

# *Blyxa mangalensis*, a new species of Hydrocharitaceae from India

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**Summary.** A new species, *Blyxa mangalensis* from the low altitude coastal lateritic plateau of the west coast of South India is described and illustrated. It differs from *B. senegalensis* in its 12 stamens, globose anthers with connective appendages, absence of petals in the female flower, distinctly longer style and 9 – 10 longitudinal-ridged seeds.

**Key Words.** Coastal lateritic plateau, Karnataka, monsoon vegetation, taxonomy.

## Introduction

The coastal lateritic plateaus of South-West India present a rich diversity of seasonal herbaceous flora during the monsoon (June – October). In places, where the plateau is wide with flowing water, there are formations of *Utricularia*, *Eriocaulon* and *Rotala* species with associated plants presenting an impressive colourful sight. Among these lateritic formations are shallow depressions providing temporary water bodies for the growth of short-lived aquatic plants. From such places we have collected a species of *Blyxa*. This species did not match with any known species of *Blyxa* and hence is here described as a new species: *Blyxa mangalensis*. The male flower of this species has 12 stamens which is a new generic character for *Blyxa*.

*Blyxa* is a tropical old world genus with 13 species, with one species each in West Africa, Madagascar, Italy and Southern USA, three in southern tropical Africa, six in the warmer regions of Asia and Australia (Cook & Luond 1983). Aquatic plants of India have been studied by Subramanyam (1962) and Cook (1996). These studies indicate that *Blyxa* is represented by three species in India.

The differences between *Blyxa mangalensis* and its related species are given in Table 1.

## Materials and Methods

Plant specimens were collected and prepared for the herbarium following standard methods. GPS (Garmin etrex 100) coordinates of the localities were recorded. Floral parts images were taken using stereomicroscope (Nikon SMZ 1000 with Nikon coolpix P6000) and SEM images of the pollen and seeds were taken using ZEISS-SIGMA.

## Taxonomy

***Blyxa mangalensis* K. Rashmi & G. Krishnak. sp. nov.**  
Type: India, Karnataka, Dakshina Kannada (Distr.), Mangalore, Konaje (12°58'4"N, 74°48'20"E), altitude 109 m, 11 Aug. 2011, *Rashmi & Krishnakumar RKK* 2071 (holotype CAL!; isotypes K!, MH!, Herbarium Department of Applied Botany, Mangalore University!)

<http://www.ipni.org/urn:lsid:ipni.org:names:60472998-2>

Dioecious, submerged annuals. *Root stocks* erect, simple, unbranched, 5 – 16 × 2 – 3 mm. *Leaves* radical, usually alike in each rosette, sheathing, 1 – 6 × 0.25 – 0.8 cm, narrowly elliptic to linear lanceolate, narrower at base, broader at middle and narrower towards the apex, midrib distinct, parallel veins 10, margin serrulate from the middle with straight unicellular spinous tips, green, sometimes with purple blotches. *Male spathe*: c. 2 – 4.1 cm long, cylindrical to narrowly obclavate, margin serrulate, crowned by two bracts, green with purple blotches; *peduncle* sessile or sometimes carried above the leaves. *Male flower*: 10 – 14 in each spathe, one or rarely two maturing and withering each day from each spathe, 1.5 – 4.5 cm long; pedicels 2 – 2.5 cm long. *Sepals* 3, c. 0.8 × 0.4 mm, lanceolate, at first apically joined but later spreading, green and often striped with purple. *Petals* 5 – 7 × 2 – 3 mm, linear, papillate, white. *Stamens* 9 – 12, in whorls of 3 each, outer whorls sometimes with 1 – 3 stamens, varying in length; *anther* c. 0.8 – 1.3 mm, varying in size, globose, 1, 2 or 4-lobed; dehiscence by release of pollen mass from distinct connective sacs; *filament* thread-like, 0.5 – 2.5 mm long; *pollen* c. 38.93 µm, spherical, foveolate. *Pistillodium* 0.4 – 0.8 mm, minute, unequally 4-lobed. *Female spathe*: c. 2.5 – 42 cm long, single-flowered, cylindrical to narrowly obclavate,

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**Table 1.** Comparison of morphological characters of *Blyxa mangalensis*, *B. senegalensis*, *B. octandra* and *B. quadricostata*.

