

A TAXONOMIC ACCOUNT OF *UTRICULARIA* LINN. FROM BANGLADESH

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Abstract

A taxonomic account of eight species of *Utricularia* Linn. viz. *U. aurea* Lour., *U. bifida* Lin., *U. caerulea* Linn., *U. gibba* Linn., *U. inflexa* Forsk., *U. minutissima* Vahl, *U. scandens* Benj. and *U. stellaris* L. f. has been provided from Bangladesh. An updated nomenclature including important synonyms, habitat and distribution have been furnished under each species. A key has also been given for easy identification of the species.

Introduction

Utricularia, an insectivorous genus of the family Lentibulariaceae encompasses 214 species, and is distributed throughout the world with the greatest species richness in the tropical regions (Taylor, 1989). They are mainly characterized by carnivorous bladders, 2-lipped calyx, personate corolla and they have no true roots. The morphology of vegetative parts usually differs from other vascular plants. Rhizoids substitute the roots. The main part of the plant is represented by a stolon with usually horizontal proliferation that bears traps, leaves and, if present, inflorescence. The leaves are organs that are considered as real leaves by some morphologists, whereas some others classify them as modified parts of the stem (Taylor, 1989). *Utricularia* inhabits a wide range of habitats including wet grounds, ponds, lakes and other marshy areas, epiphytic conditions and seasonal deserts.

Since *Utricularia* was first described in the "Species Plantarum" where Linnaeus (1753) listed only seven species, it has received considerable attention from many taxonomists. Many important accounts were produced mainly based on the morphology and floristics (Kamienski, 1895; Barnhart, 1916; Taylor, 1964; Crow, 1992). However, the most significant systematic work on the genus is the excellent monograph by Taylor (1989). Although many workers have added greatly to our knowledge of the Asian species (Oliver, 1859; Gamble, 1924; Komiya, 1972; Subramanyam, 1979), the species of this genus in Bangladesh have received very little attention (Khan and Halim 1987; Uddin *et al.* 2000).

This paper is based on the materials housed at the Bangladesh National Herbarium and the previous works (Clarke 1884, Prain 1903, Khan and Halim *l. c.*) relating to the Bangladeshi species of *Utricularia*. Most of the previous works were confined only to the incomplete list of species without providing any taxonomic account. The present paper deals with the detailed account of eight *Utricularia* species of Bangladesh, namely, *U. aurea* Lour., *U. bifida* Lin., *U. caerulea* Linn., *U. gibba* Linn., *U. inflexa* Forsk., *U.*

minutissima Vahl, *U. scandens* Benj. and *U. stellaris* L. f. The dichotomous bracket key has been provided to identify the species. An updated nomenclature along with important synonyms, habitat and distribution are provided under each taxon, while chromosome numbers have been cited whenever available.

Key to species

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|--|--------------------|
| 1. Corolla yellow. | 2 |
| - Corolla not yellow. | 6 |
| 2. Bracteoles present, much narrower than the bract; terrestrial plants, with entire linear or obovate leaves. | 3 |
| - Bracteoles absent; aquatic plants with leaves divided into narrowly linear or filiform segments. | 4 |
| 3. Capsule wall of uniform thickness. Pedicel not longer than the calyx. | bifida |
| - Capsule wall thickened on either side of the line of dehiscence. Upper calyx lobe not or scarcely wider than the lower, broadly ovoid. | scandens |
| 4. Peduncle with a whorl of inflated organs above its middle. Inflated organs sessile, with a leaf-like segments at the apex only. | stellaris |
| - Peduncle without a whorl of inflated organs. | 5 |
| 5. Corolla externally pubescent; scales always absent. | aurea |
| - Corolla externally glabrous; scales present. Bracts wider than long, not auriculate. | gibba |
| 6. Bracts basisolute. Corolla lower lip entire, calyx lobes subequal. | caerulea |
| - Bracts basifixed. | 7 |
| 7. Bracteoles absent; aquatic plant. Leaves divided into capillary segments. | inflexa |
| - Bracteoles present; terrestrial plant. Bract and bracteoles not longer than the pedicel | minutissima |

Utricularia aurea Lour., Fl. Cochinch. 1: 26 (1790); Roem. & Schult., Syst. Veg. 1: 198 (1817). *Utricularia flexuosa* Vahl, Enum. 1: 198 (1804). *Utricularia fasciculata* Roxb., Hort. Beng. : 4 (1914). *Utricularia macrocarpa* Wall. Cat. : 1494 (1829).

