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Cover: Rufous-headed Hornbill *Rhabdotorrhinus waldeni* © Philip Godfrey C. Jakosalem.



Addition of three new angiospermic taxa to the flora of Bangladesh

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Abstract: During updating the plant holding database of the botanical garden, Bangladesh Agricultural University, the authors identified three species of the family Commelinaceae namely, *Callisia fragrans* (Lindl.) Woodson, *Murdannia gigantea* (Vahl) G.Brückn., and *Tradescantia sillamontana* Matuda as new records to the flora of Bangladesh. This paper provides a comprehensive description and colour photographs of these species from Bangladesh.

Keywords: *Callisia fragrans*, Commelinaceae, dayflower, *Murdannia gigantea*, new records, *Tradescantia sillamontana*.

The dayflower or spiderwort family Commelinaceae is widely distributed throughout tropical and subtropical regions comprising 41 genera and 731 species (Christenhusz & Byng 2016) and is characterized by several features including a distinct closed leaf sheath, a succulent leaf blade, deliquescent three-merous flowers with distinct petals and sepals and a lack of nectaries (Cronquist 1981). The members of this family are important for their valuable ornamentals such as dayflower, spiderwort, moses-in-the-bulrushes, and wandering Jew; young shoots and leaves as vegetables, as well as for their medicinal uses as a laxative, to treat inflammation of the eyes, fractured bones, burns, arthritis, skin & oncological diseases, tuberculosis & asthma, among others (Alam 2007; Tan et al. 2014). Khan

& Alam (1977) reported 28 species under 13 genera of the Commelinaceae from Bangladesh. After some nomenclatural changes, later the family was exemplified from the country by 10 genera and 27 species (Alam 2007). Recently, Alam & Uddin (2018) recorded 23 species under 10 genera of Commelinaceae from the greater Chittagong and the Chittagong Hill Tracts. All these reports include taxa both from wild and cultivated states.

The Botanical Garden of Bangladesh Agricultural University (BAUBG) is located on the western bank of the old Brahmaputra River between 24.433°N and 90.263°E. Since its inception in 1963, the BAUBG has been involved in the collection and conservation of plant genetic resources from both local and international sources. With a land area of about 10 ha, approximately 1,150 plant species under 327 genera and 215 families are being conserved here over a period of time for the study by students, academicians, and researchers (Sarwar 2019). The garden's collections were primarily acquired through field / forest exploration; however, some species were acquired through exchange programmes and/or from commercial nurseries. Although BAUBG collection is enriched day by day and the database is well-managed, some of the plant collections have been

Editor: Anonymity requested.

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lost due to different natural calamities, diseases, insect predation, and theft. These necessitate initiating a new programme to update the plant holding database of the BAUBG (Sarwar 2019; Ashrafuzzaman & Sarwar 2021; Ashrafuzzaman et al. 2021).

This article includes taxonomic descriptions of the species, including the most recent nomenclature and the most frequently used synonyms, as well as information on flowering and fruiting time, ecology, mode of propagation, uses, global distribution, and conservation status.

METHODS

A detailed survey on the plant genetic resources growing and conserved throughout BAUBG has been carried out through frequent visits. During these visits, fresh flowering samples were collected; herbarium specimens were prepared as vouchers by drying the fresh samples following standard procedure (Anonymous 1996). The dried specimens were mounted on the herbarium sheet and preserved in Prof. Arshad Ali Herbarium at the botanical garden, Department of Crop Botany, Bangladesh Agricultural University (AAHBAU). The collected fresh (or dried) specimens were identified in the field or by comparing with herbarium specimens or pertinent published literature. While updating the list of the family Commelinaceae, the authors came across a few interesting specimens which, after critical examination and with help of web resources and type specimens, were identified as *Callisia fragrans* (Lindl.) Woodson, *Murdannia gigantea* (Vahl) G.Brückn., and *Tradescantia sillamontana* Matuda. A comprehensive description and colour photographs are provided for easy identification of the species. The botanical names were updated following WFO–The World flora online <<http://www.worldfloraonline.org>> (older <http://www.theplantlist.org>) and Plants of the world online <<https://powo.science.kew.org/>>.

