ascending cincinni, mostly 3 cincinni per node in sub verticilate arrangement, sometimes secondary thyrse with 3–5 cincinni are seen from inflorescence bract; peduncle 2–4 cm long, glabrous; cincinni 2–3.5 cm long, c. 10 flowered; bracteole persistant, 2–3 mm long, amplexicaul. Flowers bisexual and male, pedicellate; pedicel 1.5–3 mm long, glabrous. Sepals 3, free, oblong–elliptic, 3–5 × 2–2.5 mm, green or with apex purple tinge, tip cuplike, both surfaces glabrous; margin entire, hyaline. Petals 3, free, elliptic, 4–5.5 × 4–4.5 mm, white, glabrous, margin entire. Stamens 3, 2–3.5 mm long, antesepalous, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments free, white–pink with purple tinge at tip, bearded; hairs attached to the lower half, pink; anther lobes pink; connective broad, creamy white; dehiscence longitudinal; pollen creamy white, elliptic. Staminodes 3, 2–3 mm long, antepetalous; filaments free, pink, bearded; hairs white to pink; antherodes trilobed, yellow. Ovary elliptic, trilocular, 1–2 × 1 mm, white, glabrous; style white, bending to one side, glabrous; stigma white, papillate. Capsule elliptic, 4–6 × 3–3.5 mm, glabrous, brown, trilocular. Seeds 3 or 4 per locule, uniseriate, ovate to rectangular, 1–1.3 × 1–1.2 mm; testa ridged, furrowed; hilum dotted; embryotega semidorsal.

**Chromosome number:** n=30 (Panigrahi & Kammathy, 1963a&b).
Flowering & fruiting: July–September.

Flowering time: 1.00 pm–2.30 pm.

Ecology: Amidst grasses on hill slopes and hill tops.

Distribution: North east India, Nepal to South China.

Specimens examined: Arunachal Pradesh, West Kameng district, Salari forest, 15.09.1964, J. Joseph 40001 (ASSAM). Assam, Golaghat district, between Garampani, 22.08.1968, N.P. Balakrishnan 46967 (CAL). Himachal Pradesh, Shimla district, Shimla, 08.1889, s.coll. 133; ibid., s.die, Inayat 8829; Ibid., 22.07.1900, Inayat 25011; Ibid., s.die, Gamble 4846; Ibid., 08.1940, M.B. Raizada 14263; Ibid., 08.08.19637, R.N. Parken 3404; Shimla hills, 15.08.1948, Kirat Ram s.n.; Hazalburgh, 24.08.1949, Jameson 66 (DD); Ibid., s.die, E.R. Johnson s.n. (CAL). Sirmaur district, Rajgarh, 29.07.1986, R.S. Karki 82086 (BSD). Manipur, Imphal west district, 02.09.1937, N.L. Bor 22214 (ASSAM). Meghalaya, East Khasi hills district, Shillong, 18.08.1885, C.B. Clarke 38927C; Ibid., 03.07.1886, C.B. Clarke 44355 A; Ibid., 05.07.1965, G.K. Deka 35960; Khasia hills, 06.1876, s.coll. 562; Ibid., 08.1883, s.coll. s.n.; Ibid., 08.1885, C.B. Clarke 40039 C; Ibid., 06.1876, Gustav mann 562; Ibid., 06.1850, s.coll. s.n. (CAL); Ibid., 18.09.1850, J.D. Hooker & T. Thomson s.n. (CAL, MH). Jaintia hills district, way to Jowai, 09.09.2009, Anna Ancy Antony & Santhosh Numpy 2384; Ibid., 07.09.2011, Anna Ancy Antony & Santhosh Numpy 4618 (DEV). West Khasi hills district, Nongstoin, 21.06.1958, s.coll. 16527; s.die, N.E. Parry s.n. (CAL); Nongstoin, 21.06.1958, G. Panigrahi 16527 (ASSAM). Nagaland, Naga Hills district, Naga Hills, 08.1886, D. Prain s.n. (CAL). Odisha, Puri district, Khirsu road, 19.08.1978, G. Panigrahi 570 (BSD). Uttarakhand, Almora district, Dinapani, 13.10.1975, J.N. Vohra 57895 (BSD). Bageshwar district, Amparow, 10.08.1909, N. Gill 152; Askot, 31.08.1971, C.M. Arora

Notes: M. divergens is rare in India, confined to north eastern regions. It is allied to M. japonica but differs in the absence of a basal rosette, sub verticillate cincinni and having ridges and furrows on the seeds.
Plate 13. Type of *Murdannia divergens* (C.B.Clarke) G.Brückn.
Figure 5. *Murdannia divergens* (C.B. Clarke) G. Brückn. a. habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Capsule; h. Seed-dorsal view; i. Seed-ventral view (from Anna Ancy Antony & Santhosh Nampy 4618).

*Commelina tuberosa* Lour., Fl. Cochinch.: 40. 1790. nom. illeg.


Aneilema scapiflorum var. latifolium N.E. Br., J. Linn. Soc., Bot. 36: 154. 1903. Type: China, Ling-men, 11.1889, Henry s.n. (K!).


Aneilema platyphyllum Merr., Philipp. J. Sci. 10: 293. 1915. Type: Philippines, Luzon, Rizal Province, 06.1913, Ramos in Bureau of Science 20985 (lecto, K!; isoleceto, P!, US!).

Plate 14, 15, 6f; Fig. 6

Perennial, erect herbs. Roots thick, thick at base or fusiform tubers. Internodes green, glabrous with a line of cilia. Leaves in basal rosette, alternate to spiral; lamina lanceolate to linear-lanceolate, 5–50 × 3–5 cm; apex acute–acuminate; margin slightly wavy, scabrous towards the tip, pubescent–ciliate towards the base; base rounded to amplexicaul; upper surface glabrous; lower surface pubescent–glabrous. Inflorescence scapose; flowering shoot 10–60 cm long, either developing before the leaves or along with them, lateral, erect to ascending, glabrous, consisting terminal thyrse with 3–6 alternate, erect to ascending cincinni, sometimes secondary thyrses with 1 or 2 cincinni arises from lower bracts, 1 to 3 perfoliate bracts present on the flowering shoot below the thyrse. Cincinnus bracts perfoliate, maroon dotted, glabrous, decreases in size from lower to upper cincinnus. Cincinni very short to long, 3–10 cm long, 4–15 flowered; bracteole persistant, 3–4 mm long,
amplexicaul, maroon dotted, glabrous. Flowers bisexual and male, pedicellate; pedicel 5–6 mm long. Sepals 3, free, oblong, 3–7 × 1.5–2 mm, pale green, purple towards the apex, outer surface glabrous–pubescent; margin entire. Petals 3, free, oblong–elliptic, 6–9 × 5–6.5 mm, pink to pale blue to pale violet–purplish white, glabrous, margin wavy. Stamens 3, 3.5–5 mm long, antesepalous, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments free, white–pink, bearded; hairs attached to the lower half, pink; anther lobes white–pinkish blue; dehiscence longitudinal; pollen white, dotted. Staminodes 3, 2–2.2 mm long, antepetalous; filaments free, pinkish white, bearded; antherodes trilobed, yellow. Ovary oblong to elliptic, trilocular, 1.5–2 × 0.6–1 mm, pale green, glabrous; style white, bending to one side, glabrous; stigma white, papillate. Capsule oblong to elliptic, 4–7 × 2–2.5 mm, apically maroon tinged. Seeds 2 or 3 per locule, uniseriate, ovate to rectangular, 2.6–3 × 1.9–2 mm; testa smooth or scrobiculate, ridges and furrows running down from the embryotega; hilum oblong to elliptic; embryotega dorsal.

_Chromosome number:_ n=9 (Rao & Kammathy, 1961).

_Flowering & fruiting:_ March–May.

_Flowering time:_ 8. 00 am–11. 30 am.

_Ecology:_ In forests, moist open places, among grasses; in partial shades,

_Distribution:_ Tropical and subtropical Asia.
Plate 15. Type of *Murdannia edulis* (Stokes) Faden.
Plate 6. Distribution of Murdannia species in India. 

- **a.** *M. assamica* Nampy & A. Ancy; 
- **b.** *M. blumei* (Hassk.) Brenan; 
- **c.** *M. crocea* (Griff.) Faden subsp. *ochracea* (Dalzell) Faden; 
- **d.** *M. dimorpha* (Dalzell) G. Brück.; 
- **e.** *M. divergens* (C.B. Clarke) G. Brück.; 
- **f.** *M. edulis* (Stokes) Faden.
Figure 6. *Murdannia edulis* (Stokes) Faden. a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i. Seed-dorsal view; j. Seed-ventral view. (from Anna Ancy Antony & Anu Mary 230f).


Notes: M. edulis differs from the rest of Indian species in having scapose inflorescence, constricted thyrse, maroon dotted perfoliate bracts and the basic chromosome number n=9. In Indian plants, the flowering shoots develop before the leaves or along with them. The flowers open by 8.am in the one collection that I have from Kuruwa island in Kerala.


Aneilema scapiflorum var. minus Thwaites, Enum. Pl. Zeyl. 322. 1864. Type: Sri Lanka, Hakgalla, 1861; Badulla, April 1854, M. Thwaites C.P. 3314 (holo, PDA; iso, P!).

Plate 16, 17, 18 a; Fig. 7

Perennial, erect to ascending herbs. Roots thick or tuberous from base, fibrous from lower nodes in touch with soil. Internodes green, glabrous. Sheath reddish purple, 1–1.7 cm long, glabrous; apex hairy towards the fusing region. Leaves sometimes few towards base forming a rosette; alternate to distichous; lamina oblong to elliptic to lanceolate, 2–10 × 0.8–1.4 cm, mostly leathery; apex acute to acuminate; margin slightly undulate, thick, smooth, minutely scabrous towards apex; base rounded to amplexicaul; both surfaces glabrous. Inflorescence terminal, thyrs with 2–8 alternate sometimes sub opposite, ascending cincinni; peduncle 1–4 cm long, glabrous; bracts c. 2.2 cm long. Cincinni 4–10 cm long, c. 20 flowered; bracts persistant, 2–3 mm long, tip thick, curved. Flowers bisexual and male, pedicellate; pedicel 2–5 mm long; bracteole persistant, tip thick, curved. Sepals 3, free, elliptic, 4–6 × 2–2.5 mm, reddish purple or pale green with tip purple, glabrous; margin entire. Petals 3, free, obovate to slightly elliptic, 4.5–6 × 4–5 mm, purplish blue to lavender, glabrous; apex sometimes slightly incurved. Stamens 3, 3–4 mm long (mostly the size of stamen varies in a flower), anteseptal, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments free, purplish blue to lavender, densely bearded; hairs attached to the lower half, purplish blue to lavender; anther lobes reddish purple; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, 1.5–3 mm long, antepetalous; filaments free, purple, bearded with 3 or 4 hairs; antherodes trilobed, creamy yellow at the lobes, white at middle. Ovary oblong to elliptic, trilocular, 1–1.5 × 0.5–0.8 mm, green, glabrous; style purple or white with purple tinge, bending away from stamens and staminodes, glabrous; stigma white, papillate. Capsule oblong to elliptic, 5–7 × 2–3 mm. Seeds 4 or 5 per
locule, uniseriate, ovate to rectangular, 1–1.5 × 1–1.2 mm; testa smooth with raised, flattish, light brown warts and ridges on all surface, sometimes with a deep ventral pit; hilum elliptic to linear; embryotega semidorsal.

