

THREE NEW RECORDS OF ANGIOSPERMS FOR BANGLADESH FROM BANDARBAN DISTRICT

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Abstract

Three species of angiosperms, *Boehmeria zollingeriana* Wedd. (Urticaceae), *Solanum aethiopicum* L. (Solanaceae) and *Solanum macrocarpon* L. (Solanaceae) are being reported as new records for Bangladesh. These species are described with updated nomenclature, taxonomic description, ecology, geographical distribution and important synonyms. Illustrations with field photographs are also provided.

Introduction

A systematic floristic study from Ruma sadar to Keokradong peak road and its surrounding areas from 2017-2018 has been made. The studied areas are situated in the jurisdiction of Poly forest range and Remakri Pransa forest range, under Ruma Upazila of Bandarban district. The distance from Ruma sadar to Keokradong peak is about 35 km. The studied areas situated south-eastern of Bangladesh, lies between 21°53' to 22°10' N latitude and 92°08' to 92°34' E longitude. Geologically, the area belongs to the Pliocene and Miocene epoch of the tertiary period. The configuration of the ground is very irregularly rugged and consists of mainly hills, plain land and valleys. There are many mountain fountains (locally known as streams) that flow through the area and fall into the Sangu river. Sangu is the main source of water for agriculture purpose and other necessities.

Since the described area is inaccessible and remote, no botanical survey has been done in the area before. For that the authors carried out a botanical survey in the mentioned areas. During those botanical explorations the authors collected three plant specimens belonging to the families Urticaceae and Solanaceae. On examining the specimens under Urticaceae and Solanaceae housed at Bangladesh National Herbarium (DACB), Bangladesh Council of Scientific and Industrial Research, Chittagong (BCSIRH), Herbarium of Bangladesh Forest Research Institute (BFRIH), Dhaka University Salar Khan Herbarium (DUSH) and Herbarium of Chittagong University (HCU) the specimens did not match with any specimens stored at those herbaria. Later on, these were identified as *Boehmeria zollingeriana* Wedd. (Urticaceae), *Solanum aethiopicum* L. (Solanaceae) and *Solanum macrocarpon* L. (Solanaceae). Three specific species in the following list belong to two genera and two families.

Encyclopedia of Flora and Fauna of Bangladesh described a total of 21 species of the family Urticaceae Ullah *et al.* (2009) and a total of 37 species of the family Solanaceae Rahman *et al.* (2009) for the flora of Bangladesh. On the other hand, Uddin *et al.* (2015) added another 19 species to the account of Urticaceae. Recently Uddin and Shetu (2016) described 48 species to the account of Urticaceae for Bangladesh.

These three species, *Boehmeria zollingeriana* Wedd. (Urticaceae), *Solanum aethiopicum* L. (Solanaceae) and *Solanum macrocarpon* L. (Solanaceae) were not previously recorded from the territory of Bangladesh in the relevant works of Uddin and Shetu (2016), Uddin *et al.* (2015), Ullah *et al.* (2009), Rahman *et al.* (2009), Hooker (1888), Clarke (1883), Kurz (1877), Prain

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(1903), Heinig (1925), Rahman and Uddin (2016), Kanjilal *et al.* (1940), Raizada (1941), Islam *et al.* (2016a, 2016b), Mia and Khan (1995), Khan and Mia (2002), Rahman (2004a, 2004b), Uddin and Hassan (2010), Pasha and Uddin (2013) and Rahman *et al.* (2015).

Hence, the species *Boehmeria zollingeriana* Wedd. (Urticaceae), *Solanum aethiopicum* L. (Solanaceae) and *Solanum macrocarpon* L. (Solanaceae) are being described here to be new report for Bangladesh.