CHARACTERS	<i>B. mangalensis</i>	<i>B. senegalensis</i> Dandy	<i>B. octandra</i> (Roxb.) Planch. ex Thwaites	<i>B. quadricostata</i> Hartog
Leaves	parallel veins 10	parallel veins 2	parallel veins 20	parallel veins 18 or more
Male spathe:				
Stamens	9 – 12	9	9	9
Anther	spherical	elongate	elongate	elongate
Connective	present	absent	absent	absent
appendages				
Pistillodium	4 unequal-lobed	3-lobed	3-lobed	3-lobed
Pollen grain	foveolate	echinate	echinate	echinate
Female spathe:				
Petals	absent	present	present	present
Style	2.5 – 42 cm long, length depends on water level	not characteristic	not characteristic	not characteristic
Seed	longitudinal ridges 9 – 10, wavy; shortly-tailed at one end	with pectinate wings running end to end	longitudinal ridges up to 12; not tailed	longitudinal ridges 5; not tailed

crowned by two spathe bracts, margin serrulate, green with purple blotches. *Peduncle* sessile or sometimes carried above the leaf. *Sepals* 3, c.  $1 \times 0.18$  mm, linear to linear-lanceolate. *Petals* absent. *Style* 2.5 – 42 cm long (length depends on the water depth). *Stigma* 3-lobed, yellowish-white, papillate. *Capsule*  $2.5 \times 0.5$  mm, cylindrical, narrower towards the distal end, margins serrulate. *Seeds* ellipsoidal, c.  $2.4 \times 0.9$  mm, with 9 – 10 longitudinal ridges, ridges bearing peg-like, wavy, blunt projections and notched at some points, shortly tailed at one end, brown. Figs 1 – 5.

**RECOGNITION.** *Blyxa mangalensis* resembles *B. senegalensis* in being dioecious and by the rosette nature of the leaves, but differs in its 9 – 12 stamens, globose anthers, presence of connective appendages, absence of petals in the female flower, distinctly longer style and 9 – 10 longitudinal ridges in seeds (vs 9 stamens, elongate anthers, absence of connective appendages, presence of petals in female flower, shorter style and seeds with two pectinate wings).

**DISTRIBUTION.** *Blyxa mangalensis* is so far known only from the Dakshina Kannada district of Karnataka and Kasaragod District of Kerala, India. Plants were recorded from Konaje ( $12^{\circ}58'4''N$ ,  $74^{\circ}48'20''E$ ), Mudipu ( $12^{\circ}47'46''N$ ,  $74^{\circ}58'16.72''E$ ) and Neerumarga ( $12^{\circ}54'11''N$ ,  $74^{\circ}54'28''E$ ) and Hosangadi ( $12^{\circ}42'4.9792''N$ ,  $74^{\circ}57'16.2108''E$ ) regions.

**SPECIMENS EXAMINED:** INDIA, Karnataka, Dakshina Kannada Distr., Mangalore, Konaje plateau, 10 Aug. 2011, *Rashmi K. RK* 2068; Mudipu, 15 Aug. 2011, *Rashmi K. RK* 2089; Neerumarga, 2 Sept. 2011, *Rashmi K. RK* 2100; Kerala, Kasaragod Distr., Hosangadi, 20 Aug. 2012, *Krishnakumar KK* 7017 (Herbarium Department of Applied Botany, Mangalore University).

