ANGIOSPERMS IN NARSINGDI DISTRICT OF BANGLADESH: CLASS LILIOPSIDA

ROBAYDA KHANAM AND SALEH AHAMMAD KHAN

Plant Systematics and Biodiversity Laboratory, Department of Botany, Jahangirnagar University, Savar, Dhaka, Bangladesh

Keywords: Angiosperms; Liliopsida; Narsingdi; Bangladesh.

Abstract

This study provides the taxonomic data on 168 plant species belonging to 96 genera and 23 families of Liliopsida (monocotyledons) extant in Narsingdi district of Bangladesh. These species are mostly comprised of herbs (90.48%), followed by trees and shrubs (4.76% each). Poaceae with 66 species under 37 genera is the best represented family, followed by Cyperaceae with 26 species of seven genera, Araceae with 16 species of 11 genera, Commelinaceae with 11 species of four genera and Arecales with 10 species of eight genera. Cyperus with 13 species appears as the largest genus, which is followed by Paniceae with nine species, Digitaria with six species, and Commelina and Dioscorea with five species each. The six upazilas of this district are 39.77% similar in the species composition of their Liliopsida, but the similarity between the pairs of upazilas varies from 6.45% to 32.31%. Roadside and fallow land habitats share the highest similarity (36.84%) in species composition. Total 117 species are distinguished as economically useful. This study suggests for implementation of necessary measures in order to minimize the major threats to this plant group and to favor its sustainable development in the study area.

Introduction

Narsingdi district, situated in central Bangladesh, is a densely populated industrial area. The plant genetic-, species- and ecosystem diversities of this area might have a tremendous influence on the environment of this region. Nevertheless, the floristic elements and natural vegetation are rapidly decreasing in this district. Most of the areas of this district harboring its flora and plant diversity are being replaced by urbanization with numerous infrastructures, industrialization, habitat fragmentation, agricultural expansion and other human interventions. Considering the current trend of destruction and fragmentation of natural habitats, many plant species might disappear from this area before they are recorded and described.

After Hooker (1872-1897) and Prain (1903), some floristic studies covered the area of the present political boundary of Bangladesh including this district (Siddiqui et al., 2007 and Ahmed et al., 2008). Many other studies were conducted in different areas of this country (Rahman and Hassan, 1995; Islam et al., 2009; Arefin et al., 2011; Rahman et al., 2012; Rahman, 2013; Sarker et al., 2013; Rahman et al., 2015; Haque et al., 2018; Shetu et al., 2018). However, the flora or plant diversity of this district has never been studied before based on detail field inventories and examination of plant specimens, except the checklist of its 468 species of Magnoliopsida (Dicotyledons) recently published by Khanam et al. (2020). Thus, the Liliopsida and other plant groups of this area are left unexplored. Therefore, this study was conducted to fetch the basic taxonomic data on Liliopsida species extant in Narsingdi district, to know their current specific distribution and economic importance, to collect and preserve their representative specimens for future reference, and to identify the existing threats to their species diversity.

*Corresponding author, E-mail: robaydakhanam@yahoo.com
**Materials and Methods**

Narsingdi district, located in between 23°46'N and 24°14'N and 90°35'E and 90°60'E (http://www.narsingdi.gov.bd), is comprised of an area of 1140.76 sq. km (BBS, 2011). The area is administered under six upazilas, namely Belabo, Monohardi, Narsingdi Sadar, Palash, Raipura, and Shibpur. It is composed of mostly plain lands including numerous agricultural fields, many industries, a huge fallow lands, many low and wet lands, some small hills, and densely populated homestead areas. This area includes a total of 89045 hectares of cultivable land and 22154 hectares of fallow land. In this area, the maximum and minimum annual average temperature are 36°C and 12.7°C, respectively, and the annual rainfall is 2376 mm (BBS, 2011). The main rivers crossing this district are Meghna, Arial Khan, Haridhoa, Kalagachhia and Paharia.