Materials and Methods

Specimens of each species encountered in flowering and fruiting condition were collected and preserved at Bangladesh National Herbarium (DACB). The photographs of fertile specimens in natural habitat were taken during the field trips. Both fresh materials and herbarium specimens were studied and examined by using long arm stereomicroscope. All available taxonomic resources *viz.* literatures, herbarium specimens and botanical illustrations were taken under consideration to identify the species. Digital images of the species are also used to supplement plant identification and document their habitats. Unnamed specimens were identified and described by consulting relevant floristic literatures of Bukenya and Hall (1988), Bukenya and Carasco (1995), Hooker (1888), Hyde *et al.* (2017), Mapaura and Timberlake (2004), Heine (1963), Zhang *et al.* (1994), Huq (1986), IPNI (2008) and Chen *et al.* (2003).

Taxonomic enumeration of these three new records are prepared. In the enumeration, each species is cited with updated nomenclature, commonly known synonym, taxonomic description, ecology, geographical distribution and citation of voucher specimens deposited at DACB with proper labeling.

Results

1. *Boehmeria zollingeriana* Wedd., Ann. Sci. Nat., Bot., sér. 4. 1: 201. 1854. (Figs 1A & B)

Urticaceae

Boehmeria diversiflora Miq., Syst. Verz. 101. 1854.

Boehmeria heteroidea Blume, Mus. Bot. 2: 216. 1857.

Boehmeria heteroidea var. *latifolia* Gagnep, Fl. Indo-Chine 5: 844. 1929.

Ramium zollingerianum (Wedd.) Kuntze, Revis. Gen. Pl. 2: 633 1891.

Pendular shrub, up to 3 m tall, branchlets glabrous. Leaves opposite or alternate on distal branches; petiole 2-12 cm, glabrous, stipules lanceolate, up to 1.2 cm long; leaf blade ovate, broadly ovate to subcordate or in upper branches narrowly elliptic or narrowly ovate, 8-18 × 4-12 cm, secondary veins 3-5 pairs along midvein, adaxial surface glabrous or subglabrous, abaxial surface sparsely strigillose on veins, base rounded or subcordate, margin crenulate from base, apex caudate or acuminate. Glomerules unisexual; female glomerules on long slender terminal or subterminal branches, drooping, usually rebranching, 26-48 cm, all leaves reduced and scale-like; male glomerules in the axils of current or fallen leaves on normal branches. Male glomerules axillary, 1-1.5 cm in diam. Male flowers 5-merous; pedicel 4-4.5 mm; perianth lobes boat-shaped to elliptic, to 1 mm, glabrous or subglabrous, connate at base, often corniculate near apex; rudimentary ovule ellipsoid, to 0.55 mm. Fruiting perianth brown, ellipsoid or obovoid with a cuneate to stipitate base, compressed, 1.0-1.2 mm, sparsely pubescent, smooth, sessile, apex with prolonged neck, to 0.2 mm, 2-3-toothed. *Flowering & fruiting*: May-November.

Ecology: Grows at the top of the hill, Forests, thickets, along streams about 100-1200 m altitude.

Distribution: China, Taiwan, India, Laos, Indonesia, Myanmar, Java, Thailand and Vietnam.

Specimen examined: **Bandarban:** Ruma, Bogalake east side hill slope; 2 xii 2017; K.K. Islam KKI3099a, b & c (DACB).



Fig. 1A. *Bohmeria zollingeriana* Wedd.



Fig. 1B. Illustration of *Boehmeria zollingeriana* Wedd. a. Flowering branch b. Female flower

2. ***Solanum aethiopicum* L.**, Cent. Pl. 2: 10. 1756.

(Figs 2A & B)

Solanaceae

Solanum anguivi Lam., Tabl. Encycl. 2: 23. 1794.

Solanum gilo Raddi, Mem. Soc. Ital. Moden. xviii. Fis. 410. 1820.

Solanum incanum Forssk., Fl. Aegypt.-Arab. 46. 1775.

Solanum undatum Poir., Encycl. 4: 301. 1797.

Solanum integrifolium Poir., Encycl. 4(1): 301. 1797.

Solanum texense Engelm. & Gray, Boston J. Nat. Hist. 5. 227: 1845.