A medium-sized to large, perennial, suspended aquatic herb. Rhizoids present at the base or shortly above the base of the peduncle, bearing botryform or leaf-like branches. Stolons filiform, terete, branched, papillose. Leaves very numerous, semicircular in outline, 1-8 cm long, divided from the base into 3-5 semiverticillate primary segments, the secondary segments pinnate, alternate, each pinna dichotomously divided into numerous further segments, the ultimate segments capillary, terete, setulose. Traps dimorphic, obliquely ovoid. Racemes 5-25 cm long, up to 10-flowered. Bracts ovate to suborbicular, basifixed, 1-nerved, truncate at base, acute to acuminate at apex. Bracteoles absent. Flowers up to 10 mm long. Pedicels 6-20 mm long. Calyx lobes subequal, ovate to oblong, fleshy. Corolla bright yellow; upper lip ovate, hairy at base, obtuse to retuse at apex; lower lip obovate, hairy at throat, truncate, undulate at apex. Spur more or less equal to lower lip in length, papillose, glandular hairy at base, obtuse at apex. Stamens c. 2 mm long; filaments curved, dilated above, papillose; anther thecae confluent. Ovary

subglobose. Style thick; stigma 2-lipped, lower lip hairy, margin ciliate, upper lip obsolete. Capsule globose with a long beak, circumscissile. Seeds polygonal, margin winged. Flowering and fruiting period: July to April with a peak during October to January.

Chromosome number: $2n = 80$ (Tanaka and Uchiyama, 1988).

Habitat: Common in ditches, *beels*, lakes, pools, ponds, swamps and in still or slowly flowing water and rice fields.

Distribution within Bangladesh : This species is distributed throughout the country.

Distribution outside Bangladesh : Australia, China, Hong Kong, India, Indochina, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines and Thailand.

Utricularia bifida Linn., Sp. Pl. 1: 18 (1753); Oliver in J. Linn. Soc. Bot. 3: 182 (1859). Clarke in Hook. f., Fl. Brit. Ind. 4: 332 (1884); Prain, Beng. Pl. 2: 582 (1903, rep. ed. 1963). *Utricularia recurva* Lour., Fl. Cochinch. 1: 26 (1790). *Utricularia humilis* Vahl, Enum. 1: 203 (1804). *Utricularia biflora* Wall. Cat. : 1498 (1829).

A small, annual, terrestrial herb. Rhizoids numerous, capillary. Stolons few, capillary, branched. Leaves narrowly linear, rounded or subacute at apex, 10-20 x 0.5-1.0 mm. Traps globose, stalked. Racemes 3-30 cm long, erect, 1-8- flowered. Bracts basifixed, ovate, obtuse to acute at apex. Bracteoles subulate. Flowers 5-15 mm long. Pedicels 2.5-4.0 x 1.0-1.5 mm, broadly winged, spreading at anthesis, recurved in fruit. Calyx lobes subequal, ovate. Corolla yellow; upper lip linear oblong; lower lip orbicular to ovate, hairy in throat, gibbous at base. Spur subulate, acute at apex. Stamens c. 1.5 mm long; filaments straight, 1 mm long; anther thecae distinct. Ovary ovoid, dorsiventrally compressed. Style distinct; stigma 2-lipped, lower lip semicircular, the upper one very short or obsolete. Capsule broadly ellipsoid, dorsiventrally compressed. Seeds ovoid, ellipsoid to obovoid, numerous. Flowering and fruiting period: July to December with a peak during August to October.

Habitat: In wet and marshy areas near perennial water bodies, falls, streams, lakes and in rice fields.

Distribution within Bangladesh : It is commonly found in all the districts of the country.

Distribution outside Bangladesh: Australia, China, Hong Kong, India, Indo-China, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka and Thailand.

Utricularia caerulea Linn., Sp. Pl. : 18 (1753); Wight in Hooker's J. Bot. Kew Gard. Misc. 1: 374 (1849); Taylor in Steenis, Fl. Males. 8: 287 (1977). *Utricularia racemosa* Wall. ex Walp. in Meyen, Observ. Bot. 19: 401 (1843); A. DC. in DC. Prodr. 8:21

(1844); Clarke in Hook. f., Fl. Brit. Ind. 4: 333 (1884); Prain, Beng. Pl. 2 : 582 (1903, rep. ed. 1963). *U. purpurea* Willd. ex Benj. in Linnaea 20: 309 (1847).