**CONSERVATION STATUS.** The species appears to have a limited distribution in the coastal plateaus of the

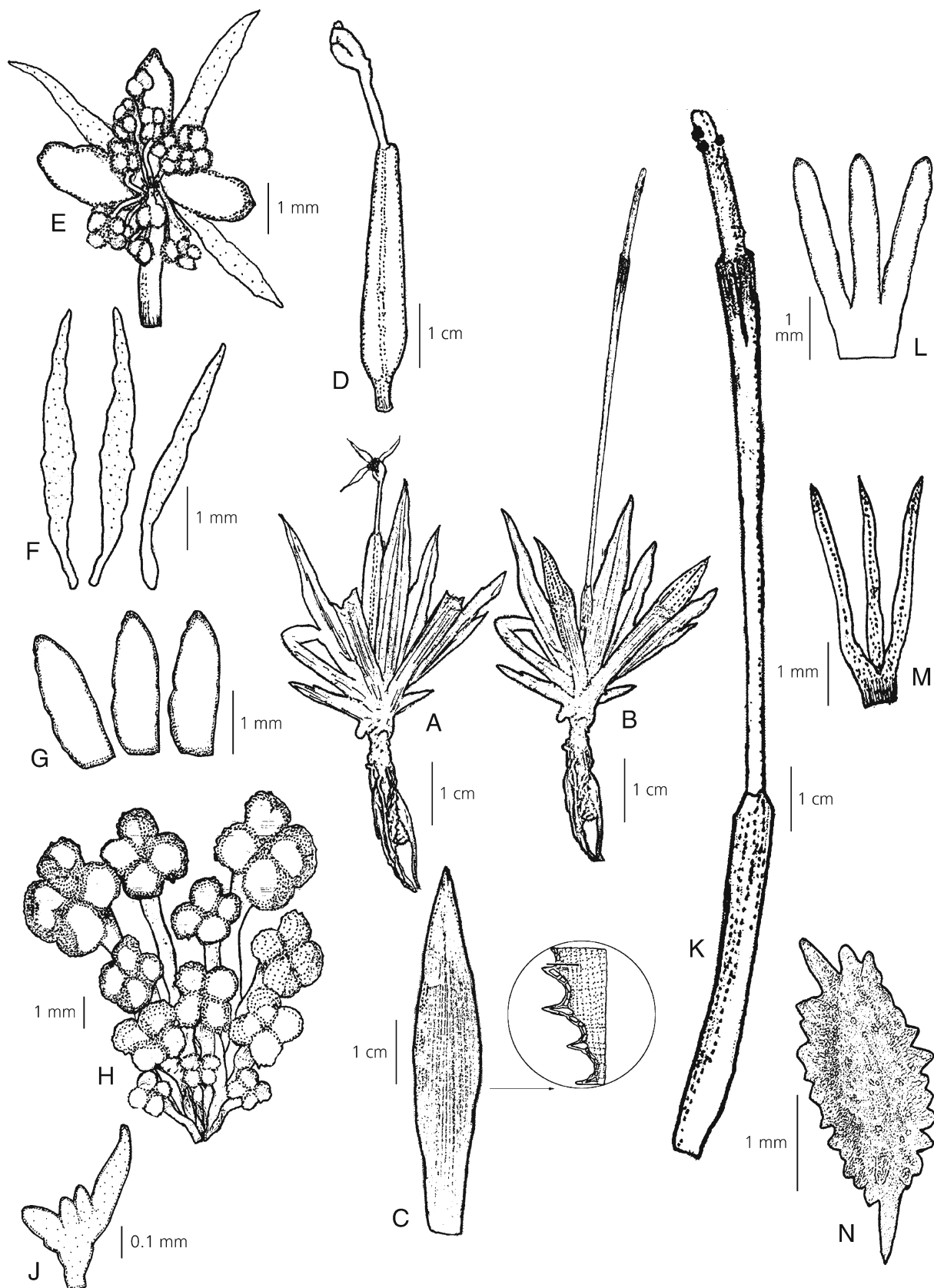
adjoining districts of Dakshinakannada (Karnataka state) and Kasaragod (Kerala state). These plateaus are under heavy anthropic pressure. This could further reduce the population of the species. Following the IUCN categories and criteria (IUCN 2014) *Blyxa mangalensis* is tentatively classified as VU D2 (future threat could drive the taxon to CR or EX in a very short time).