**Chromosome number:** n=10 (R.S. Rao & Kammathy, 1962).

**Flowering & fruiting:** April–January.

**Flowering time:** 11.30 am–2.30 pm.

**Ecology:** In grasslands, mountain slopes and on rock crevices, usually fully exposed.

**Distribution:** South India, Sri Lanka.

Plate 16. Murdannia esculent a (Wall. ex C.B. Clarke) R.S. Rao & Kammathy

- a. Habit; b. Flowering twig; c. Roots; d & e. Inflorescence; f. Flower; g. Sepal; h. Petal; i. Stamen; j. Staminode; k. Gynoecium; l. Seeds- dorsal view; m. Seeds- ventral view (a-n from Anna Ancy Antony 4688).
Plate 17. Type of *Murdannia esculenta* (Wall. ex C.B.Clarke) R.S.Rao & Kammathy.

Notes: M. esculenta is easily recognized by its tuberous roots, terminal thyrse alternate cincinni and seeds having flattish raised warts uniformly on the testa. I have studied a wide range of materials and it show some variations. The materials from silent valley has tuberous roots and leaves in a basal rosette, thus agreeing to typical M. esculenta while the materials from Nelliyampathy has thick, long roots, which also lack a deep ventral pit characteristic to this species.


Plate 19, 20, 18 b; Fig. 8

Perennial, erect herbs. Roots from base, thin fibrous. Leaves all in basal rosette, spiral; lamina oblong-lanceolate to lanceolate, 4–12 × 1.8–3 cm; apex acute–acuminate; margin undulate, hyaline; base amplexicaul; upper surface green, glabrous; lower surface green to reddish in older leaves, glabrous. Inflorescence scapose, 17–20 cm long; consists terminal or axillary thyrs with 4–6 alternate, erect to ascending cincinni. Cincinnus bracts amplexicaul, 8 mm long, pale white with green towards tip, glabrous. Cincinni 3–6 cm long, 4–8 flowered; bracteole persistant, 2–4 mm long, amplexicaul, green or purple, glabrous. Flowers bisexual and male, pedicellate; pedicel 5–8 mm long. Sepals 3, free, oblong, 3.5–4.5 × 2–2.5 mm, purple tinge throughout, apex pale green, outer surface glabrous to rarely pubescent apically; margin entire. Petals 3, free, elliptic, 5–6 × 4–5 mm, purple white, glabrous, margin entire. Stamens 3, 3–4 mm long, antesepalous, slightly curving inwards in flower, dorsifixed; filaments free, purple white, bearded; hairs attached to the lower half, purple white; anther lobes bluish black, connective white; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, 2.2–2.5 mm long, antepetalous; filaments free, purple white, bearded; antherodes hastate to trilobed with third lobe reduced, yellow. Ovary oblong to elliptic, trilocular, 1.5–2 × 0.5–0.8 mm, pale white, glabrous; style white with purple tinge towards base, bending away from stamens, glabrous; stigma white, papillate. Capsule
Plate 19. *Murdannia foemina* Nampy & Joby: a & b, Habit; c, Flower; d, Sepal; e, Petal; f, Stamen; g, Staminode; h, Gynoecium; i, Capsule; j, Seed- dorsal view; k, Seed- ventral view (a-k from Anna Acy Antony 468).
Plate 20. Type of *Murdannia fadeniana* Nampy & Joby
Figure 8. Murdannia fedoniana Nampy & Joby a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i & j. Seed-dorsal view. (d, j from Auna Ancy Antony 4685; a-c, e-i Santhosh Nampy & Joby paul 459).
oblong to elliptic, 7–10 × 2.5–4 mm, glabrous, trilocular. Seeds 10–16 per locule, biseriate, triangular to polygonal, 1.2–1.5 × 0.3–0.5 mm; testa smooth, deposition of white flaky material, pitted on lateral side; hilum rounded to elliptic; embryotega dorsal.

**Chromosome number:** Not reported.

**Flowering & fruiting:** July–December.

**Flowering time:** 8.30 am–1.30 pm.

**Ecology:** Dripping rocks near streams and waterfalls.

**Distribution:** South India, endemic.

**Specimens examined:** Kerala, Kottayam district, Vagamon hills, 18.07.2002, Santhosh Nampy & Joby Paul 459; 01.08.2012, Anna Ancy Antony 4685 (DEV). Thiruvananthapuram district, Athirumala, 12.10.1988, M. Mohanan 4223 (CALI); Forest near Bonacaud estate, J. Joseph 44521; Kallar, s.die, Gopalan 90690 (MH). Tamil Nadu, Thirunelveli district, Thirunelveli hills, s.die, Beddome 85605 (MH).

**Notes:** *M. fadeniana* Nampy & Joby replaces *M. glauca* (Thwaites ex C.B. Clarke) G. Brückn. in India. *M. fadeniana* is closely allied to *M. glauca*, but differs in having 10 to 16 seeds arranged biseriately in each locule and possessing 3 staminodes as against 5 to 8 seeds uniseriately arranged in each locule and 2 staminodes in the latter.


Commelina hookeriana Spreng., Syst. Veg. 5: 186. 1828.


Aneilema nudiflorum F. Muell., Fragm. 8: 62. 1872, nom. illeg.


Murdannia saddlepeakensis M.V. Ramana & Nandikar, Phytokeys 20: 9–15. 2013, syn. Nov. Plate 21, 22, 18 c; Fig. 9

Perennial erect herbs with most leaves in a basal rosette. Roots from base, fibrous, thick. Internodes green, glabrous, 10–25 cm long. Sheath 3–8 cm long, glabrous, pale green or with slight purple tinge. Rosette leaves
alternate to spirally arranged; lamina linear, 20–55 × 1–1.5 cm; cauline leaves alternate or distichous, greatly reduced distally; lamina lanceolate to linear–lanceolate, 3–10 × 0.8–1.6 cm; base narrow; margin scabrous at the apex; apex acute–acuminate; both surfaces glabrous. Flowering shoot terminal in the rosette, 25–100 cm tall. Inflorescence terminal and axillary, on the main stem, consisting of 1–2–(3) cincinni; peduncle 1–5 cm long, glabrous; cincinni 5–10 cm long, c. 8–20 flowered; bracteole 7–10 mm long, caducous.

Flowers bisexual and male (rarely), 14–19 mm wide closely placed on the cincinnus; pedicel 2–5 mm long, ascending, erect in fruit, glabrous. Sepals 3, free, elliptic to lanceolate, c. 6–9 × 3–4 mm, pale green, glabrous. Petals 3, free, obovate, lateral petals slightly orbicular, 8–12 × 7–10 mm, lavender to lilac to pale bluish, glabrous, margin entire. Stamens 2 (3), anteseopalous, curving outwards towards the lateral petals, dorsifixed; filaments free, 5–18 mm long, densely bearded; hairs attached to the lower half, pink–lilac; anther lobes deep blue, connective white to pale blue; dehiscence longitudinal; pollen white, elliptic. Staminodes (3) 4, 3 antepetalous, with filaments ca. 3–8 mm long, lilac to purple, bearded, antherodes trilobed, lobes yellow; 1 anteseopalous, with filaments 10–15 mm long, densely bearded, antherode minute reduced to a knob. Ovary ovate, 0.6–1.5 × 0.4–0.5 mm, pale green, glabrous; style pale lavender, bending away from the stamens, glabrous; stigma white, papillate. Capsule elliptic to ovate–elliptic, 6–10 × 4–6 mm. Seeds 2 per locule, uniseriate, ovate to elliptic, 3–4 × 2.5–3 mm; testa with flattish warts, ridges and furrows in lines radiating from embryotega or sometimes foveolate, granular; hilum linear; embryotega dorsal.

Chromosome number: n=11 (Panigrahi & Kammathy, 1963; Rao et al., 1960); n=22 (Kammathy & Rao; 1961 b).

Flowering & fruiting: July–December.

Flowering time: 10.30 am–12.30 pm.
Ecology: In grassy mountain slopes, rock outcrops, along forest margins, in full sun to partial shades,

Distribution: Madagascar, tropical Asia to north Australia.


- **a.** Habit;  
- **b.** Inflorescence;  
- **c.** Diptera pollinator visiting the flower;  
- **d.** Thick roots;  
- **e.** Bracteole;  
- **f.** Sepal;  
- **g.** Lateral petal;  
- **h.** Posterior petal;  
- **i.** Stamens;  
- **j.** Antepetalous staminode;  
- **k.** Antecapetalous staminode;  
- **l.** Gynoecium;  
- **m.** Capsule;  
- **n.** Seeds- dorsal view;  
- **p.** Seeds- ventral view (from Anna Ancy Antony & Santhosh Nampy 4961).
Plate 22. Type of *Murdannia gigantea* (Vahl) G. Brückn.
Figure 9. *Murdannia gigantea* (Vahl) G. Brückn. **a.** Habit; **b.** Flower; **c.** Bracteole; **d.** Sepal; **e.** Petal; **f.** Stamen; **g & h.** Staminodes; **i.** Gynoecium; **j.** Capsule; **k.** Seed-dorsal view; **l.** Seed-ventral view. (from Anna Ancy Antony & Santhosh Nampy 4691).