An annual, terrestrial herb. Rhizoids glandular, rarely branched. Stolons sparsely glandular, branches hyaline. Leaves 4.0-8.0 x 1.0-1.4 mm, spatulate, rounded to obtuse at apex. Traps ovoid, stalked. Racemes 3-4 cm long, simple or rarely branched, terete or flattened, glabrous. Bracts elliptic to rhomboid, basisoluate, sparsely papillose without. Bracteoles linear, papillose. Flowers up to 6 mm long. Pedicels up to 2.0 x 0.5 mm, erect, terete, often recurved in fruit, papillose. Calyx lobes subequal, hooded, papillose. Corolla purple, pink, blue or violet, papillose; upper lip oblong to rarely deltoid, constricted at middle with two horn like projections on ventral surface, ciliate at lower margin, truncate, notched or emarginate at apex; lower lip semiorbicular to broadly ovate, gibbous at base, rounded or shallowly 3-lobed at apex. Spur horizontally projected, often curved upwards. Stamens c. 1 mm long; filaments strap-shaped, curved; anther thecae distinct. Ovary ovoid, attached to upper calyx lobe at base. Style short; stigma 2-lipped, lower lip semiorbicular, hairy; upper lip filiform, glabrous. Capsule subglobose to obliquely ovoid, papillose. Seeds ovoid, ellipsoid to obovoid. Flowering and fruiting period: August to April with a peak during December to February.

Chromosome number: $n = 20$ (Subramanyam and Kamble, 1968).

Habitat: In wet or marshy sandy soil and mud.

Distribution within Bangladesh : It is common throughout the country.

Distribution outside Bangladesh : Africa, Australia, Malaysia, New Zealand, Northern Asia, including the USSR, China, Mongolia, Korea and Japan, and Tropical Asia from Pakistan to Indo-China.

Utricularia gibba Linn. Sp. Pl.: 18 (1753); Willd., Sp. Pl., ed. 4, 1: 113 (1798); Vahl, Enum. 1: 204 (1804). *Utricularia fibrosa* Roem. & Schult., Syst. 1: 196 (1817). *Utricularia exoleta* R. Br., Prodr. : 430 (1810). *Utricularia gibba* L. subsp. *gibba* P. Taylor in Kew Bull. 18: 198 (1964). *Utricularia gibba* L. subsp. *exoleta* (R. Br.) P. Taylor in Kew Bull. 18: 204 (1964).

A small to medium-sized, annual or perennial, aquatic herb. Rhizoids filiform. Stolons much branched and often mat forming, filiform, terete. Leaves numerous, 0.5-1.5 cm long, uniform; primary segments 2, sparsely dichotomously branched into up to 8 segments, the ultimate segments capillary, slightly flattened. Traps obliquely ovoid. Racemes 4-15 cm long, erect, solitary or fasciculate, glabrous, 1-3-flowered. Bracts wider than long, transversely oblong, truncate or denticulate at apex. Bracteoles absent. Flowers up to 7 mm long. Pedicels 2-8 mm long, terete, erect or suberect. Calyx lobes subequal, obovate to ovate with rounded or truncate apex. Corolla yellow, upper lip orbicular to ovate with truncate or rounded apex; lower lip broadly ovate, rounded, truncate or rarely 3-lobed at apex. Spur as long as lower lip, conical, glandular within. Stamens c. 1 mm

long; filaments flat, curved; anther thecae distinct. Ovary globose. Style short; stigma 2-lipped, lower lip larger and semiorbicular, upper lip obsolete or denticulate. Capsule globose, laterally bivalvate. Seeds lenticular with a broad, irregular corky wing. Flowering and fruiting period: January to May with a peak in February and March.

Chromosome number: $n = 14$ (Kondo, 1972).

Habitat: In shallow still or slowly running water, mud, ditches, pools, lakes, river backwaters, bogs, swamps and marshes. Also found in deep water but not flowering unless supported on floating mats or living or dead vegetation.

Distribution within Bangladesh : It is common throughout the country.

Distribution outside Bangladesh : Pantropical, extending northward into eastern and western Canada and U.S.A., Spain and Portugal, North Africa, Israel, China and Japan and southward to Argentina, South Africa, Australia and New Zealand, also as an occasional inhabitant in the European countries and a common weed of aquaria and botanic gardens throughout the world.