Perennial shrub or annual herb, up to 1 m tall, often much-branched. Leaves alternate, simple, ovate to oblong-ovate, 12-20 × 5-10 cm, obtuse or cordate at base, acute to obtuse at apex, entire or slightly to deeply lobed at margin, pinnately veined, stipules absent, petiole up to 9 cm long, upper leaves smaller, often unequal paired, narrower, less lobed and often subopposite; with or without prickles and stellate hairs. Inflorescences a lateral or extra-axillary, racemose cyme, few flowered, peduncle often short about 1.5 cm even absent, rachis short to long, pedicel 4-14 mm long, up to 27 mm long in fruit. Flowers bisexual, regular, 5-6-merous. Calyx campanulate, 5-6 lobes, lobes slightly unequal, ovate to ovate-lanceolate, 5-7 × 3-4 mm long. Corolla white, stellate or stellate-rotate, 6-15 mm long; limb up to 6.5 mm. Stamens about 6 mm long, 5-6 numbers, inserted near the base of the corolla tube and alternate with corolla lobes; filaments 0.5-1 mm long, thick and glabrous. Anther yellow, lanceolate-elliptic, 4-5 × 0.7-1 mm, emarginate at apex and base. Ovary superior, 4-8 celled, style as long as or slightly longer than stamens; stigma small, obtuse. Fruit orange or red, 1.5-3 cm in diameter, smooth often longitudinally 4-6 grooved, many-seeded. Seeds lenticular to reniform, flattened, 2-3.5 mm in diameter, pale brown or yellow. *Flowering & fruiting*: Throughout the year.