Notes: Ramana et al. (2013) recently described a new species, *M. saddlepeakensis* from Andaman and Nocibar islands characterized by linear leaves, 2 fertile stamens, 1-seeded capsule locules and scorbiculate seeds. While studying a wide range of materials of *M. gigantea*, I am of the opinion that there exists considerable variation in this species. During my trip to North east India and Andamans, I came across plants with slender grass like leaves. In the north east Indian specimens, the sheath and leaf base are hairy, 2 stamens and 3 stamens are seen in different flowers of the same inflorescence which also shows variation in the size of stamens and staminodes. Similarly, in some flowers, the stigma is trilobed while the antherodes are trilobed to hastate. The South Indian materials are glabrous, consistently have 2 stamens and a third one with dense hairy filament and reduced knob like antherode. Similarly the seed testa is prominently ridged and furrowed and scorbiculate in different populations. I also have collected materials from Saddlepeak (North Andaman) which agrees with *M. saddlepeakensis* in every respect except the number of seeds in the capsule locules. Hence, I consider *M. saddlepeakensis* as conspecific to *M. gigantea*.


**Plate 23, 24, 18d; Fig. 10**

Perennial, diffusely spreading herbs. Roots fibrous from base and from nodes in touch with soil. Internodes green, glabrous with a line of hairs. Sheath green or with purple tinge, 1–1.5 cm long, glabrous; apex hairy towards the fusing region. Leaves all cauline; alternate; lamina lanceolate, 2–12 × 1–2.4 cm; apex acute to rarely acuminate; margin slightly hyaline, undulate, scabrous towards apex; base rounded to amplexicaul; both surfaces glabrous. Inflorescence terminal sometimes axillary from upper leaves, thyrse with 3–12 alternate or sub opposite to opposite, ascending to much spreading cincinni; peduncle 1–5 cm long, glabrous; Cincinni 2–5 cm long, c. 10 flowered; bracts persistent; 2–3 mm mm long; sometimes lower cincinnus bracts leafy ca. 1.5 cm long. Flowers bisexual and male, pedicellate; pedicel 2–5 mm long; bracteole persistent, linear–lanceolate. Sepals 3, free, elliptic, 4–5.5 × 1.5–2 mm, pale green or with purple tip, glabrous; margin entire, hyaline. Petals 3, free, elliptic, 4.5–6 × 4–4.5 mm, white–pale bluish purple, glabrous.
Stamens 3, 4–4.5 mm long, antesepalous, symmetrical or slightly bending to one side in bisexual flowers, dorsifixed; filaments free, white with slight purple tinge, bearded; hairs attached to the lower half, white or slight purple; anther lobes bluish black; dehiscence longitudinal; pollen yellow or creamy yellow. Staminodes 3, 3–3.5 mm long, antepetalous; filaments free, white to minutely purple, bearded with few hairs; antherodes trilobed, lobes not prominent, yellow or creamy yellow. Ovary oblong to elliptic, trilocular, 1–1.5 × 0.8–1 mm, creamy white or pale green, glabrous; style white with purple tinge, bending away from stamens and staminodes, glabrous; stigma white, papillate. Capsule elliptic to linear–elliptic, 5–6 × 1–1.5 mm, trilocular. Seeds 3 or 4 per locule, uniseriate, rectangular to ovate, 2–3 × 1–1.2 mm; testa prominently ridged and furrowed or scrobiculate, white flaky material covering the surface; hilum linear; embryotega semidorsal.

Chromosome number: n=10 (Kammathy & Rao, 1964).

Flowering & fruiting: July–October.

Flowering time: 8.30 am–11.00 am.

Ecology: This is a high altitude plant, often seen fully exposed, in grasslands, mountain slopes and on thin soil over rocks.

Distribution: North East India to China.
Plate 24. Type of *Murdannia hookeri* (C.B.Clarke) G.Brückn.
Figure 10. *Hur营ia hookeri* (C.B. Clarke) G. Brückn. a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i. Seed-dorsal; j. Seed-ventral view (from Anna Ancy Antony & Santhosh Namgy Namgy 4615).

**Notes**: Clarke (1874) described *M. hookeri* (*Aneilema hookeri*) based on Hooker & Thomson’s material from Khasia hills. During the present study, I have consulted these specimens housed at CAL and MH which agrees with the protologue in every respect. Hence, Hooker & Thomson’s material at CAL is designated here as the lectotype. It is closely allied to *M. zeylanica*, but can be differentiated by its scrobiculate seeds without flattish raised warts against foviate seeds with flattish raised warts in *M. zeylanica*.


Plate 25, 26, 18c; Fig. 11

Perennial, erect herbs. Roots thick, long fibrous or with fusiform tips. Internodes green, glabrous. Sheath green or with purple tinge, 1–2.5 cm long, glabrous with a line of cilia along the fused edges; apex ciliate. Rosette leaves alternate to spiral; lamina lanceolate, 10–17 × 2.5–3.5 cm. Cauline leaves alternate to spiral; lamina elliptic to ovate-lanceolate, 5–10 × 2–4 cm; apex acute to rarely acuminate; margin undulate, hyaline, scabrous towards the tip, ciliate towards the base; base rounded; both surfaces glabrous. Inflorescence
terminal or rarely an axillary thyrs with 3–8 alternate, ascending cincinni, sometimes secondary thyrs with 2–5 cincinni arises from inflorescence bract; peduncle 2–3.5 cm long, glabrous; cincinni 2–4 cm long, c. 14 flowered; bracteole persistant, 2–3 mm long, amplexicaul. Flowers bisexual and male, pedicellate; pedicel 4–5 mm long, glabrous. Sepals 3, free, oblong, 3.5–5 × 2–3 mm, green or with purple tinge, tip rounded, both surfaces glabrous; margin entire, hyaline. Petals 3, free, oblong, 5–6 × 4.2–4.5 mm, white, glabrous, clawed, margin entire. Stamens 3, 4–4.5 mm long, antesepalous, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments free, white, bearded; hairs attached to the lower half, violet; anther lobes brown–blue; connective broad, creamy yellow; dehiscence longitudinal; pollen creamy white, elliptic. Staminodes 3, 2–3 mm long, antepetalous; filaments free, white, bearded; hairs violet; antherodes trilobed, one lobe highly reduced, yellow. Ovary globose, trilocular, 1–1.5 × 1 mm, white, glabrous; style white, bending to one side, glabrous; apex curved; stigma white, papillate. Capsule sub-globose, 5–7 × 4–4.2 mm, glabrous. Seeds 3 or 4 per locule, uniseriate, ovate to triangular, 1.8–2.2 × 1.8–2 mm; testa smooth with tubercles, sometimes tubercles radiating down from the embryotega or ventral surface pitted; hilum rounded; embryotega dorsal.

*Chromosome number:* n=32 (Kammathy & Rao, 1961 b); n=21, 2n=42 (Panigrahi & Kammathy, 1963); 2n=40 (Sharma & Sharma, 1958).

*Flowering & fruiting:* August–March.

*Flowering time:* 2.00 pm–4.00 pm.

*Ecology:* Fairly common in deciduous or evergreen forests, along forest margins, rocky slopes and waterfalls; in partial or completely shady habitats.

*Distribution:* India to Japan and West Malesia.

*Specimens examined:* **Assam,** Dima Hasao district, North Cachar hills, 30.08.1908, *William G. Craib 11, 55* (CAL). Goalpara district, woods near
rail station, 06.09.2009, Anna Ancy Antony & Santhosh Nampy 2374 (DEV).
Kamrup district, South of Guwahati, 13.08.1964, A.S. Rao 38793 (CAL).
Lakhimpur district, Motharguri, 12.07.1957, G. Panigrahi 9252, 9951 (CAL).
Marigaon district, Sonaikushi, 18.08.1964, N.P. Balakrishnan 39218 (CAL).
Nagoan district, Kohalhat, 30.08.1964, N.P. Balakrishnan 39544 (CAL).
Sonitpur district, Singri, 24.07.1958, s.coll. 14348 (CAL).

**District unknown**

Kamrup district, South of Guwahati, 13.08.1964, A.S. Rao 38793 (CAL).
Lakhimpur district, Motharguri, 12.07.1957, G. Panigrahi 9252, 9951 (CAL).
Marigaon district, Sonaikushi, 18.08.1964, N.P. Balakrishnan 39218 (CAL).
Nagoan district, Kohalhat, 30.08.1964, N.P. Balakrishnan 39544 (CAL).
Sonitpur district, Singri, 24.07.1958, s.coll. 14348 (CAL).

**Goa**

North Goa district, Darbandora, 30.08.1963, K.C. Kanodia 89649; Onda, 07.10.1964, R.S. Raghavan 103367 (BSI, CAL).

**Jharghand**

Hazaribagh district, Chota Nagpur, 1875, J.J. Wood s.n. (CAL); Hundugagh, 12.09.1896, D. Prain s.n. (CAL).

**Karnataka**


**Kodagu district**


**Mysore district**

Biligiri Rangan hills, 07.09.1978, S.R. Ramesh KFP 2628 (JCB); Ketherdevargudi, 04.09.1961, R.S. Rao 73625 (BSI). North Canara district, Dandeli, 29.09.1978, K.P. Sreenath & K.R. Keshava Murthy KFP 3056 (JCB); North Canara, s.die,
Plate 25. *Murdannia japonica* (Thunb.) Faden. a. Habit; b. Pollinator visiting the flower; c. Basal rosette with thick fibrous roots; d. Inflorescence; e. Flower; f. Sepal; g. Petal; h. Stamen; i. Staminode; j. gynoecium; k. Gynoecium; l. Seeds- dorsal view; m. Seeds- ventral view (from *Anna Ancy Antony & Santhosh Nampy 2374*).
Plate 26. Type of *Murdannia japonica* (Thunb.) Faden.
Figure 11. *Murdannia japoinca* (Thunb.) Faden a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i. Seed-ventral view; j. Seed-dorsal view (from Joby Paul & Santhosh Nampy 895).
Agartala, 29.08.1957, s.coll. 1698; Ibid., 03.09.1957, s.coll. 1134; Ibid., 04.06.1959, s.coll. 1759; Chandrapur rain forest, 29.08.1957, R.S. Rao 8965 (CAL). South Tripura district, Reang, 25.05.1914, C.W. Cousins 118 (CAL). District unknown, ricefield banks, 29.08.1957, R.S. Rao 8858 (CAL). West Bengal, Jalpaiguri district, South Moraghat, 31.05.1975, J.K. Sundar 433 (CAL); Ibid., 25.05.1944, S.K. Mukerjee 1030 (DD); Chapramari forest, 15.07.2002, J. Battachary & Party 31102 (CAL). State unknown, South India, s.loc., s.die, Wight 2845; Malabar, 06.1836, s.coll. 1169; s.loc., 27.08.1913, C.C. Clader & M.S. Ramaswamy 247 (CAL); s.loc., side, s.coll. Dalzell s.n. (DD); Malabar, Concan Region, Stocks & Law s.n.; s.loc., s.die, Gustavmann 1181, 330; s.loc., s.die, C.B. Clarke 40208 B (CAL).