Utricularia inflexa Forsk., Fl. Aegypt. Arab. Descr. Pl.: 9 (1775). *Utricularia inflexa* var. *inflexa* Basak, Bull. Bot. Surv. Ind. 17 (1-4): 99 (1975). *Utricularia stellaris* L. f. var. *inflexa* (Forsk.) Clarke in Hook. f., Fl. Brit. Ind. 4: 329 (1884); Prain, Beng. Pl. : 581 (1903, rep. ed. 1963).

An aquatic, floating herb. Stolons filiform, glabrous. Leaves dissected, divided into 3-5 primary segments, multifid, floating leaves narrow, cylindrical to filiform. Traps ovoid, shortly stalked, slightly compressed. Floats present on the peduncle, inflated, spongy, globose, ellipsoid to cylindrical. Racemes held above water level by floats. Bracts basifixed, elliptic to ovate-deltoid. Bracteoles absent. Peduncle stout and without scales, bearing a whorl of oblong vesicles about the middle. Calyx lobes erect, somewhat fleshy, up to 1 cm long in fruit, completely enclosing and concealing the capsule. Corolla white with violet stripes. Spur pubescent and slightly curved. Stamens 2, usually 1.5 mm long; filaments dilated towards anther; anthers two-thecous, distinct. Ovary globose, unilocular with a free basal placenta. Style up to 3 mm long, cylindrical; stigma 2-lipped, lower lip ciliate. Capsule globose, circumscissile. Seeds narrower than long, prismatic, winged. Flowering and fruiting period: August to February.

Habitat: Found in floating condition in beels, ditches and low lands.

Distribution within Bangladesh : It is found in Kushtia and Jessore districts.

Distribution outside Bangladesh : Afghanistan, Africa, Europe, Malaysia, Middle Eastern countries and Tropical Asia from Pakistan to Indo-China.

Utricularia minutissima Vahl, Enum. Pl. 1: 204 (1804); A. DC. in DC. Prod. 8: 16 (1884); Clarke in Hook. f., Fl. Brit. Ind. 4: 334 (1884). *Utricularia capillacea* Wight ex Oliver in J. Linn. Soc. Bot. 3: 184 (1859). *Utricularia nipponica* Makino in Bot. Mag. Tokyo 20: 95 (1906).

A very small, annual, terrestrial herb. Rhizoids few to many, capillary, simple. Stolons few, glandular or glabrous, sparsely branched. Leaves few, linear, up to 3 cm long and 0.8 mm wide, glandular or terete at base, rounded at apex. Traps numerous, subglobose to ovoid, stalked. Racemes 2-8 cm long, erect, glabrous, 1-4-flowered. Bracts basifixed, narrowly ovate, acute at apex; bracteoles linear-ovate. Bracts and bracteoles not longer than the pedicel. Flowers c. 4 mm long. Pedicels filiform, terete. Calyx lobes subequal, 2.0-3.5 mm long, ovate to obovate, glabrous or rarely papillose. Corolla 0.6-1.0 cm long, violet, pink or white; upper lip narrowly oblong-elliptic to obovate, rounded or emarginate at apex; lower lip narrowly 3-lobed. Spur straight, notched at apex. Stamens 1 mm long; filaments flattened, curved; anther thecae distinct. Ovary obliquely ovoid. Styles short; stigma 2-lipped, lower lip short or obsolete, upper lip long and recurved. Capsule obliquely ellipsoid, c. 2 mm long, uniformly membranous. Seeds globose to broadly ellipsoid. Flowering and fruiting period: August to March with a peak during October to January.

Chromosome number: $n = 8$ (Subramanyam and Kamble, 1968).

Habitat: In wet sandy soil or mud in open, grassy places.

Distribution within Bangladesh : It is found in Chittagong district.

Distribution outside Bangladesh: Australia, China, Hong Kong, Indo-China, Indonesia, India, Japan, Malay Peninsula, Myanmar, New Guinea, Philippines, Sri Lanka and Thailand.