RESULTS AND DISCUSSION

While updating the list of Commelinaceae species conserved at BAUBG, we identified three new species to the flora of Bangladesh: *Callisia fragrans* (Lindl.) Woodson, *Murdannia gigantea* (Vahl) G.Brückn. and *Tradescantia sillamontana* Matuda.

These species and even the genus *Callisia* were not included in any previous reports of the country (Khan & Alam 1977; Alam 2007). There is no mention of the species in the recent floristic accounts that covered the major floristic areas of the country (Hossain & Hossain 2014; Rahman 2017; Rahman et al. 2015, 2017; Alam &

Uddin 2018; Haque et al. 2018; Harun-Ur-Rashid et al. 2018; Khan et al. 2021; Uddin et al. 2021).

Three species of Commelinaceae recorded as new to the flora of Bangladesh are described below.

Callisia fragrans (Lindl.) Woodson, Annals of the Missouri Botanical Garden. 29: 154 (1942).

Spironema fragrans Lindley, Edwards's Bot. Reg. 26: t. 47 (TYPE), misc. 26 (1840). *Rectanthera fragrans* (Lindl.) O.Deg., Fl. Hawaiiensis [Degener] Fam. 62 (1932); *Spironema orthandrum* Lindb., Acta Soc. Sci. Fenn. 10: 127. t. 4. (1871) (Image 1).

Common names: Basket plant, false bromeliad, octopus plant, inch plant, purple succulent, sweet-scented spiral thread.

A perennial, robust, stoloniferous, herb, ascending, to 1 m. Leaves in clusters from long stems, spirally arranged, oblong to lanceolate-oblong, 15–30 x 2.5–5 cm, glabrous, glossy green, tend to become reddish-purple in strong light, distal leaf blades much narrower than sheaths when sheaths opened, flattened, apex acuminate, glabrous. Inflorescences terminal panicles to 30 cm or longer, flowers emerging on slender peduncles. Flowers fragrant, subsessile; bract papery, 10–15 mm long; sepals 3, whitish-transparent, membranous, lanceolate, 5–6 mm; petals three, white, short-lived, lanceolate, 6 mm; stamens six, long-exserted, connectives white, broad, flag-like; filaments glabrous; ovary 3-locular, stigma penicillate. Fruit a capsule, 3-locular; seeds two per locule, exarillate, uniseriate, hilum punctiform to linear, embryotega dorsal to lateral.

Flowering & fruiting: February to June.

Chromosome number: 2n= 18 (Nandikar et al. 2010).

Ecology: Common cultivated ornamental. Often becomes open perennial drought-resistant colonies on the ground.

Mode of propagation: Can be easily propagated through stem cuttings.

Uses: A common ornamental indoor plant. It is traditionally used to treat burns, arthritis, skin and oncological diseases, tuberculosis, and asthma (Chernenko et al. 2007). It has a rich folkloric reputation as an antiviral and antimicrobial plant. Especially in eastern Europe, its leaves are used for the treatment of various skin diseases, burns, and joint disorders (Yarmolinsky et al. 2010).

Distribution: Endemic to Mexico, and is a popular pot plant cultivated throughout Europe, Asia, and the Americas. Introduced into Dominican Republic, Florida, Hawaii, Jamaica, Leeward Is., Louisiana, Morocco, Netherlands Antilles, Norfolk Is., Puerto Rico, Taiwan,