Notes: *M. japonica* is easily distinguished by large ovate-lanceolate leaves with prominent undulate hyaline margin, large terminal inflorescence, afternoon flowering, clawed petals, seeds with tuberculate testa and rounded hilum. It is a perennial species with a basal rosette and thick long roots.


Plate 27, 28, 18f; Fig. 12

Perennial, erect herbs. Roots thin fibrous from base. Base bulbous; Internodes green or reddish, glabrous. Sheath green or with reddish tinge, 1–5 mm long, glabrous; margins fused. Leaves cauline, alternate; lamina filiform, falcate towards the base, 5–14 × 0.1–0.2 cm; apex acute; margin entire; both surfaces glabrous. Inflorescence terminal and axillary; consisting of 2–3 pedunculate or non pedunculate pseudoumbellate cincinni. Peduncle 1–2 cm long, glabrous; bracts filiform, glabrous; cincinni 2–4 cm long, c. 8–10 flowered; bracteole persistent, 1–2.5 mm long, amplexicaul. Flowers bisexual and male, pedicellate; pedicel 2–3 mm long, glabrous. Sepals 3, free, elliptic–oblong, 2–2.5 × 1–1.3 mm, reddish, both surfaces glabrous; margin entire, minutely hyaline. Petals 3, free, oblong, 4–5 × 2.5–3 mm, blue–purple blue, glabrous, margin entire. Stamens 3, 2–3 mm long, antesepalous, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments basally fused, white with slight purple tinge, glabrous; anther lobes reddish; connective creamy yellow; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, 1.5–2 mm long, antepetalous; filaments basally fused with stamen filaments, white with purple tinge, glabrous; antherodes trilobed, creamy white. Ovary globose, trilocular 1.5–2 × 0.5–1 mm, green, purple tinge; style purple, bending to one side, glabrous; stigma white to purple, papillate. Capsule globose–ovate, 1.5–2 × 1.5–2 mm. Seeds 8 per locule, biseriate, ovate–rectangular, 0.5–0.55 × 0.6 mm; testa smooth, striate with white farinose material; hilum elliptic; embryotega dorsal.

*Chromosome number*: n=12 (Kammathy & Rao, 1964).

*Flowering and fruiting*: August–November.
Flowering time: 2.00 pm–4.00 pm.

Ecology: Found in water held rocks crevices, in full sun.

Distribution: South India, endemic.


Notes: Wight (1853) described Dichespermum juncoides as “erect, ramous…… filaments glabrous…… cells 6–8 seeded in 2 rows.” based on his materials from Courtallum and Quilon. In the present investigation, Wight’s material at K and E (image) has been consulted. Among them, Wight’s material at E annotated “Courtallum July 1835 967,” agreeing with the protologue is designated here as the lectotype.
Plate 28. Type of Murdannia juncoidea (Wight) R.S.Rao & Kammathy
Some authors consider *M. juncoides* as conspecific to *M. semiteres*. However, the identity of *M. juncoides* is discussed in detailed by Nampy and Joby (2008) and they considered both species as distinct. In the present study, I also consider *M. juncoides* as a distinct species. *M. juncoides* is a perennial species with a bulbous base and fibrous roots. SEM on seed indicates that in *M. semiteres* testa is minutely striate with less farinose granule and without any white flaky materials, while in *M. juncoides* testa is highly granular forming white flaky materials. Hilum is elliptic in *M. juncoides* but is dotted in *M. semiteres*. The flowering time of the two species overlaps and, hence it cannot be considered as a distinguishing character as stated by Nampy and Joby (l.c.)


Annual, unbranched or sparsely branched herbs with erect to ascending branches. Roots thin fibrous from base. Leaves cauleine, alternate; sheath 2–5
Plate 29. Type of *Murdannia lanceolata* (Wight) Kammathy.
mm long, glabrous with a line of cilia along the fused edges; lamina narrow linear–lanceolate 2–8 × 0.3–0.5 cm; base rounded; margin minutely hyaline; apex acute to acuminate; both surfaces glabrous. Inflorescence terminal and axillary from the upper leaves, consisting of 1–2 opposite or 4–5 alternate cincinnii, ascending cincinni; peduncle 1–3 cm long, glabrous; cincinni 3–4 cm long, c. 8 flowered; bracteole amplexicaul, persistant. Flowers bisexual; pedicel erect, glabrous. Sepals 3, free, elliptic to lanceolate, 3–5 × 2–2.5 mm, glabrous. Petals 3, free, obovate to orbicular, lilac; apex emerginate. Stamens 3, anteseopalous, dorsifixed; filaments free, 2–3 mm long, densely bearded below the lower half; anthers elliptic to oblong; dehiscence longitudinal. Staminodes 3, free, antepetalous; filaments few haired; antherodes trilobed. Ovary oblong to elliptic, glabrous; style glabrous; stigma papillate. Capsule oblong to elliptic, 4–7 × 1.5–2 mm, pale brown, glabrous, trilocular; Seeds biseriate, 20 per locule, triangular to polygonal, 0.5–1 × 0.4–0.7 mm; testa smooth; hilum elliptic; embryotega dorsal.

**Chromosome number:** Not reported.

**Flowering & fruiting:** January–February.

**Flowering time:** 10.00 am–1.00 pm

**Ecology:** In open fields and marshylands.

**Distribution:** South India and Sri Lanka.

17810 (MH). **State unknown**, Malabar, Concan Region, s. die, J.D. Hooker & T. Thomson s.n.; Koenig s.n. in Herb. Wallich 5214B (CAL).

**Notes:** *M. lanceolata* is rare gregarious in South India. Even after extensive field surveys we couldn’t collect this species live.


**Plate 31, 32, 30b; Fig. 14**

Perennial, erect to ascending herbs. Roots tuberous; fibrous roots also arise from a few lower nodes in touch with soil. Internodes green or with slight purple tinge, mostly densely ciliate to glabrous with a line of cilia along the fusing margin of the sheath. Sheath green or with slight purple tinge, c. 0.5 mm long, pubescent to glabrous, with a line of cilia along the fused edges; mouth ciliate. Leaves oblong to oblong-lanceolate, 1.5–5.5 × 0.8–1.3 cm, cauline, distichous; lamina prominently ribbed; apex acute; margin scabrous, minutely hyaline; base rounded to amplexicaul; upper surfaces pubescent to
ciliate; lower surface glabrous to pubescent. Inflorescence terminal and axillary cymes, 1–3 fascicles of 4–8 single flowered cincinnus. Flowers male and bisexual, pedicellate; pedicel once jointed, upper portion the pedicel, pubescent to glabrous; lower portion the peduncle, pubescent. Sepals 3, free, elliptic, 3–4 × 1–1.5 mm, pale green, glabrous; margin entire. Petals 3, free, obovate to orbicular, c. 3 × 2 mm, yellow-orange to yellow, glabrous, margin entire. Stamens 3, 2–3 mm long, antesepalous, bending to one side, dorsifixed; filaments free, orange to yellow, bearded; hairs attached to the lower half, yellow-orange; anther lobes deep blue to black; dehiscence longitudinal; pollen yellow, elliptic. Staminodes 3, c. 1 mm long, antepetalous; filaments free, yellow-orange, glabrous to few haired; antherodes trilobed, yellow, sometimes with a purple tinge on the middle lobe. Ovary elliptic to obovate, trilocular, c. 3 × 1 mm, pale green, glabrous; style yellow-orange to purple, bending to one side, glabrous; stigma white to purple, papillate. Capsule oblong to elliptic, 5–10 × 3–3.5 mm. Seeds 12–16 per locule, biseriate, rectangular-ovate, 0.3–1 × 0.3–0.8 mm; testa foveolate-reticulate, flattish raised warts, light brown flaky material present; hilum rounded; embryotega dorsal.

Chromosome number: Not reported.

Flowering & fruiting: August–October.

Flowering time: 9.00 am–11.30 am.

Ecology: In grasslands, fully exposed, usually at higher elevation.

Distribution: Peninsular India, endemic.

Specimens examined: Karnataka, Chikmagalur District, Baba Budan Giri Hills, 24.10.2003, Joby Paul 5175 (DEV). Mysore District, Cadamaney, 10.09.1903, Barber 6099 (MH); s.loc., 07.09.1893, W. A. Talbot 2997 (CAL).
Plate 36. Type of *Murdannia lanuginosa* (Wall ex C.B. Clarke) G. Bruckn.
Figure 14. *Murdannia lanuginosa* (Wall. ex C.B. Clarke) G. Brückn. a. Habit; b. Root; c. Flower; d. Sepal; e. Petal; f. Stamen; g. Staminode; h. Gynoeceum; i. Capsule; j. Seed-dorsal view; k. Seed-ventral view. (from Anna Ancy Antony & Santhosh Nampy 4661).
Uttara Kannada District, Castle Rock, 10.1908, M. Meebold 10694 (CAL).


Maharashtra, way to Morjai Plateau, 06.10.2011, Anna Ancy Antony & Santhosh Nampy 4661 (DEV). Tamil Nadu, Nilgiris District, Naduvattam, 10.1884, s.coll. 14872 (CAL); Ibid., s.die, s.coll. 72890 (MH).

State unknown, South India, Malabar, Concan, s.die, Stocks Laws n. (CAL).

Notes: There are 4 specimens on the Wallich catalogue No. 5221 of which the uppermost specimen is designated here as the lectotype. _M. lanuginosa_ occurs among grasses and it is very difficult to identify unless it has flowers. The term ‘lanuginosa’ refers to the lanuginose or wooly nature of the plant but the plant under cultivation become glabrous except for a line of hairs. Larger flowers with obovate petals and prominently ribbed leaves along with the lanuginose hairs help to distinguish _M. lanuginosa_ from other axillary flowered species of this genus.


_Aneilema terminale_ Wight, Icon. Pl. Ind. Orient. t. 2076. 1853. _Aneilema nudiflorum_ var. _terminale_ (Wight) C.B. Clarke, Commelyn. Cyrtandr.