Utricularia scandens Benj. in *Linnaea* 20: 309 (1847); Taylor in *Kew Bull.* 18: 46 (1964); Abraham and Subramanyam in *Proc. Indian Acad. Sci.* 62B: 98 (1965). *Utricularia volubilis* Wight *ex* Benj. in *Linnaea* 20: 309 (1847). *U. wallichiana* Wight, *Icon.* t. 1572, f. 1. (1850); Clarke in *Hook. f., Fl. Brit. Ind* 4: 332 (1884).

An annual, terrestrial herb. Rhizoids papillose. Stolons filiform, profusely branched. Leaves up to 15 x 1 mm, linear, acute or rounded at apex. Traps globose, stalked. Racemes up to 25 cm long, twining, rarely erect in smaller ones, glabrous, 1-9-flowered. Bracts basifixed, broadly ovate, acuminate to caudate at apex. Bracteoles linear to lanceolate. Flowers 5-10 mm long. Pedicels 1-5 mm long, erect, winged. Calyx lobes ovate. Corolla yellow, upper lip obovate to oblong, constricted near middle, obtuse to emarginate at apex; lower lip more or less obovate, hairy in throat, gibbous at base, rounded or shallowly emarginate at apex. Spur subulate or rarely conical, acute and curved at apex. Stamens c. 1 mm long; filaments flat, twisted; anther thecae distinct. Ovary ovoid. Stigma 2-lipped, lower lip oblong and hairy, upper one semiorbicular, glabrous. Capsule oblong to ovoid, dorsiventrally compressed; Seeds ovoid to ellipsoid. Flowering and fruiting period: Almost throughout the year with a peak during September to December.

Chromosome number: $n = 6$ (Subramanyam and Kamble, 1968).

Habitat: Along wet and marshy places, twining among themselves or on other plants.

Distribution within Bangladesh : This species has been recorded from North Bengal (Prain 1903) some parts of which fall under the territory of present Bangladesh.

Distribution outside Bangladesh : Africa, Malaysia, Northern Asia including the USSR, China, Mongolia, Korea and Japan, and tropical Asia from Pakistan to Indo-China.

Utricularia stellaris L. f., Suppl. Pl. : 86 (1781); Roxb., Fl. Coromandel. 2: 42, t. 180 (1798); Clarke in Hook. f., Fl. Brit. Ind. 4: 328 (1884); Prain, Beng. Pl. 2: 581 (1903, rep. ed. 1963). *Utricularia macrocarpa* Wall. ex Clarke in Hook. f., Fl. Brit. Ind. 4: 328 (1884); *Utricularia inflexa* Forssk. var. *stellaris* (L.f.) Taylor in Kew Bull. 18: 189 (1964).

An annual or perennial, aquatic herb. Rhizoids absent. Stolons filiform, glabrous, branched. Leaves up to 5 cm long; primary segments 3-5, semiverticillate, filiform; secondary segments 2 per point and repeatedly divided; ultimate segments capillary, terete, minutely setulose. Traps obliquely ovoid, shortly stalked, slightly compressed. Racemes up to 20 cm long, held above water level by floats, up to 12-flowered; floats globose, ellipsoid to cylindrical, usually at the middle of peduncle, rarely near at base. Bracts basifixed, elliptic to ovate-deltoid. Bracteoles absent. Flowers up to 8 mm long. Pedicels 2-6 mm long, terete, erect at anthesis and recurved in fruit. Calyx larger than the capsule. Calyx lobes subequal, accrescent, reflexed or rarely covering the capsule. Corolla yellow, glandular hairy; upper lip broadly ovate, emarginate, rounded at apex; lower lip orbicular, hairy in throat, emarginate or crenate at apex, bigibbous at base. Spur short, cylindrical, slightly curved, obtuse at apex. Stamens c. 1.5 mm long; filaments dilated towards anther; anther thecae distinct. Ovary globose. Style short, cylindrical; stigma 2-lipped, lower lip semiorbicular and hairy, upper lip 3-denticulate. Capsule globose, circumscissile, shorter than the calyx. Seeds prismatic, 4-7 angled, winged on all the angles. Flowering and fruiting period: July to April with a peak during October to February.

Chromosome number: $n = 21$ (Subramanyam and Kamble, 1968).

Habitat: In still or slow running water, ponds, tanks, lakes and rice fields.

Distribution within Bangladesh : It is found all over the country.

Distribution outside Bangladesh : Afghanistan, Africa, Australia, Bhutan, Europe, India, Indo-China, Indonesia, Malaysia, Myanmar, Nepal, Pakistan and Sri Lanka.

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