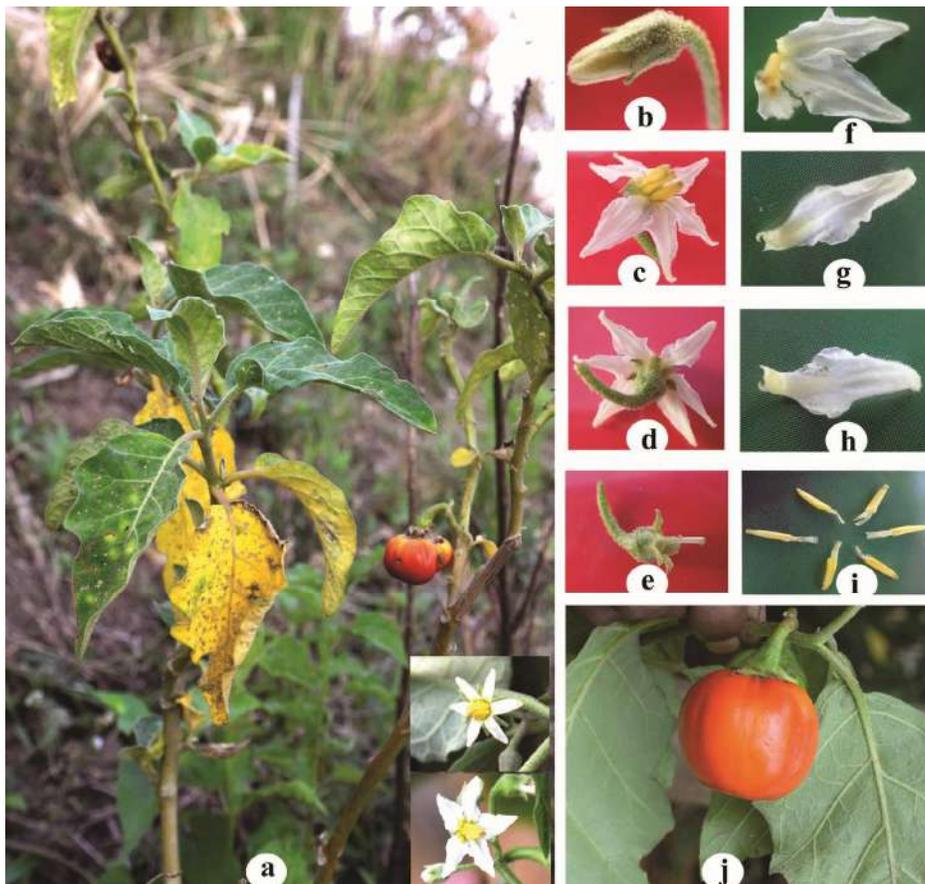


Fig. 2A. *Solanum aethiopicum* L. a. Habit b. Calyx c. Flower (Dorsal view) d. Flower (Vertical view) e. Ovary and style f. Petal with inserted stamen at base g. Petal (Dorsal view) h. Petal (Vertical view) i. Anthers and j. Ripen fruit with longitudinally grooved.

Ecology: Grows at hill slopes, hill tops, floodplains and cultivated ground about 400-1800 m altitude.

Distribution: Throughout tropical Africa (especially Uganda, savanna, Yunnan, Henan Ghana and Ethiopia), South America (mainly Brazil) and occasionally in southern most France and Italy.

Specimen examined: **Bandarban:** Ruma, Munlaipara; 7 xii 2017; K.K. Islam KKI3360 (DACB) and Keokradong peak; 28 iii 2018; K.K. Islam KKI3638 (DACB).



Fig. 2B. Illustration of *Solanum aethiopicum* L. a. Flowering branch b. Ripen fruit with longitudinally grooved.

3. *Solanum macrocarpon* L., Mant. Pl. 2: 205. 1771.

(Figs. 3A & B)
Solanaceae

Solanum atropo Schumach. & Thonn., Beskr. Guin. Pl. 124. 1827.

Solanum calicinum Dunal, Encycl. Suppl. 3. 747. 1814.

Solanum dasyphyllum Schumach. & Thonn., Beskr. Guin. Pl. 126. 1827.

Solanum zanonii Gouan, Ill. Observ. Bot. 7. 1773.

Solanum acanthoideum Drege ex Dunal, Prodr. 13(1): 364. 1852.

Solanum thonningianum Jacq.f, Eclog. i. 123. 1832.

Perennial shrub or annual herb, up to 1.5 m tall. Stems erect, branched, blackish-violet, woody at the base, glabrous or with stellate hairs, robust, prickles up to 6 mm long. Leaves alternate, simple; stipules absent; petiole up to 6.5 cm long; blade 14-42 cm × 8-33 cm, oval, entire or with short to large lobes up to 8 cm long, hairy on both surfaces with stellate or simple hairs, later often glabrescent, Prickles may or may not be present on the leaves. When prickles are present they are



Fig. 3A. *Solanum macrocarpon* L. a. Habit b. Flower with 5-fused petal c. Flower with 6-fused petal d. Young fruit partly covered by enlarged calyx lobes and e. Ripen fruit with crack.



Fig. 3B. Illustration of *Solanum macrocarpon* L. a. Flowering branch b. Flower with fused petal c. Young fruit partly covered by enlarged calyx lobes and d. Ripen fruit with crack.

found more along the midrib and lateral veins. Inflorescence lateral, racemose, 3-7 flowered. The flowers have a diameter of 2-6 cm and are located on short stalked. Flowers are complete, actinomorphic, hermaphrodite, 5-6 merous, pedicellate. Calyx campanulate, lobes pointed, hairy, glandular, sometimes prickly, often accrescent in fruit; Corolla infundibuliform-rotate or campanulate, 2-4 cm long, pale purple or purple, rarely white, glandular hairy outside, glabrous inside; stamens alternate with corolla lobes, filaments short and thick, anthers connivent, yellow

but tip reddish, opening by terminal pores; ovary white, superior, 2-5-celled, glabrous or slightly glandular hairy, style white and slightly longer than stamens, stigma three part and green colour. Fruits are round, glossy, the top and the bottom are flattened out and have grooved portions with a length of 4-6 cm and a width of 6-7.5 cm, partly covered by the enlarged calyx lobes, bitter tasted but edible when cooked. The stalk of the fruit is 1-4 cm long and is either de-curved or erect. At a young stage the color of the fruit is light-green, ivory, or a purple and white color with dark stripes. When ripe, the fruit turns yellow or a yellow-brownish or reddish. Fruit contains many seeds, seeds are compressed obovoid to reniform, length of 3-4.5 mm and width 2-3.5 mm. *Flowering & fruiting*: June to December.