**Plate 33, 34, 30c; Fig. 15**

Perennial herbs with a basal rosette of leaves and decumbent lateral branches. Roots fibrous, from base and from lower nodes in touch with soil. Internodes green or with slight purple tinge, with a line of cilia. Rosette leaves linear to oblong–linear, 8–30 × 1–1.5 cm, spirally arranged. Cauline leaves lanceolate to oblong–lanceolate, 3–10 × 0.8–1.5 cm, alternate or distichous; sheath green, 0.5–1 mm long, glabrous with a line of cilia along the fused edges; base rounded; margin scabrous near the apex, minutely hyaline, mostly undulate; apex acute–acuminate; both surfaces glabrous. Inflorescence terminal and axillary, on the lateral branches, consisting of single pedunculate cincinni, sometimes seen as paired terminally; peduncle 1–10 cm long; cincinni 1.5–3 cm long, c 10 flowered; bracteole 4–5.7 mm long, caducous. Flowers bisexual and male (rarely), closely placed on the axis; pedicel 2.5–4 mm long, ascending, mostly recurved in fruit, glabrous. Sepals 3, free, elliptic–lanceolate, 2.5–3 × 1–1.5 mm, pale green, glabrous, outer surface rarely minutely pubescent; margin entire, minutely hyaline. Petals 3, free, ovate-elliptic to obovate 4–6 × 2.5–3 mm, lilac, glabrous, margin entire. Stamens 2, antesepalous, dorsifixed; filaments free, 5–6 mm long, densely bearded; hairs pink–lilac; anther lobes deep blue–purple, connective white–blue; dehiscence longitudinal; pollen white–yellow, elliptic. Staminodes 4, 3 antepetalous with filaments free, c. 3–4 mm long, lilac to purple, glabrous to few haired, antherodes trilobed, lobes white, rarely creamy yellow; 1 antesepalous, with filaments 1.5–2.5 mm long, densely bearded, antherode
reduced to a knob. Ovary ovate to elliptic, 0.8–1.5 × 0.5–0.9 mm, pale green, glabrous; style white, glabrous; stigma white, papillate. Capsule ovate to elliptic, 4–5 × 2–3 mm. Seeds 2 per locule, uniseriate, ovate to elliptic, 2–2.1 × 1–1.2 mm; testa foveolate-reticulate, pale warty brown flaky depositions around depressions, slightly ridged and furrowed, farinose granules present; hilum linear to oblong; embryotega semidorsal.

*Chromosome number:* n=20 (Kammathy & Rao, 1961b); 2n=39 (Panigrahi & Kammathy, 1963).

*Flowering & fruiting:* June–December.

*Flowering time:* 10.00 am–12.00 pm.

*Ecology:* Rocky slopes, stream banks, cultivating fields, plantations, in shades.

*Distribution:* Tropical and subtropical Asia to Malesia.

Plate 33. *Murdannia loriciformis* (Hassk.) R.S. Rao & Kammathy

- a. Habit
- b. Inflorescence
- c. Flower
- d. Bracteole
- e. Sepals
- f. Petal
- g. Stamen
- h. Antesepalous staminode, i & j. Antepetalous Staminodes
- k. Gynoecium
- l. Capsule
- m. Seeds- dorsal view
- n. Seeds- ventral view (from *Anna Ancy Antony 2337*).
Plate 34. Type of *Murdannia loriformis* (Hassk.) R.S.Rao & Kammathy.
Figure 15. *Murdannia toriformis* (Hassk.) R.S. Rao & Kammathy a. Habit; b. Flower; c. Bracteole; d. Sepal; e. Petal; f. Stamen; g. Antepetalous staminode; h. Antesepalous staminode; i. Gynoeicum; j. Capsule; k. Seed-dorsal surface; l. Seed-ventral surface (from John Paul & Santhosh Namby 929).

**Notes:** *M. loriformis* is characterized by the presence of caducous bracteoles, single terminal or axillary cincinni and two seeded capsule locules. A prominent basal rosette is present and the main axis is reduced. The flowering shoots are always lateral, many centimeters long and spreading out in all directions, which sometimes produce basal rosettes. Faden (2000) reported elongate rosette producing terminal inflorescence in addition to the axillary flowering shoots, a character not shown by any of the Indian specimens, I examined.


**Commelina nudicaulis** Burm.f., Fl. Indica: 17. 1768. **Type**: India (G). **Aneilema nudicaule** Burm.f.) Loudon, Hort. Brit.: 15. 1839.


Aneilema foliosum Hassk. in F.A.W.mMiq., Pl. Jungh.: 144. 1852.
Cyanotis gueinzii Hassk., Commelyn. Ind.: 132. 1870.
Tradescantia cristata Blanco, Fl. Filip., ed. 3, 1: 293. 1877, nom. illeg.

Plate 35, 36, 30d; Fig. 16

Annual, erect to decumbent herbs with unbranched to scarcely branched to tufted shoots. Roots fibrous, from basal nodes in touch with soil. Internodes green or with slight purple tinge, with a line of cilia. Sheath green, 0.5–1mm long, glabrous with a line of cilia along the fused edges to ciliate, sometimes split to the base. Leaves oblong–linear to linear–lanceolate, 3–10 × 0.4–0.9 cm, alternate or distichous, sometimes basal leaves on the main axis closely placed forming a prominent to less prominent basal rosette; base rounded; margin scabrous, minutely hyaline, mostly undulate; apex acute–acuminate; both surfaces glabrous to ciliate. Inflorescence terminal and axillary, consisting of single pedunculate cincinni, sometimes seen as paired terminally; peduncle 0.7–10 mm long; cincinni 1–1.5 cm long, c. 12 flowered; bracteole 1.5–3.5 mm long, caducous. Flowers bisexual and male; 2–4 mm across, closely placed on the cincinnus axis; pedicel 2.5–4.5 mm long, straight to ascending, glabrous. Sepals 3, free, ovate–elliptic, 2–3 × 1.5 mm, pale green, glabrous; margin entire, minutely hyaline. Petals 3, free, obovate 5–7 × 5–6 mm, pink–lilac, glabrous, margin entire. Stamens 2, antesepalous, dorsifixed; filaments free, 4.5–5.5 mm long, densely bearded; hairs attached to the lower half, pink–lilac; anther lobes deep blue–purple, connective
white–purple; dehiscence longitudinal; pollen white–creamy yellow, elliptic. Staminodes 4, 3 antepetalous, 1 antesepalous; filaments free, c. 1mm long, lilac to purple, glabrous to few haired; antherodes trilobed, white, rarely creamy; antesepalous staminode with bearded filaments, antherode minute reduced to a knob. Ovary obovate–elliptic, 0.8–1.5 × 0.5–1mm, pale green, glabrous; style white, glabrous; stigma white, papillate. Capsule ovate to elliptic, 3–4 × 2–3 mm. Fruiting pedicel 2.5–4.5 mm long straight to ascending. Seeds 2 per locule, uniseriate, ovate to oblong, 1–1.2 × 1–1.1 mm; testa foveolate-reticulate, pale warts around depressions, granular, white flaky material present; hilum elliptic; embryotega semidorsal.

*Chromosome number:* n=10 (Simmonds, 1954; Kammathy & Rao, 1961b; Panigrahi & Kammathy, 1963); n=10, 2n=20 (Sharma, 1955); 2n=20 (Morton, 1967; Jones & Jopling, 1972).

*Flowering & fruiting:* June–February.

*Flowering time:* 11.00 am–1.30 pm

*Ecology:* This is one of the most common and widely distributed species of the genus. They occur in partially to fully exposed situations, along the way sides, in wet places, marshes & ditches, cultivating fields and stream banks.

*Distribution:* Tropical and subtropical; Asia to North west Pacific.

Plate 36. Type of Murdannia nudiflora (L.) Brenan.
Figure 16. *Murdannia nudiflora* (L.) Brenan a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f, g & h. Staminodes; i. Gynoecium; j. Capsule; k. Seed-dorsal view; l. Seed-ventral view (from *Joby Paul & Santhosh Nampy 950*).
Notes: *M. nudiflora* is easily recognized by its caducous bracteoles, single terminal cincinni and two seeded capsule locules. The term ‘nudiflora’ meaning naked flower may be due to the presence of caducous bracteoles. When young, the capsules are marked with three longitudinal lines along the point of dehiscence.


*Plate 37, 38, 30e; Fig. 17*

Annual, erect to decumbent to ascending herbs. Roots fibrous, from basal nodes in touch with soil. Internodes green or with purple tinge, with a dense line of cilia along the fusing margin of the sheath, sometimes younger parts much ciliate. Sheath green, *c.* 0.5 mm long, glabrous with a line of cilia along the fused edges to ciliate; mouth ciliate. Leaves ovate, 1–3 × 0.6–1.5
cm, cauline, alternate or distichous; base cordate; margin serrulate, hyaline; apex acute; both surfaces glabrous to pubescent to ciliate. Inflorescence terminal and axillary, 1–3 single flowered cincinni. Flowers male and bisexual, pedicellate, with a pungent smell; pedicel pubescent, once jointed, lower portion the peduncle. Sepals 3, free, ovate–elliptic, c. 3 × 1 mm, pale green, glabrous to minutely pubescent; margin entire, hyaline. Petals 3, free, elliptic–ovate, 3–4.5 × 2–3 mm, yellow-orange to golden-yellow to brick red, glabrous, margin entire. Stamens 3, antesepalous, dorsifixed; filaments free, 2–2.5 mm long, basally yellow orange to purple, bearded; hairs attached laterally to the lower half, yellow orange; anther lobes deep blue to purple, connective brown–purple; dehiscence longitudinal; pollen creamy, elliptic. Staminodes 3, antepetalous; filaments free, c. 1 mm long, yellow orange to purple, glabrous to few haired; antherodes trilobed, yellow. Ovary elliptic to obovate, 1.5–1.8 × 0.7–1 mm, pale green, glabrous; style yellow-orange to purple, glabrous; stigma white, papillate. Capsule narrowly elliptic, 5–7 × 1.5–2.2 mm; Fruiting pedicel recurved. Seeds 4 per locule, uniseriate, oblong to rectangular, 1–1.2 × 0.7–0.9 mm; testa smooth, regularly pitted in lines, raised farinose deposition in these depressions, finely granular, flattish raised warts, 1 or 2 ridges on each surface; hilum elliptic; embryotega semidorsal.

*Chromosome number:* n=9 (Kammathy & Rao, 1964; Sreenath & Rama, 1984); n=10 (Raghavan & Rao, 1961).

*Flowering & fruiting:* August–January.

*Flowering time:* 9.00 am–12.30 pm.

*Ecology:* A common species growing in partially or fully exposed situations, wet places, way sides, agricultural fields, stream banks, sandy soil, loose soil in below rocks, among grasses in grass lands, etc., reaching up to 1100 m.