**PHENOLOGY.** Flowering: July – Sept. Fruiting: Sept. – Oct. **ETYMOLOGY.** The specific epithet *mangalensis* is for the type locality Mangalore in the Karnataka state of India.

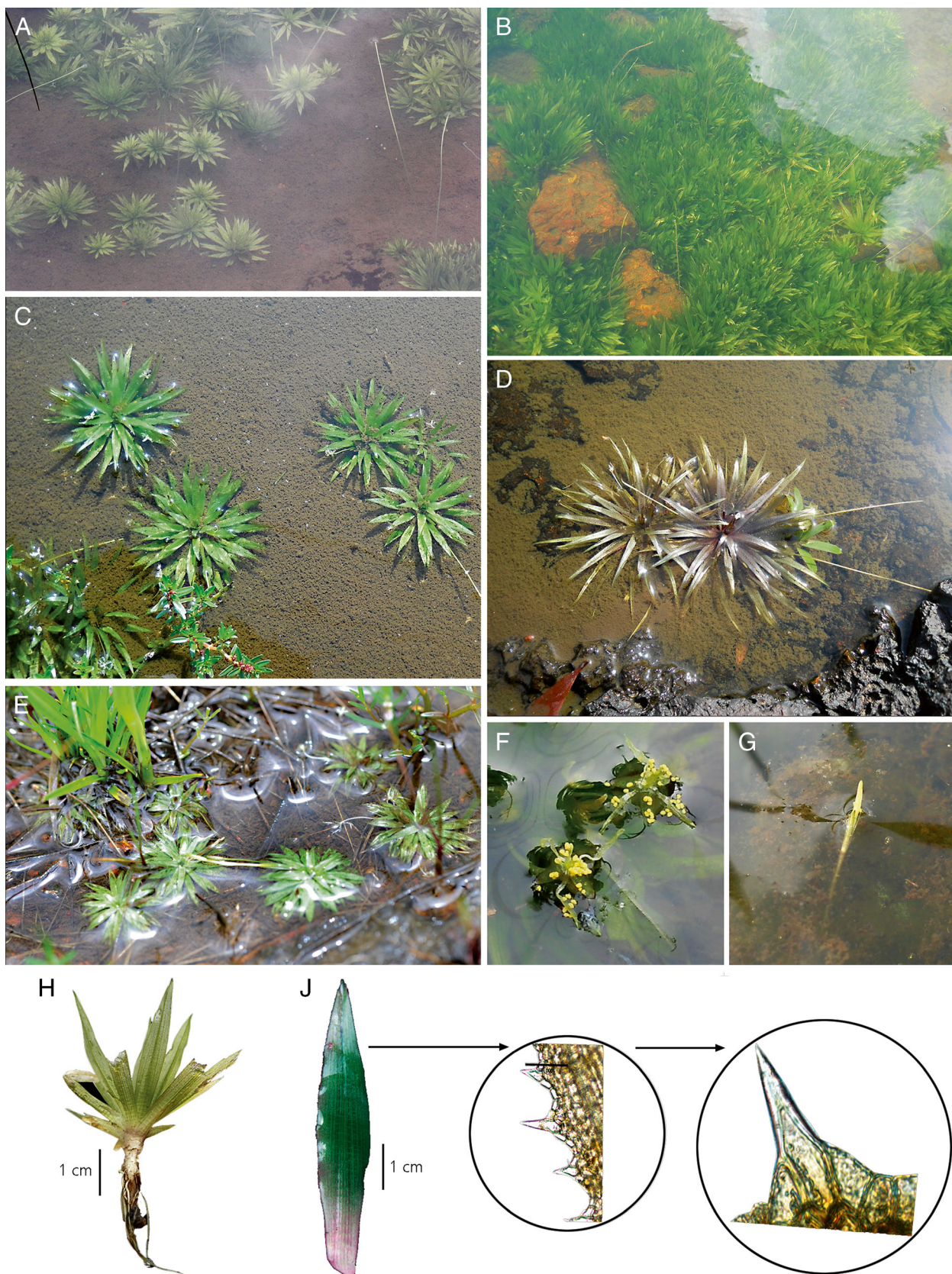
**ECOLOGY AND HABITAT.** The plant grows rooted in the mud in small, shallow, seasonal water bodies formed among or between the laterite formations on the coastal plateaus during monsoon (Fig. 2). It is generally associated with *Crotalaria quinquefolia* L. (Papilionaceae), *Dopatrium junceum* (Roxb.) Buch-Ham. ex Benth. (Scrophulariaceae), *Eriocaulon cuspidatum* Dalzell (Eriocaulaceae), *E. richardianum* (Fyson) R. Ansari & N. P. Balakr. (Eriocaulaceae), *Ischaemum barbatum* Retz. (Poaceae), *Rotala lucalensis* A. Fern. & Diniz. (Lythraceae) and *Utricularia caerulea* L. (Lentibulariaceae).