Ecology: Grows at hill slopes, hill tops, floodplains and cultivated ground about 1765 m altitude.

Distribution: Central Africa, West Africa, East Africa, Southern Africa (Malawi, Zambia, Zimbabwe, Nigeria and Mozambique), South America (Suriname), India (Kerala, Mizoram), Thailand and Indonesia.

Specimen examined: **Bandarban**: Ruma, Keokradong peak; 3 xii 2017; K.K. Islam KKI3112 (DACB).

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References

- Bukenya, Z.R. and Carasco, J.F. 1995. *Solanum* (*Solanaceae*) in Uganda. *Bothalia* 18(1): 43-59.
- Bukenya, Z.R. and Hall, J.B. 1988. *Solanum* (*Solanaceae*) in Ghana. *Bothalia* 18: 79-88.
- Chen, J., Lin, O.P., Friis, I., Wilmot-Dear, C.M. and Monro, A.K. 2003. *Urticaceae*. In Wu, Z. Y., Raven, P. H. and Hong, D. Y. (Eds.). *Flora of China*. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing and Missouri Botanical Garden Press, St. Louis. pp. 164-174.
- Clarke, C.B. 1883. (Repr. 1930 & 1959). *Solanaceae*. In: Hooker, J.D., *The Flora of British India*, Vol. 4. L. Reeve & Co. Ltd., The Oast House, Brooke, Ashford, Kent, England. pp. 228-237.
- Heine, H.H. 1963. *Solanaceae*. In: Hepper, F. N. (ed.), *Flora of West Tropical Africa*, ed. 2, Crown Agents, London. pp. 325-335.
- Heinig, R.L. 1925. *List of Plants of the Chittagong Collectorate and Hill Tracts*. The Bengal Government Branch Press, Darjeeling, India. pp. 1-89.
- Hooker, J.D. 1888 (Repr. 1954). *Urticaceae*. In: Hooker, J.D., *The Flora of British India*, Vol. 5. L. Reeve & Co. Ltd., The Oast House, Brooke, Ashford, Kent, England. pp. 477-594.
- Huq, A.M. 1986. *Plant names of Bangladesh National Herbarium*, Dhanmondi, Dhaka. pp. 1-289.
- Hyde, M.A., Wursten, B.T., Ballings, P. and Coates Palgrave, M. 2017. *Flora of Zimbabwe*: Species Information: *Solanum macrocarpon*, < <http://www.zimbabweflora.co.zw> >, retrieved 17 March 2018.
- IPNI 2008. *The International Plant Names Index*. <www.ipni.org>. Retrieved on 20 April 2018.
- Islam, K.K., Anwar, K.B., and Uddin, S.N. 2016a. Angiosperm flora of the Karnafuli river and its surrounding areas under Rangamati district of Bangladesh. II Magnoliopsida (Dicotyledons). *Bull. Bangladesh National Herbarium Herb.* 5: 1-57.