*Distribution:* Peninsular India, endemic.
Plate 38. Type of *Murdannia pauciflora* (G. Brückn.) G. Brückn.
Figure 17. *Mardamia panciflora* (G. Brückn.) G. Brückn. a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i. Seed-dorsal view; j. Seed-ventral view (from Santhosh Nampy & Joby Paul 975).

Notes: M. pauciflora is often confused with grasses unless it has flowers. The leaves with a cordate base, narrowly elliptic capsules and usually strongly recurved fruiting pedicels helps to distinguish this from other species. Occasionally, the plant produces brick red or white flower, but without any marked differences.


Annual erect herbs, c. 20 cm tall, unbranched to basally 1–2 branched. Roots thin, fibrous from the base. Internodes 2–3 cm long, green, glabrous. Leaves cauline, alternate; sheath 0.6–1.5 mm long, pale green, glabrous, with fused margins; lamina 5–15× 0.5–2 mm, filiform, falcate towards the base; apex acute; margins entire, smooth; both surfaces glabrous. Inflorescences

Plate 39, 40, 30f; Fig. 18
terminal and axillary, consisting of 2–4 pedunculate or non pedunculate pseudoumbellate cincinni; peduncle 4–10 mm long, glabrous; bracts filiform; bracteoles amplexicaul, persistant. Flowers male and bisexual, opening c. 10 am, fading 12.30 pm; pedicel glabrous, green to purple, 2–2.5 mm long. Sepals 3, free, equal, 1.4–1.8 × 1 mm, elliptic, pale green, glabrous; apex sometimes with purple tinge; margin entire, hyaline. Petals 3, free, blue, 3.5–4 × 2.5–3 mm, orbicular, nearly incurved; margin apically minutely undulate; apex acute. Stamens 3, antesepalous, symmetrically oriented around the style, slightly curving inwards; filaments glabrous, 2 mm long, fused at the base with 2 staminode filaments, slightly purple basally; anthers elliptic, dorsifixed, deep maroon to black; dehiscence longitudinal. Pollen elliptic, white. Staminodes 3, antepetalous; antherodes hastate to 3–lobed; lobes white. Ovary globose to widely ovate, pale green–maroon, central; style central, white–purple; stigma papillate. Capsule 1–2 × 1–1.6 mm, widely ovate, 3–locular, brown, glabrous. Seeds 2 or 3 per locule, uniseriate, 0.6–1 × 0.5–0.8 mm, rounded to elliptic; testa dark brown to black, smooth with white flaky material fused forming faint, irregular reticulations; hilum dotted to elliptic; embryotega dorsal.

**Chromosome number:** Not reported.

**Flowering & fruiting:** August–November.

**Flowering time:** 10.00 am–12.30 pm.

**Distribution:** Hitherto known only from Maharashtra.

**Specimens examined:** Maharashtra, Pune district, on the way to Kukdi river, 13.10.1962, R.S. Rao 81943 (BSI); Sinhagad, 05.10.2011, Anna Ancy Antony & Santhosh Nampy 4654; Borbat, Morjai plateau, 06.10.2011, Anna Ancy Antony & Santhosh Nampy 4676 (DEV)
Plate 40. Type of Murdannia sahyadrica A. Ancy & Nampy
Figure 18. Murdannia sakhydrica A. Ancy & Nampy. a. Habit; b. Flower; c. Sepal; d. Petal; e. Fused stamens and staminodes; f. Stamen; g. Free staminode; h. Gynoecium; i. Capsule; j. Seed-dorsal view; k. Seed-ventral view (from Souhosh Nampy & K.M. Manudev 2394).
Notes: *M. sahyadrica* resembles *M. semiteres* and *M. juncoides* but differs by its orbicular petals; stamens arranged symmetrically around the central erect style, ovoid capsule and uniseriately arranged seeds.


Plate 41, 42, 43a; Fig. 19


Nelam pullu’ van Rheede in *Hortus Malabaricus* 10:37, t. 19.1690.


Annual, erect herbs. Roots thin fibrous from base. Internodes green or reddish, glabrous. Sheath green or with reddish tinge, 1–5 mm long, glabrous; margins fused. Leaves cauliine, alternate; lamina filiform, falcate towards the base, 3–15 × 0.1–0.2 cm; apex acute; margin entire; both surfaces glabrous. Inflorescence terminal and axillary; consisting of 2–3 pedunculate or non pedunculate pseudoumbellate cinncini. Peduncle 1–2 cm long, glabrous; bracts filiform, glabrous; cincinni 2–5 cm long, 8–10 flowered; bracteole persistant, 1–2.5 mm long, amplexicaul. Flowers bisexual and male, pedicellate; pedicel 2–3 mm long, glabrous. Sepals 3, free, elliptic to oblong, 2–2.5 × 1–1.3 mm, reddish, both surfaces glabrous; margin entire, minutely hyaline. Petals 3, free, oblong, 4–5 × 2.5–3 mm, blue–purple blue, glabrous, margin entire. Stamens 3, 2–3 mm long, anteseopalus, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments basally fused, white with slight purple tinge, glabrous; anther lobes reddish; connective creamy yellow; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, 1.5–2 mm long, antepetalous; filaments basally fused with stamen filaments, white with purple tinge, glabrous; antherodes trilobed, one lobe highly reduced, creamy white. Ovary globose, trilocular 1.5–2 × 0.5–1 mm, green, purple tinge; style purple, bending to one side, glabrous; stigma white to purple, papillate. Capsule elliptic, 2–2.5 × 1–1.5 mm, glabrous, brown, trilocular. Seeds biseriate, 6–8 per locule, ovate–rectangular 0.5 × 0.6 mm; testa dark brown, smooth with white farinose forming minute striations; hilum dotted; embryotega dorsal.

Chromosome number: n = 7, 10, 20 (Raghavan & Rao, 1961); n = 12 (Kammathy & Rao, 1961 b); n = 6 (Kammathy & Rao, 1964).

Flowering & fruiting: July–November.

Flowering time: 6.00 am–2.30 pm.
Ecology: A very common species of lateritic rocks during mansoons; fully exposed.

Distribution: Eastern tropical Africa, Iran to Indo-China.

Plate 41. *Murdannia semijeris* (Dalzell) Santapau a & b. Habit; c. Flower; d. Sepal; e. Petal; f. White flowers in collection from Madayipara; g. Basally fused stamens and staminodes; h. Free staminode; i. Gynoecium; j. Capsule; k. Seed-dorsal view; l. Seed-ventral view (a-e, g-l from Anna Ancy Antony & Santhosh Nampy 4602; g from Santhosh Nampy 2321).
Plate 42. Type of *Murdannia semiteres* (Dalzell) Santapau.
Figure 19. *Murdannia semiteres* (Dalzell) Santapau. **a.** Habit; **b.** Flower; **c.** Sepal; **d.** Petal; **e.** Fused stamens and staminodes; **f.** Free staminode; **g.** Gynoecium; **h.** Capsule; **i.** Seed-dorsal view; **j.** Seed-ventral view (from Joby Paul & Santosh Nampy 895).

**Notes**: It is a very distinct species, easily recognized by its filiform falcate leaves, basally fused stamens and staminodes and petals with acuminate apex.

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Aneilema longifolium Hook., Exot. Fl. t. 204. 1826.


Type: Table land of Panchagani in grassland, Bombay Presidency, s.die, Blatter P 75 (BLAT!).

Plate 44, 45, 43b; Fig. 20

Perennial, ascending herbs with a basal rosette; lateral branches from the axils of the radical leaves. Roots thick fibrous from base. Sheaths c. 1.5 cm long, green or with a purple tinge. Leaves radical and cauline; rosette leaves with lamina linear-lanceolate, 8–25 × 0.35–0.7 cm; cauline leaves with lamina reduced distally, narrowly lanceolate to linear, 1.5–4 × 0.3–6 cm, base rounded, apex acute to acuminate, surfaces glabrous. Flowering shoots lateral in the rosette, ascending, unbranched or scarcely branched. Inflorescence terminal and axillary, consisting of single, pedunculate cincinni, often appearing paired terminally but one cincinnus terminal and the other axillary; peduncle 3–9 cm long, glabrous; cincinni c. 3.5 cm long; bracteoles 3–5 mm long, caducous. Flowers bisexual and male, 13–15 mm wide; pedicels 3–4.5 mm long. Sepals 3, lanceolate–elliptic, Petals 3, broadly ovate–obovate, pale lavender, glabrous. Stamens 2, antesepalous, curving on to side and the style to the other, filaments densely bearded. Staminodes 4; 3 antepetalous, filament bearded, antherodes 3 lobed; 1 antesepalous, filaments bearded, antherodes reduced to a knob. Ovary green; style white; stigma papillate, white. Capsules ovate, 4–5.5 × 2.5–3 mm. Seeds 2 per locule, uniseriate, ovate to elliptic, 2–2.5 × 1–1.7 mm; testa foveolate to scrobiculate, white flaky material in the depressions, finely granular; hilum linear to oblong; embryotega semidorsal.
Chromosome number: 2n= 40 (Faden & Suda, 1980); (Chimphamba, 1973); (Morton 1966, 1967); n=10, 2n=40 (Hsu 1967); n=20 (Heitz, 1969; Hsu, 1971; Lewis, 1964); n=30 (Kammathy & Rao, 1961 b; Raghavan & Rao, 1961); n=40 (Panigrahi & Kammathy, 1963).

Flowering & fruiting: July–October.

Flowering time: 12.30 pm–2.00 pm.

Distribution: Tropical Asia, Tropical Africa, Madagascar and North Australia.

Ecology: In shallow soil on rock crevices, wet rocks and road side banks, in cultivating fields, in full sun or partial shade.

Plate 44. Murdannia simplex (Vahl) Brenan a & b. Habit; c. Bracteole; d. Sepals; e. Lateral petal; f. Antesepalous staminode; g. Stamen; h. Antepetalous staminodes; i. Posterior petal; j. Gynoecium; k. Capsule; l. Seed-dorsal view; m. Seed-ventral view (from Anna Ancy Antony & Santhosh Nampy 4660).
Plate 45. Type of *Murdannia simplex* (Vahl) Brenan.
Figure 20. *Murdannia simplex* (Vahl) Brenan. a. Habit; b. Flower; c. Sepal; d. Stamen; e & f. Staminodes; g. Gynoecium; h. Capsule; i. Seed-dorsal view; j. Seed-ventral view (from Joby Paul & Santhosh Nampy 899).