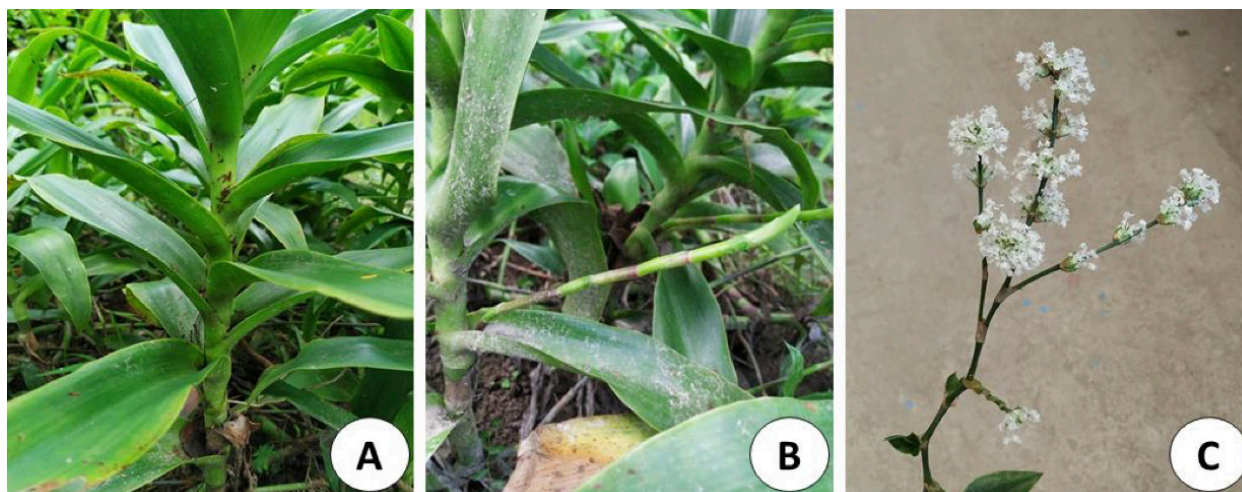


Image 1. *Callisia fragrans*: A–B—Habit | C—Terminal inflorescence. © M. Ashrafuzzaman & A.K.M. Golam Sarwar.

Venezuelan Antilles, and Windward Is. In Bangladesh, it is so far recorded in cultivation only.

Conservation status: *Callisia fragrans* is currently known only in cultivation state, hence no threat has been assessed and is considered as Least Concern.

The species can be easily identified by spirally arranged clustered leaves, terminal panicle with white fragrance flowers.

Representing specimens examined: Mymensingh, Botanical Garden, Bangladesh Agricultural University, cultivated, 19.vi.21. Ashrafuzzaman & Sarwar (AAHBAU)

Murdannia gigantea (Vahl) G.Brückn., Nat. Pflanzenfam., ed. 2 15a: 173 (1930). Faden, Revis. Handb. Fl. Ceylon 14: 147 (2000); Nandikar & Gurav, Phytodiversity 2(1): 72 (2015). *Commelina gigantea* Vahl, Enum. Pl. 2: 177 (1805–06). Type: India, Röttler (lectotype Herb. Vahl C) cited by Faden (2000).

Aneilema giganteum (Vahl) R.Br., Prodr. Fl. Nov. Holland. 271 (1810); Hook.f., Fl. Brit. Ind. 6: 379 (1892). *Aneilema ensifolium* Wight, Icon. Pl. Ind. Orient. 6: 30, t. 2074 (1853). TYPE: India, Courtallum, Herb. Wight s.n. (SYNTYPES: K). (Image 2).

A tufted, erect, perennial herb; roots thickened but not tuberous. Stem 25–60 cm high, glabrous, or puberulous, with long internodes. Rosette leaves linear, 25–60 × 0.5–1 cm, apex acuminate to finely acuminate, base narrowed, sheath 1–7 (–8) cm long; flowering shoots terminal in the rosette, erect, 1 m tall, leafy with long internodes, leaves on flowering shoot gradually reduced. Inflorescences terminal with many-flowered cincinni; bracteoles. 5 mm long. Flowers many, pedicellate; pedicel erect, 6 mm long, glabrous; sepals

elliptic, 5–8 mm long; petals ovate to obovate, pale lavender to blue; stamens 2, filaments bearded, anthers ellipsoid; staminodes 4, filaments sparsely bearded, antherodes trilobed, yellow; ovary green, ovoid. Fruit a capsule, ellipsoid ovoid, 0.6–10 × 5–6 mm, brown, glabrous; seeds 2 per locule, uniseriate, ovoid ellipsoid in outline, 2.5–4 × 2–2.5 mm, rugose with warts and ridges in lines radiating from embryotega, the whole surface finely granular.

Flowering & fruiting: May to August.

Chromosome number: $2n = 22$ (Rao et al. 1960); 44 (Kammathy & Rao 1961)

Ecology: Seepage areas on rock outcrops and secondary forest, full sun to part shade; 0–200 m (Faden 2000).

Mode of propagation: Vegetative propagation through plant division.

Uses: Planted as an ornamental in many parts of the world.