This study was based on field data accumulated by thorough taxonomic inventories comprised of 32 field trips conducted in different seasons of 2014-2019 throughout the study area and laboratory data collected through the examination of representative specimens of each plant taxon. The collection, processing, drying and preservation of plant specimens were done following standard herbarium methods and techniques (Bridson and Forman, 1989; Singh and Subramaniam, 2008). All plant specimens of Liliopsida collected from the study area were examined at Plant Systematics and Biodiversity Laboratory of Jahangirnagar University and Bangladesh National Herbarium (DACB). The specimens were identified by consulting taxonomic descriptions and keys available in the relevant literatures (Hooker, 1872-1897; Prain, 1903; Nasir and Ali, 1980-2005; Wu and Raven, 2000; Wu et al., 2006-2010), and by matching with the respective voucher specimens of DACB and Jahangirnagar University Herbarium (JUH). Additionally, the relevant specimen images including those of types available in the web pages of different international herbaria, especially of Royal Botanic Gardens Kew (K), and the Conservatoire et Jardin botaniques de la Ville de Genève (G), and pertinent illustration of Flora of China (Wu and Raven, 2000; Wu et al., 2006-2010) were matched. The voucher specimens of all taxa studied are preserved at JUH.

Recent literatures (Wu and Raven, 2000; Wu et al., 2006-2010; Zuloaga et al., 2008; Jørgensen et al. 2014; Schatz et al., 2020) and nomenclatural databases (The Plant List, 2013; TROPICOS, 2017; IPNI, 2018; Madagascar Catalogue, 2020) were consulted for nomenclatural verification. The common names were collected from Huq (1986), Siddiqui et al. (2007), Ahmed et al. (2008) and through interviews with local people during field visits. In the checklist, the families are arranged following Cronquist (1981), and all genera and species alphabetically (Table 1). However, in case of the Liliaceae taxa, their new combination under three separate families, viz. Hypoxidaceae, Amaryllidaceae and Asparagaceae, and the recent circumscription of Aloaceae under Asphodelaceae, accepted by APG IV System (Angiosperm Phylogeny Group, 2016), are followed. The economic uses of the species were recognized consulting the relevant literatures (Ghani, 1998; Van Valkenburg and Bunyapraphatsara, 2002; Siddiqui et al., 2007; and Ahmed et al., 2008) and through interviews with the local people during the field visits. The similarities in the upazilas of the study area and habitats in species composition were measured by Jaccard coefficient (Jaccard, 1912).

**Results and Discussion**

This study confirmed the current occurrence of total 168 species of monocotyledons (Liliopsida) under 96 genera and 23 families in Narsingdi district. All of these species are presented here in the checklist with habit, habitat, distribution within the study area, and representative specimen examined (Table 1). Among the monocot families documented by this study, only five were represented by more than 10 (10-66) species each and 10 by single species.
Table 1. List of the species of Liliopsida (monocotyledons) extant in Narsingdi district, Bangladesh.