Notes: M. simplex and M. loriformis are two closely resembled species and hence difficult to separate. In M. simplex, the lateral shoots become decumbent and rooting at the nodes, often producing new rosettes. But the former can be identified by its tuberous roots, after noon flowering and larger flowers.

Annual, erect to ascending to decumbent herbs. Tufted to diffusely spreading with or without a definite base. Roots thin fibrous from base and nodes. Internodes green, glabrous with a line of hairs or pubescent throughout. Sheath green or purple, 0.2–0.8 cm long, glabrous with a line of cilia along the fused edges; apex ciliate. Leaves cauline, alternate to spiral; lamina elliptic to ovate-lanceolate to lanceolate, 1–4 × 0.2–1.5 cm.; apex acute to rarely acuminate; margin minutely hyaline, scabrous towards the tip, ciliate towards the base; base rounded to amplexicaul; both surfaces glabrous to minutely pubescent. Inflorescence terminal or axillary thyrs; terminal pedunculate with 1–3 alternate cincinni; axillary with or without peduncle, 1–3 cincinni; peduncle 0.7–4.3 cm long, glabrous rarely pubescent; cincinni 2–4 cm long, c. 13 flowered; bracteole persistant, 2–3 mm long, amplexicaul. Flowers bisexual and male, pedicellate; pedicel 4–8 mm long, glabrous. Sepals 3, free, elliptic, 2–4 × 1–2 mm, green, both surfaces glabrous; margin entire, hyaline. Petals 3, free, oblong to elliptic to orbicular, 3.5–7 × 2.5–4.5 mm, lilac to lavender, glabrous, sometimes with contrasting dark veins, margin entire. Stamens 3, 0.6–1.5 mm long, antesepalous, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments free,
purple, bearded; hairs attached to the lower half, purple; anther lobes purple; connective broad, purple; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, 0.6–1.2 mm long, antepetalous; filaments free, purple, bearded; hairs purple; antherodes trilobed, white to creamy. Ovary elliptic to ovate, 1–1.5 × 1 mm, pale green, glabrous; style with purple tinge towards the base, bending to one side, glabrous; stigma white, papillate. Capsule ovate to elliptic, 2–3.5 × 1.5–2.5 mm, glabrous, brown, trilocular. Seeds uniseriate, 3 or 4 per locule, ovate to elliptic, 0.75–1.1 × 0.6–1 mm; testa with flattish raised warts, furrowed, rugose; hilum elliptic; embryotega semidorsal.

_Chromosome number_: n=9 (Raghavan & Rao, 1961); n=20 (Kammathy & Rao, 1961; Panigrahi & Kammathy, 1963; Murthy, 1934); 2n=40 (Jones & Jopling, 1972); 2n=20 (Sharma & Sharma, 1958).

_Flowering & fruiting_: July–March.

_Flowering time_: 10.00 am–3.00 pm.

_Ecology_: It is the most common species of _Murdannia_ in India, found from sea level to 1800 mts. It occurs in wayside ditches, sandy soils of seashore, moist open places and near streams, often exposed to partial sun.

_Distribution_: India to Japan and west Malesia.

Plate 46. *Mundania spirata* (L.) G. Brückn. a. Habit; b. Inflorescence; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i. Seed- dorsal view; j. Seed- ventral view (a-k from *Anna Ancy* Antony 4685).
Plate 47. Type of *Murdannia spirata* (L.) G.Brückn.
Figure 21. *Murdannia spirata* (L.) G. Brückn.  

- a. Habit;  
- b. Flower;  
- c. Sepal;  
- d. Petal;  
- e. Stamen;  
- f. Staminode;  
- g. Gynoecium;  
- h. Capsule;  
- i. Seed-dorsal view;  
- j. Seed-ventral view. (from *Johy Paul & Santhosh Nampy* 836).
Notes: This is the most varying species of Murdannia in India. This may be erect or decumbent, ascending or much looping and trailing, with or without a definite base. The leaf size and shape also shows variations. In some collections the plant appears much pubescent. A difference in flower size is also noticed. In some collections, petals are uniformly coloured or with contrasting dark vein.


Plate 48, 49, 43d; Fig. 22

Tufted or unbranched annual herbs with erect to ascending branches. Roots thin fibrous from base and from lower nodes. Internodes green, with a line of cilia. Leaves cauline, alternate to spirally arranged; sheath pale green to slightly purple, 0.2–0.5 cm long, glabrous with a line of cilia along the fused edges; lamina narrowly linear–lanceolate, 1.5–2 × 0.3–0.5 cm; base rounded; margin scabrous, minutely hyaline; apex acute; both surfaces glabrous. Inflorescence terminal and axillary from the upper leaves, consisting of 1–2(–3) opposite or pseudo umbellate ascending cincinni; peduncle 1–3 cm long, glabrous; cincinni 3–4 cm long, c. 10 flowered;
Plate 49. Type of *Murdannia striatipetala* Faden
Figure 22. *Murdannia striatipetala* Faden. a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f. Staminode; g. Gynoecium; h. Capsule; i. Seed-dorsal view; j. Seed-ventral view. (from Anna Ancy Antony & Sunthosh Nampy 2395).
bracteole amplexicaul, persistant. Flowers bisexual or male; pedicel 3–6 mm long, ascending in flower & fruit, glabrous. Sepals 3, free, ovate–elliptic, 2.3–4 × 1.5–2 mm, pale green with purple tinge apically, glabrous. Petals 3, free, orbicular, 3–5 × 3–4.8 mm, pale lavender with dark contrasting veins, glabrous; margin crenulate. Stamens 3, antesepalous, dorsifixed, bending away from the style in bisexual flowers; filaments free, 2.2–3 mm long, densely bearded below the lower half; hairs purple–lavender, short appressed; anthers elliptic to oblong, deep blue–black, connective white–blue; dehiscence longitudinal; pollen white, ovate. Staminodes 3, free antepetalous, filaments c. 1 mm long, purple to lavender, glabrous; antherodes trilobed, lobes creamy white. Ovary ovate to elliptic, 0.5–0.8 × 0.3–0.6 mm, pale green, glabrous; style lavender, deep purple basally, glabrous; stigma white, papillate. Capsule oblong to elliptic, 2.5–4 × 1–1.5 mm. Seeds 5–7 per locule, uniseriate, ovate–rectangular, 0.35–1.1 × 0.6–0.9 mm; testa alveolate-reticulate or scorbiculate; hilum elliptic; embryotega semidorsal.

Chromosome number: Not reported.

Flowering & fruiting: January–February.

Flowering time: 10.00 am–12.30 pm.

Ecology: In moist sandy areas, near marshy reservoir and on way sides; fully exposed.

Distribution: South India (Only from Tamil Nadu) and northern Sri Lanka.

Specimens examined: Tamil Nadu, Tiruvallur district, Thirumullaivoyal, Banks of Red Hill lakes, 26.02.2011, Anna Ancy Antony & Santhosh Nampy 2395 (DEV).
Notes: *M. striatipetala* can be separated from the most variable and widespread *M. spirata* by its definite base, narrow leaves, dark veined petals, short appressed hairs on the stamen filaments and having more seeds per locule.


*Type*: Bangladesh, Silhet, *Wallich N. 5220* (E).


**Plate 50, 51a; Fig. 23**

Annual, decumbent to ascending slender herbs. Roots fibrous, from nodes in touch with soil. Internodes green, minutely pubescent with a dense line of cilia along the fusing margin of the sheath. Sheath green, 5–6 mm long, glabrous with a line of cilia along the fused edges to ciliate; mouth ciliate. Leaves linear lanceolate, 2–2.4 × 0.3–0.5 cm, cauline, alternate to distichous; base rounded to amplexicaul; margin minutely hyaline, serrulate towards the tip; apex acute–acuminate; upper surface minutely pubescent, lower surface glabrous. Inflorescence terminal and axillary, single flowered cymes, 1–2 cymes per axil. Flowers male or bisexual, hardly exserted from the sheath, pedicellate; pedicel 4–6 mm long, once jointed, bract at the joint, recurved in fruit, upper portion glabrous, lower portion with a line of cilia. Bracts prominent, long linear, 2–3 × 0.4–0.8 mm, glabrous with a line of hairs along the fusing margin; margin hyaline. Sepals 3, free, oblong–elliptic,
Plate 50. Type of *Murdannia triquetra* (Wall. ex C.B.Clarke) G.Brückn.
Figure 23. *Murdannia triquetra* (Wall. ex C.B. Clarke) G. Bruck. a. Habit; b. Bract; c. Sepal; d. Petal; e. Stamen; f. recurved fruiting pedicel; g. Capsule; h. Seed-dorsal view; i. Seed-ventral view. (from Anna Ancy Antony & Sunilosh Nampy 4622).
2.6–3 × 1 mm, pale green, glabrous; tip ciliate, cordate; margin entire, minutely hyaline. Petals 3, free, elliptic, 3–4 × 2–2.5 mm, lilac, glabrous, margin entire. Stamens 3, 2–2.5 mm long, antesepalous, dorsifixed; filaments free, glabrous; anther lobes pale brown–white; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, antepetalous; filaments free. Ovary ovate to obovate, c. 3 × 1 mm, pale green, glabrous; style white, glabrous; stigma white, papillate. Capsule elliptic, 3–4.5 × 1–2.5 mm. Fruiting pedicel recurved, seeds, 2–4 per locule, uniseriate, rectangular to oblong, 5–2 × 1–1.1 mm; testa variously ridged and furrowed or pitted; hilum linear; embryotega semidorsal.

Chromosome number: 2n=40 (Panigrahi & Kammathy, 1963).

Flowering & fruiting: October–May.

Flowering time: 10 am–12 pm.

Ecology: In wet places, in marshes, way sides and among water held agricultural fields; in partially or fully exposed situations.

Distribution: North east India to Vietnam.


Notes: During my trip to Meghalaya, I collected this species in vegetative condition and later on it flowered in our botanical garden. As in M. blumei, the flowers remained enclosed within the sheath but later their pedicels elongate and recurved. The seeds are 2–4 per locule and uniseriate,. A prominent linear bract is also present in M. triquetra.