**NOTES.** The male and female plants are seen in the same ratio. The plants appear in the beginning of July and remain until the middle of October. Flowering starts in August. Male plants flower earlier than female plants. A male plant produces 10 – 14 spathes and a female plant produces 8 – 10 spathes, sequentially.

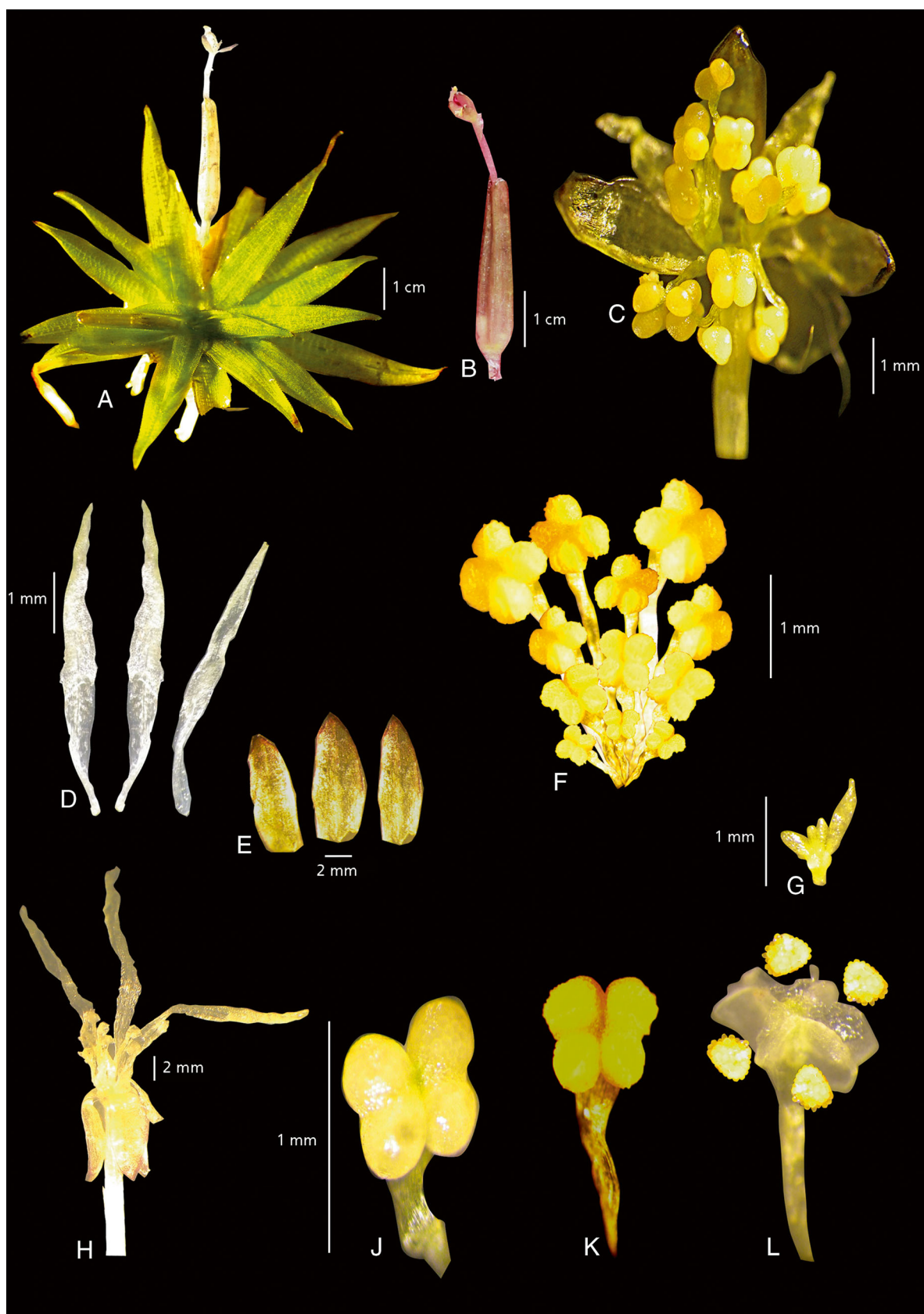
The pollen mass released from the male flower can be seen moving randomly on the water surface in the early morning on bright sunny days. 8 – 10 pollen masses are usually seen deposited on the stigma. The papillate stigma folds over and entraps the pollen masses. About 30 hours after pollen deposition, the stigma disintegrates. Pollination appears to be very efficient and capsules are usually full of viable seeds.