Distribution: Native range is Madagascar, tropical Asia to northern Australia, cultivated in India, Sri Lanka, Singapore, Cambodia, Viet Nam, Thailand, Lao People's Democratic Republic, Myanmar, Sri Lanka, Indonesia, Papua New Guinea, Philippines, China, Australia and Madagascar. In Bangladesh, it is so far recorded in cultivation only.

Conservation status: *Murdannia gigantea* is currently known only in cultivation state; hence no threat has been assessed and is considered as Least Concern.

The species can easily differentiate with tall flowering shoot terminal in the rosette with leafy internodes; broad leaves.

Representing specimens examined: Mymensingh,

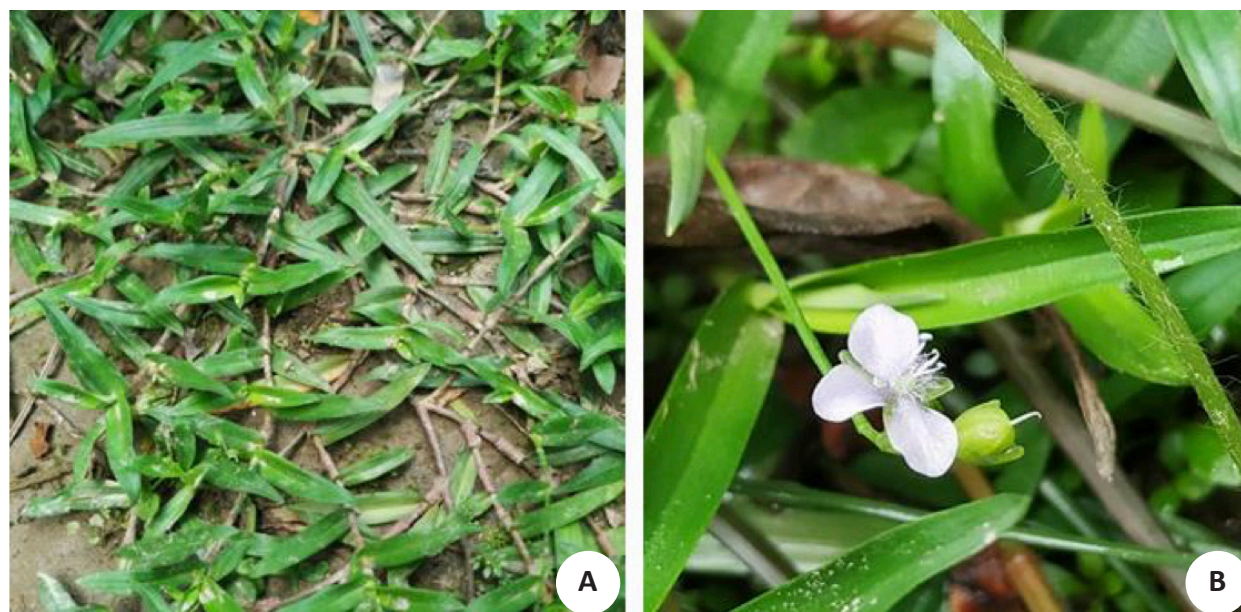


Image 2. *Murdannia gigantea*: A—Habit | B—Flower on flowering twig and immature fruit. © M. Ashrafuzzaman & A.K.M. Golam Sarwar.

Botanical Garden, Bangladesh Agricultural University, cultivated, 19.vi.21. Ashrafuzzaman & Sarwar s.n. (AAHBAU)

Note: One herbarium (specimen) collection is recorded by Silva, F.W.de & W. Gomez (G-DC-357361/1) from Sylhet - Mont. Sillet/Sylhet Division stored in Geneva Herbarium – De Candolle's Prodrumus (G-DC) <<https://www.gbif.org/occurrence/1144569612>>.

C.B. Clarke's note of 25 August 1896 on "Wallich Catalogue: Sylhet, Pundua and Khasia Hills" indicate that Wallich distinguished between 'Sillet', i.e., the old (and present) Zilla, and the 'Mont. Sillet' or 'Mont. Sillet vicinae', by which he indicated Khasia <https://stories.rbge.org.uk/archives/5029> seen on 01 July 2021.