Annual, tufted, erect to decumbent herbs. Roots fibrous, thin or thick, c. 1–2 mm in diameter, from base and very rarely from lower nodes in touch
with soil. Internodes green or with slight purple tinge, glabrous, with a line of cilia along the fusing margin of the sheath. Sheath green, sometimes purple at base, 0.3–1 cm long, glabrous with a line of cilia along the fusing edges; apex ciliate. Leaves sometimes few at base to all cauline, distichous to spirally arranged; lamina linear-lanceolate to lanceolate, 2–12 × 0.8–1 cm; apex acute to acuminate; margin entire, minutely hyaline, smooth, ciliate at base; base straight to slightly rounded; upper surface glabrous to pubescent, sometimes ciliate towards the tip; lower surface glabrous, rarely pubescent. Inflorescence terminal and axillary, 1–3 fascicles of 3–8 single flowered cincinni; peduncle 3–10 cm long, glabrous with a dense line of hairs; bract linear, persistant, prominently ribbed, glabrous. Flowers mostly bisexual, rarely male, pedicellate; pedicel 0.6–2.5 cm long, twice jointed, upper portion densely hairy, middle portion minutely pubescent towards the apex, lower portion glabrous. Sepals 3, free, elliptic, 3–4.5 × 1 mm, pale green; margin entire, hyaline; apex sometimes with purple tinge; outer surface pubescent, densely pubescent towards the base; inner surface glabrous. Petals 3, free, elliptic, c. 3 × 2 mm, violet–lavender, glabrous, margin entire. Stamens 2, 2mm long, antesepalous, dorsifixed; filaments free, violet, densely hairy; hairs attached to the lower half; anther lobes elliptic, bluish brown, connective white; dehiscence longitudinal; pollen yellow, elliptic. Staminodes 4, 1 mm long, 3 antepetalous, 1 antesepalous; filaments free, violet, hairy; antherodes trilobed, yellow, antesepalous staminode with antherodes reduced. Ovary elliptic to obovate, c. 3 × 1 mm, pale green, glabrous; style white–violet, glabrous; stigma white or pale yellow, papillate. Capsule ovate to sub globose, 3–4 × 2–3 mm. Seeds 1 per locule, uniseriate, broadly elliptic, dorsiventrally compressed, 1.75–2.4 × 1.3–1.8 mm; testa, foveolate-reticulate; hilum linear, embryotega dorsal.
Plate 52. Murdannia vaginata (L.) G. Bruckn. a & b. Habit; c. Inflorescence; d. Ribbed sheath; e. Roots; f. Flower; g. Sepal; h. Stamen; i. Petal; j & k. Stamens; l. Gynoecium; m. Capsule; n. Seed-dorsal view; o. Seed-ventral view (from Anna Ancy Antony & Santhosh Nampy 4696).
Plate 53. Type of *Murdannia vaginata* (L.) G.Brückn.
Figure 24. Mordmannia vaginata (L.) G. Brückn.  a. Habit; b. Flower; c. Sepal; d. Petal; e. Stamen; f & g. Staminodes; h. Capsule; i. Seed-dorsal view; j. Seed-ventral view (from Cini C.P. 949).

Flowering & fruiting: July–February.

Flowering time: 9 am–12 pm.

Ecology: Occur in exposed or shady areas especially in wet places, in marshes, on way side shades, in paddy fields, among plantations and in moist sandy areas.

Distribution: Tropic and subtropic Asia to North Australia.


Notes: M. vaginata is wide spread in India. It is easily distinguished by its persistent, ribbed sheath covering the inflorescence, twice jointed pedicels, 1-seeded capsule locules and dosiventrally compressed seeds.

*Murdannia satheeshiana* Joby, Nisha & Unni, Phytotaxa 22: 41. 2011. syn. nov. **Type**: India, Kerala, Idukki district, Mathikettan shola National Park, 24.10.2010, **Joby, Rameshan & Toms 431** (holo, CAL; iso, CALI, MH & Herbarium, School of Environmental Sciences, Mahatma Gandhi University, Kottayam!).

*Murdannia brownii* Nandikar & Gurav, Taiwania 56: 227. 2011. syn. nov. **Type**: India, Maharashtra, Kolhapur district, Gaganbawda Tahsil, 21.09.2009, **Nandikar M. D.62** (holo, BSI; iso, SUK!) **Plate 54, 55, 51c; Fig. 25**

Annual, erect to sub erect to ascending herbs. Roots fibrous, from base and from nodes in touch with soil. Internodes green or with slight purple tinge, with a dense line of cilia along the fusing margin of the sheath. Sheath green, c. 0.3 mm long, glabrous to pubescent and with a line of cilia along the fusing edges; mouth ciliate. Leaves ovate to ovate lanceolate, 1 – 3 × 0.5 – 1.5 cm, cauline, alternate to distichous; apex acute; margin scabrous towards the apex, ciliate at base; base obtuse; both surfaces glabrous to pubescent. Inflorescence terminal and axillary, 2–6 single flowered cincinni. Flowers male and bisexual, pedicellate; pedicel once jointed; upper portion the pedicel, glabrous to sparsely pubescent; lower portion the peduncle, pubescent. Sepals 3, free, ovate to elliptic, 3–4.3 × 1.5–2.5 mm, pale green, both surfaces glabrous; margin entire, hyaline. Petals 3, free, ovate, 3–4.8 × 2–4.1 mm, yellow to ochre-yellow, glabrous, margin entire. Stamens 3,
ante sepalous, dorsifixed; filaments free, 2mm long, yellow to purple, bearded; hairs laterally attached to the lower half, yellow to ochre-yellow; anther lobes purple to bluish; dehiscence longitudinal; pollen yellow, elliptic to pear shaped. Staminodes 3, 0.8–1.6 mm long, antepetalous; filaments free, yellow, glabrous to 2 or 3 haired; antherodes trilobed, yellow. Ovary obovate, 1.5–2.5 × 1 mm, pale green, glabrous; style white or with purple tinge, glabrous; stigma white, papillate. Capsule oblong to elliptic, 4–6 × 1–2.5 mm, trilocular. Seeds 4 or 5 (very rarely 6) per locule, uniseriate, elliptic to ovate, 0.8–1.2 × 0.9–1.1 mm; testa with flattish raised warts or ridged and furrowed, finely granular; hilum ovate; embryotega semidorsal.

**Chromosome number:** n=9, 2n=18 (Bai et al., 1984).

**Flowering & fruiting:** September–December.

**Flowering time:** 9 am–10.30 am.

**Ecology:** Near springs, waterfalls, in wet places, agricultural fields, stream banks; both in exposed and in partially shady places.

**Distribution:** India to Philippines.


Notes: *M. versicolor* is allied to *Murdannia crocea* sub sp. *ochracea* in its habit, inflorescence pattern and flower colour. But the former can be separated by its 4–6 seeds uniseriately arranged in the capsule locules and testa ornamentation.
Plate 55. Type of *Murdannia versicolor* (Dalzell) G. Brückn.
Figure 25. *Murdannia versicolor* (Dalzell) G. Brückn.  

During my collection trips to various localities variations in plant size are noticed even at same altitude. Specimens from Kass reaches about 25–27 cm. in height, with thin, long internodes. In one collection from Mahabaleshwar, plants are about 10–15 cm. long with short internodes and in another collection from same locality are only 3–4 cm. tall with short ovate leaves. Similar size differences are also noted in herbarium specimens examined. In one herbarium sheet at BSI the plant appears like a prostrate herb, forming small patches. Hence, the two recently described species from India viz., *Murdannia brownii* by Nandikar and Gurav, (2011) and *Murdannia satheeshiana* by Joby et al., (2011), are treated here as conspecific to *M. versicolor*.


Perennial, erect to ascending to decumbent herbs. Roots fibrous from nodes in touch with soil. Internodes green, glabrous with a line of cilia. Sheath green or rarely with purple tinge, 1–3 cm long, glabrous with a line of cilia along the fused edges; apex ciliate. Leaves cauline, alternate to distichous; lamina elliptic to lanceolate, 1.5–13 × 1–3 cm; apex acute to rarely acuminate; margin highly undulate, scabrous towards the tip, pubescent towards the base; base rounded to amplexicaul; upper surface glabrous; lower surface pubescent to glabrous. Inflorescence terminal and axillary thyrse with 3–12 alternate, ascending cincinni; peduncle 2–8 cm long, glabrous; cincinni 5–10 cm long, c. 15 flowered; bracteole persistent, 3–4 mm long, amplexicaul. Flowers bisexual and male, pedicellate; pedicel 5–6 mm long. Sepals 3, free, oblong, 3–4.5 × 1.5–2 mm, pale green, tip slightly purple, outer surface glabrous to minutely pubescent; margin entire. Petals 3, free, ovate to elliptic, 4.5–6 × 4–5 mm, white, glabrous, margin entire. Stamens 3, 3–4 mm long, anteseopalous, bending to one side in bisexual flowers, symmetrical in male flower, dorsifixed; filaments free, white, bearded; hairs attached to the lower half, white; anther lobes brown to reddish brown; dehiscence longitudinal; pollen white, elliptic. Staminodes 3, 2–2.5 mm long, antepetalous; filaments free, white, bearded; antherodes trilobed, yellow. Ovary elliptic, trilocular, c. 1.5 × 0.5 mm, white, glabrous; style white, bending to one side, glabrous; stigma white, papillate. Capsule oblong to elliptic, 4–6.5 × 2–2.5 mm. Seeds 4–5 per locule, uniseriate, ovate to rectangular, 0.6–1 × 0.6–1 mm; testa foveate, with fine flattish raised ridges and warts, white farinose on the surface or around hilum; hilum elliptic to linear; embryotega semidorsal.

*Chromosome number:* 2n=40 (Faden & Suda, 1980).

*Flowering & fruiting:* August–March.
Flowering time: 10.00 am–12.30 am.

Ecology: In forests, rocky slopes, along river banks and waterfalls; in partially or fully.

Distribution: South India and Sri Lanka.

Plate 57. Type of *Murdannia zeylanica* (C.B.Clarke) G.Brückn.
Plate 51. Distribution of *Murdannia* species in India. 

Figure 26. *Murkannia zeylanica* (C.B. Clarke) G. Brückn. **a.** Habit; **b.** Flower; **c.** Sepal; **d.** Petal; **e.** Stamen; **f.** Staminode; **g.** Gynoecium; **h.** Capsule; **i.** Seed-dorsal view; **j.** Seed-ventral view. (from Joby Paul & Samihsad Namgy 807).
Notes: *M. zeylanica* is easily distinguished by broad succulent leaves with wavy margins, inflorescence and with white flowers. Clarke (1881) recognized a new variety, var. *longicapsa* characterised by broader leaves and longer capsules. In the present study shows the leaf breadth vary from 1–3 cm and capsule length vary from 4–6 mm. Hence the variety is considered here as a synonym of *M. zeylanica*. 