**Fig. 1.** *Blyxa mangalensis*. A male plant; B female plant; C leaf with margin detail; D male spathe; E male flower; F petals; G sepals; H stamens; J pistillodium; K female spathe; L sepals; M stigma; N seed. DRAWN BY K. RASHMI.



**Fig. 2.** *Blyxa mangalensis*. A – E habitat (variation of plant size and colours in different habitats); F male flowers in habitat; G female flower in habitat; H plant with root stock; J leaf with margin detail. PHOTOS: K. S. VENU VINODA.



**Fig. 3.** *Blyxa mangalensis*. A male plant; B spathe; C bud forced open; D petals; E sepals; F stamens; G pistillodium; H flower after anthesis; J – L anther, stages of development. PHOTOS: K. S. VENU VINODA.



**Fig. 4.** *Blyxa mangalensis*. A female plant; B – D spathe, stages of development; E calyx; F bud forced open; G stigma; H seed. PHOTOS: K. S. VENU VINODA.

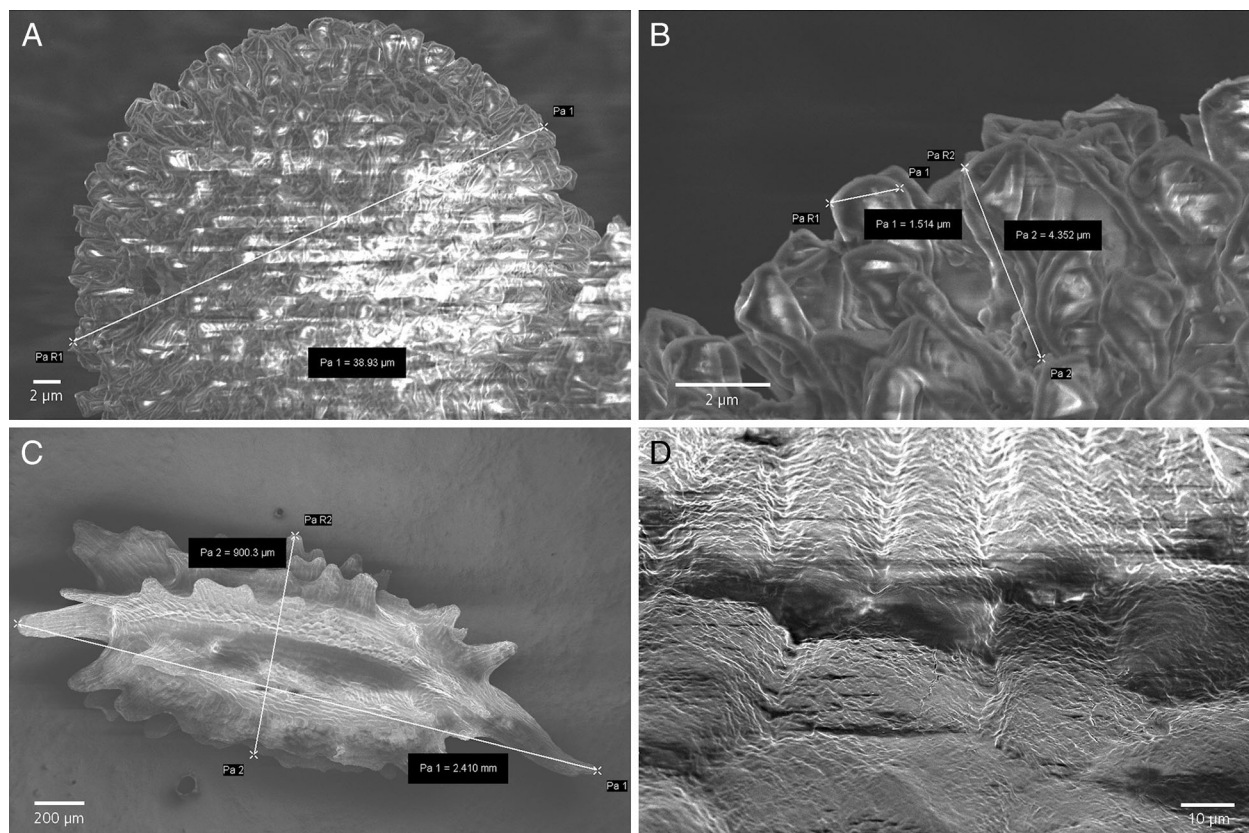


Fig. 5. *Blyxa mangalensis*, SEM images. A pollen grain; B pollen surface; C seed; D seed surface. PHOTOS: MURARI.

**Key to the species of *Blyxa***

- 1A. Plants dioecious, (with some exceptions: *Blyxa octandra* and *B. vietii* are rarely monoecious); stamens more than 3.
  - 2A. Stamens 6
    - 3A. Leaf midrib distinct, parallel veins 18; apex hooded or boat-like . . . . . **B. radicans**
    - 3B. Leaf midrib faint, parallel veins absent, leaf apex flat, obtuse or sub-acute . . . . . **B. hexandra**