Tradescantia sillamontana Matuda, Bol. Soc. Bot. México 18: 1 Fig. 1 (1955). TYPE: Mexico, Nuevo Leon (White & Chatters 30 [MICH, GH, MEXU]) (Hunt 2020).

Tradescantia pexata H.E.Moore Jr., Bailey 8: 100 (1960). TYPE: H.E. Moore Jr. 7750, July 1959 (in flower); 7750 bis, 23 February 1960 (vegetative) (BH) (Moore, Jr. 1960) (Image 3).

Common name: White Velvet, White Gossamer lant, Hairy Wandering Jaw, Cobweb Spiderwort

A tuberous, xerophytic, evergreen perennial herb, 30–40 cm tall. Stem erect to trailing, rooting on the soil surface. Leaves spirally alternate, distichous, fleshy, elliptic-ovate to broadly ovate-lanceolate, 3–7 x 2.0–2.5 cm, upper surface silvery green, turning bright purplish-red under high light conditions, covered with

a dense layer of silvery hairs, undersurface reddish-purple. Inflorescence terminal and usually solitary, often cluster of flowers enclosed by leaf-like bracts. Flowers c. 2 cm across, bright magenta to pink deep rosy-pink, sepals three, more or less transparent forming calyx tube, elliptic to broadly elliptic, petals three, sessile or clawed, equal, free to connate, stamens six, arranged in two series, equal, filaments epipetalous, hairless, ovary glabrous or pubescent, locules 2-ovulate, style straight at anthesis and post-anthesis. Fruit a capsule, subglobose to globose, loculicidal, 3-valved, seeds exarillate, 1–2 per locule.

Flowering & fruiting: June–August.

Chromosome number: Tetraploids, $2n=24$ (Chinnappa 1976).

Ecology: Almost succulent and nearly xerophytic in nature.

Mode of propagation: Can be easily propagated through stem cuttings.

Uses: Grown as indoor pot plants. It can also be grown as a ground cover.

Distribution: Native to Mexico, Italy, USA, Brazil, Spain, Argentina, South Korea, Norway, Chinese Taipei, South Africa, Belgium, Greece, Nicaragua, El Salvador, India. In Bangladesh, it is so far recorded in cultivation only.

Conservation status: *Tradescantia sillamontana* is currently known only in cultivation state; hence no threat has been assessed and is considered as Least Concern.

Easy to recognize by its distinctive feature being the

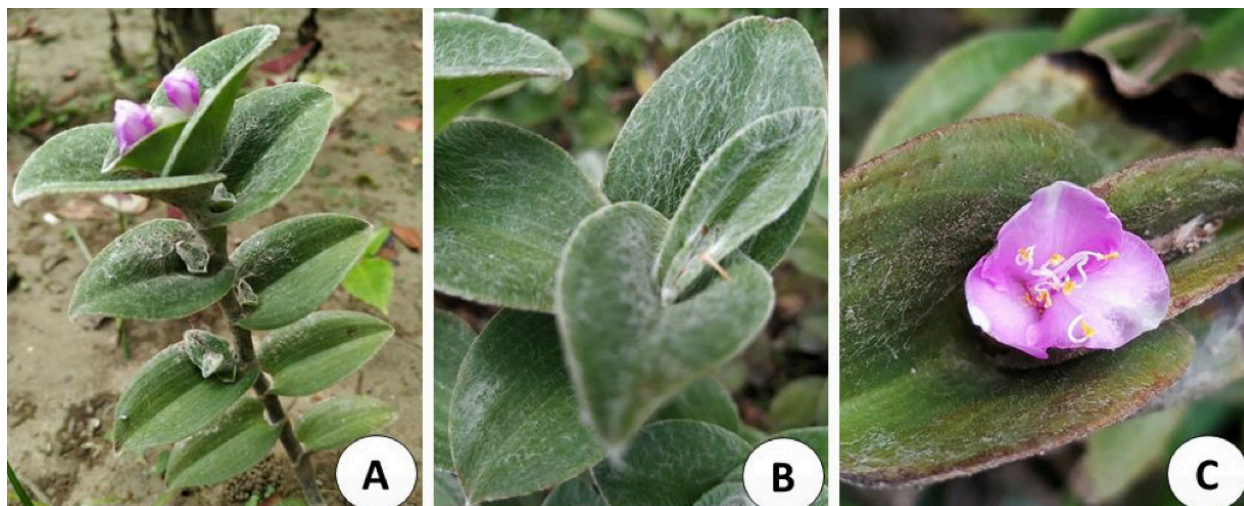


Image 3. *Tradescantia sillamontana*: A—Habit | B—Leaves surface covered with a dense layer of silvery hairs | C—Flower.
© M. Ashrafuzzaman & A.K.M. Golam Sarwar.

leaf surface covered with dense layer of silvery hairs.