- Islam, K.K., Uddin, S.N., Khan, B. and Mirza, M.M. 2016b. An annotated checklist of the vascular plants of Pharia reserve forest under Bilaichari, Rangamati district of Bangladesh. *Bull. Bangladesh National Herbarium Herb.* 5: 59-95.
- Kanjilal, U.N., Kanjilal, P.C., De, R.N. and Das, A. 1940 (Repr. 1982). *Flora of Assam*, Vol. 4. A Von Book Company, Ajmeri Gate, Delhi, India. pp. 279-296.
- Khan, M.S. and Mia, C. 2002. *Solanaceae*. In: Khan, M.S. and Rahman, M.M. (eds.), *Flora of Bangladesh*, Vol. 53. Bangladesh National Herbarium, Dhaka. pp. 1-48.
- Kurz, S. 1877 (Repr. 1974). *Forest Flora of British Burma*, Vol. 2. Bishen Singh Mahendra Pal Singh, Dehra Dun, India. pp. 222-227 and 419-474.
- Mapaura, A. & Timberlake, J. eds. 2004. *A checklist of Zimbabwean vascular plants*, Southern African Botanical Diversity Network Report no. 33 sobonet, Pretoria and Harare. pp. 1-79.
- Mia, M.M.K. and Khan, B. 1995. First list of angiospermic taxa of Bangladesh not included in Hooker's Flora of British India and Prain's Bengal Plants. *Bangladesh J. Plant Taxon.* 2(1&2): 25-45.
- Pasha, M.K. and Uddin, S.B. 2013. *Dictionary of Plant Names of Bangladesh (Vascular Plants)*, Janokalyan Prokashani, Chittagong, Bangladesh. pp.1-434.
- Prain, D. 1903 (Indian Repr. ed. 1963). *Bengal Plants*, Vol. 2. Bishen Singh Mahendra Pal Singh, Dehra Dun, India. pp. 552-562 and 955-971.
- Rahman, M.M., Sultana, N., Khatun, B.M.R., Yusuf, M. and Hassan, M.A. 2009. *Solanaceae*. In: Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmad, M. Ahmed, A.T.A. (Eds.). *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 10. Angiosperms: Dicotyledons (Ranunculaceae-Zygophyllaceae). Asiatic Society of Bangladesh, Dhaka, pp. 287-320.
- Rahman, M.O. 2004a. Second list of angiospermic taxa of Bangladesh not included in Hooker's 'Flora of British India' and Prain's 'Bengal Plants': Series I. *Bangladesh J. Plant Taxon.* 11(1): 77-82.
- Rahman, M.O. 2004b. Second list of angiospermic taxa of Bangladesh not included in Hooker's 'Flora of British India' and Prain's 'Bengal Plants': Series II. *Bangladesh J. Plant Taxon.* 1(2): 49-56.
- Rahman, M.S., Hossain, G.M., Khan, S.A. and Uddin, S.N. 2015. An annotated checklist of the vascular plants of Sundarban mangrove forest of Bangladesh. *Bangladesh J. Plant Taxon.* 22(1): 17-41.
- Rahman, N. and Uddin, S.N. 2016. Plant collections from Bangladesh stored in the Herbarium at Royal Botanical Garden, Kew, England, *Bull. Bangladesh National Herbarium Herb.* 5: 97-121.
- Raizada, M.B. 1941. *On the Flora of Chittagong*. *Indian Forester* 67(5): 245-254.
- Uddin, S. N., Khan, B., & Hassan, M. A. 2015. Nineteen new records of Urticaceae from Bangladesh. *Bull. Bangladesh national Herb.* 4: 1-27.
- Uddin, S.N. and Shetu, S.S. 2016. *Urticaceae*. In: Ara, H. and Khan, B. (eds.), *Flora of Bangladesh*, Vol. 66. Bangladesh National Herbarium, Dhaka. pp. 1-121.
- Uddin, Z.M. and Hassan, M.A. 2010. Angiosperm diversity of Lawachara National Park (Bangladesh): a preliminary assessment. *Bangladesh J. Plant Taxon.* 17(1): 9-22.
- Ullah, M.A., Afroz, S. Tutul, E., Liza, S.A., Yusuf, M. and Huq, A.M. 2009. *Urticaceae*. In: Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmad, M. Ahmed, A.T.A. (Eds.). *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 10. Angiosperms: Dicotyledons (Ranunculaceae-Zygophyllaceae). Asiatic Society of Bangladesh, Dhaka, pp. 411-428.
- Zhang, Z.Y., Lu, A.M. and D'Arcy, W.G. 1994. *Solanaceae*. In: Wu, C.Y., Raven, P.H. and Hong, D.Y. (eds.), *Flora of China*. Vol.17. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis. pp. 300-332.