  - 2B. Stamens 9 or more
    - 4A. Stem irregularly branched
      - 5A. Leaf base not sheathing, margin with unicellular spines . . . . . **B. novoguineensis**
      - 5B. Leaf bases sheathing, margin with multicellular teeth crowned by unicellular spines . . . . . **B. vietii**
    - 4B. Stem not branched
      - 6A. Leaves with parallel veins more than 10
        - 7A. Leaf apex distinctly obtuse and hooded; seeds with 5 or more ridges . . . . . **B. quadricostata**
        - 7B. Leaf apex attenuate to a fine point; seeds up to 12-ridged. . . . . **B. octandra**
      - 6B. Leaves with parallel veins 10 or less than 10
        - 8A. Leaf midrib faint, parallel veins 2; stamens 9; seeds with 2 pectinate wings . . . . . **B. senegalensis**
        - 8B. Leaf midrib distinct, parallel veins 10; stamens 9 – 12; seeds 9 – 10-ridged and shortly tailed **B. mangalensis**
- 1B. Plants monoecious; stamens 3
  - 9A. Stem is corm-like, not branched; seeds ellipsoidal
    - 10A. Seeds not tailed . . . . . **B. aubertii** var. **aubertii**
    - 10B. Seeds tailed . . . . . **B. aubertii** var. **echinosperma**
  - 9B. Stem is flaccid, slender, branched below; seeds fusiform
    - 11A. Seeds smooth. . . . . **B. japonica** var. **japonica**
    - 11B. Seeds with a few spines. . . . . **B. japonica** var. **alternifolia**

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