Representing specimens examined: Mymensingh, Botanical Garden, Bangladesh Agricultural University, cultivated, 19.vi.21. Ashrafuzzaman & Sarwar (AAHBAU)

REFERENCES

- Alam, M.K. (2007). Commelinaceae R. Brown, pp. 142–162. In: Siddiqui, K.U., M.A. Islam, Z.U. Ahmed, Z.N.T. Begum, M.A. Hassan, M. Khondker, M. M. Rahman, S.M.H. Kabir, M. Ahmad, A.T.A. Ahmed, A.K.A. Rahman & E.U. Haque (eds). *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 11. Angiosperms: Monocotyledons (Agavaceae–Najadaceae). Asiatic Society of Bangladesh, Dhaka.
- Alam, M.K. & S.N. Uddin (2018). Commelinaceae, pp. 352–370. In: Uddin, S.N. & M.A. Hassan (eds.). *Vascular Flora of Chittagong and the Chittagong Hill Tracts Vol. 1*. Bangladesh National Herbarium, Ministry of Environment, Forest & Climate Change, Government of the People's Republic of Bangladesh, Dhaka.
- Anonymous (1996). *Techniques and Procedures for Collecting, Preserving, Processing, and Storing Botanical Specimens*. Research Branch, British Columbia Ministry of Forest, Victoria, B.C. Work Paper 18/1996.
- Ashrafuzzaman, M. & A.K.M.G. Sarwar (2021). Species diversity of Sterculiaceae at Bangladesh Agricultural University Botanical Garden and their ethnobotanical uses. *Asian Journal of Research in Botany* 5: 1–8.
- Ashrafuzzaman, M., M.M. Khatun, N.A. Tunazzina & A.K.M.G. Sarwar (2021). Conservation of minor fruit genetic resources at the Botanical Garden, Bangladesh Agricultural University. *International Journal of Minor Fruits Medicinal & Aromatic Plants* 7: 1–18. <https://doi.org/10.53552/ijmfmap.2021.v07i01.001>
- Chernenko, T.V., N.T. Ul'chenko, A.I. Glushenkova & D. Redzhepov (2007). Chemical investigation of *Callisia fragrans*. *Chemistry of Natural Compounds* 43: 253–255. <https://doi.org/10.1007/s10600-007-0098-x>
- Chinnappa, C.C. (1976). Cytology of *Tradescantia sillamonta*. *Caryologia* 29: 363–367. <https://doi.org/10.1080/00087114.1976.10796511>
- Christenhusz, M.J.M. & J.W. Byng (2016). The number of known plants species in the world and its annual increase. *Phytotaxa* 261(3): 201–217. <https://doi.org/10.11646/phytotaxa.261.3.1>
- Cronquist, A. (1981). *An Integrated System of Classification of Flowering Plants*. New York: Columbia University Press.
- Faden, R.B. (2000). Commelinaceae, pp. 116–196. In: Dassanayake, M.D. & W.D. Clayton (eds). *Revised Handbook to the Flora of Ceylon Vol. 14*. Oxford and IBH Publishing, New Delhi.
- Haque, A.K.M.K., S.A. Khan, S.N. Uddin & S.S. Shetu (2018). An annotated checklist of the angiospermic flora of Rajkandi Reserve Forest of Moulvibazar, Bangladesh. *Bangladesh Journal of Plant Taxonomy* 25(2): 187–207. <https://doi.org/10.3329/bjpt.v25i2.39525>
- Harun-Ur-Rashid, M., S. Islam & S.B. Kashem (2018). Floristic diversity (Magnoliids and Eudicots) of Baraiyadhala National Park, Chittagong, Bangladesh. *Bangladesh Journal of Plant Taxonomy* 25(2): 273–288. <https://doi.org/10.3329/bjpt.v25i2.39532>
- Hossain, M.K. & M.A. Hossain (2014). *Biodiversity of Chunati Wildlife Sanctuary: Flora*. Arannayk Foundation & Bangladesh Forest Department, Dhaka, Bangladesh, v +175pp.
- Hunt, D.R. (2020). *Tradescantia* Commelinaceae, pp. 1183–1187. In: Eggle, U. & R. Nyffeler (eds.). *Illustrated Handbook of Succulent Plants. Monocotyledons*. 2nd ed., Springer-Verlag GmbH, Germany.
- Kammaty, R.V. & R.S. Rao (1961). Notes on Indian Commelinaceae. 3: Cytological observations. *Bulletin of the Botanical Survey of India* 3: 393–394.
- Khan, M.S. & M.K. Alam (1977). Commelinaceae, pp. 13–41. In: Khan, M.S. (ed.). *Flora of Bangladesh. Fasc. No. 4*. Bangladesh National Herbarium, Dhaka.
- Khan, S.A., S. Sultana, G.M. Hossain, S.S. Shetu & M.A. Rahim (2021). Floristic composition of Jahangirnagar University campus - A semi-natural area of Bangladesh. *Bangladesh Journal of Plant Taxonomy* 28(1): 27–60. <https://doi.org/10.3329/bjpt.v28i1.54207>
- Moore, H.E. Jr. (1960). *Tradescantia pexata* (Comelinaceae), a New Species. *Baileya* 8: 98–101.
- Nandikar, M.D., M. Lekhak & R.V. Gurav (2010). Karyotype analysis of a new cytotype of *Callisia fragrans* (Lindl.) Woodson (Comelinaceae). *Nucleus* 53(3): 95–97. <https://doi.org/10.1007/s13237-011-0019-z>
- Rahman, M.A. (2017). Plant diversity in Hazarikhil Wildlife Sanctuary of Chittagong and its conservation management. *Journal of Biodiversity Conservation & Bioresources Management* 3(2): 43–56.
- Rahman, M.R., M.K. Hossain, M.A. Hossain & M.S. Haque (2017). Floristic composition of Madhupur National Park (MNP), Tangail, Bangladesh. *Bangladesh Agriculture* 7(10): 27–45.
- Rahman, M.S., G.M. Hossain, S.A. Khan & S.N. Uddin (2015). An annotated checklist of the vascular plants of Sundarban Mangrove

- Forest of Bangladesh. *Bangladesh Journal of Plant Taxonomy* 22(1): 17–41. <https://doi.org/10.3329/bjpt.v22i1.23862>
- Rao, R.S., G. Panigrahi & R.V. Kammathy (1960). Cytotaxonomic studies on Indian Commelinaceae. *Proceedings of Indian Science Congress 1960*, 366 pp. (Abst.).
- Sarwar, A.K.M. Golam (2019). Plant Biodiversity and Conservation of Higher Plants in Bangladesh: Present Status and Future Prospects, pp. 259–288. In: Sangeetha, J., D. Thangadurai, H.C. Goh & S. Islam (eds.). *Biodiversity and Conservation: Characterization and Utilization of Plants, Microbes and Natural Resources for Sustainable Development and Ecosystem Management*. AAP/CRC, Florida, USA.
- Tan, J.B.L., W.J. Yap, S.Y. Tan, Y.Y. Lim & S.M. Lee (2014). Antioxidant content, antioxidant activity, and antibacterial activity of five plants from the Commelinaceae family. *Antioxidants* 3: 758–769. <https://doi.org/10.3390/antiox3040758>
- Uddin, M.Z., A. Shomrat, M.S. Hasan, M.R. Khan, A.R. Fahad & M. Al-Amin (2021). Evaluation of plant species diversity in the road dividers of Dhaka city. *Bangladesh Journal of Plant Taxonomy* 28(1): 141–154. <https://doi.org/10.3329/bjpt.v28i1.54214>
- Yarmolinsky, L., M. Zaccai, S. Ben-Shabat & M. Huleihel (2010). Anti-Herpetic activity of *Callisia fragrans* and *Simmondsia chinensis* leaf extracts in vitro. *The Open Virology Journal* 4(1): 57–62. <https://doi.org/10.2174/1874357901004010057>



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