| Scientific name                  | Bangla name | Habit | Habitat | Distribution | Use | RSE (JUH) |
|----------------------------------|-------------|-------|---------|--------------|-----|-----------|
| **Liliopsida Batsch**            |             |       |         |              |     |           |
| **Alismataceae** Vent.           |             |       |         |              |     |           |
| Sagittaria guayanensis Kunth     | Ramkarala,  | Herb, aq | WL    | B, M         | Fd  | Robayda 2635 |
|                                 | Shamakola   |       |         |              |     |           |
| **Hydrocharitaceae** Juss.       |             |       |         |              |     |           |
| Ottelia alismoides (L.) Pers.    | -           | Herb, aq | WL    | R, NS, M     | V   | Robayda 2235 |
| **Najas gracillima** (A. Braun ex Engelm.) Magnus | - | Herb, aq | WL | NS, M, R | FF | Robayda 2372 |
| **Potamogetonaceae** Bercht. & J. Presl | - | Herb, aq | WL | R | - | Robayda 2374 |
| Potamogeton crispus L.           |             |       |         |              |     |           |
| **Areceaceae** Bercht. & J. Presl |             |       |         |              |     |           |
| Areca catechu L.                 | Supari      | Tree  | RS FL, SJ (pl) | All Upazilas | M, T | Robayda 1799 |
| Borassus flabellifer L.          | Tal         | Tree  | RS FL, SJ (pl) | All Upazilas | Fr, M, T, Ju | Robayda 695 |
| Calamus gracilis Roxb.           | Mapuri Bet  | Shrub | SJ, ML, FL | B, M, S | DU | Robayda 2316 |
| C. longisetus Griff.             | Uddom Bet   | Shrub | SJ, FL    | B, NS, M, S | DU | Robayda 48 |
| Caryota urens L.                 | Chau Gota   | Tree  | SJ, FL    | B, M, S | - | Robayda 1083 |
| Cocos nucifera L.                | Narikel     | Tree  | RS FL, ML (pl) | All Upazilas | Fr, T, OI | Robayda 1774 |
| Dypsis lutescens (H. Wendl.) Beentje & J. Dransf. | - | Tree | RS, ML | P | O | Robayda 1272 |
| Elaeis guineensis Jacq.          | -           | Tree  | RS      | P            | OI  | Robayda 1458 |
| Phoenix acuella Roxb.            | Khudi khejur| Tree  | RS, SJ, ML | P, S        | Fr  | Robayda 1647 |
| P. sylvestris (L.) Roxb.         | Khejur      | Tree  | RS, FL, SJ | All Upazilas | Fr  | Robayda 1338 |
| **Pandanaeaceae** R. Br.         |             |       |         |              |     |           |
| Pandanus amaryllifolius Roxb.    | Polao Pata  | Shrub | SJ, FL   | S, M         | Sp  | Robayda 2213 |
| P. foetida Roxb.                 | Keya-kanta  | Shrub | SJ, FL( pl) | M           | -   | Robayda 15 |
| **Araceae** Juss.                |             |       |         |              |     |           |
| Alacasia acuminata Schott        | -           | Herb  | SJ, ML   | B, M, S      | -   | Robayda 85  |
| A. fornicata (Roxb.) Schott      | Salukachu   | Herb  | SJ, FL, ML | S, M, NS | V   | Robayda 1171 |
| A. macrorrhizos (L.) G. Don      | Mankachu, Fankachu | Herb | FL, AF, SJ | B, NS, M | V   | Robayda 2580 |
| Scientific name | Bangla name     | Habit | Habitat     | Distribution | Use | RSE (JUH) |
|-----------------|-----------------|-------|-------------|--------------|-----|-----------|
| Amorphophallus bulbifer (Roxb.) Blume | Janglee Ool     | Herb  | SJ, FL, ML  | B, M, S, NS  | V   | Robayda 2559 |
| Colocasia affinis Schott | -               | Herb  | SJ, FL      | M, S         | -   | Robayda 2225 |
| C. esculenta (L.) Schott | Kachu           | Herb  | RS, FL, ML  | All Upazilas | V   | Robayda 327  |
| C. gigantea (Blume) Hook. f. | Salad Kachu     | Herb  | RS, FL, SJ  | All Upazilas | V   | Robayda 2584 |
| Dieffenbachia seguine (Jacq.) Schott | -               | Herb  | FL, SJ, ML  | P, B         | O   | Robayda 1104 |
| Lasia spinosa (L.) Thwaites | Kanta Kachu     | Herb  | SJ, FL      | M            | V   | Robayda 2496 |
| Lemna perpusilla Torr. | Khudipana       | Herb, aq | WL        | All Upazilas | FF  | Robayda 2681 |
| Pissia striatipes L. | Topa pana       | Herb, aq | WL        | All Upazilas | M   | Robayda 1226 |
| Pothos scandens L. | Batilata         | Herb  | SJ, RS, FL  | S, M, B      | M   | Robayda 49   |
| Scindapsus officinalis (Roxb.) Schott | Gaj-pipul       | Herb  | FL, SJ      | P, M         | M   | Robayda 1569 |
| Syngonium podophyllum Schott | -               | Herb  | FL, SJ, ML  | P, S         | O   | Robayda 1555 |
| Typhonium flagelliforme (Lodd.) Blume | Ghechu          | Herb  | FL, AF, SJ  | P, M, NS     | -   | Robayda 636  |
| T. trilobatum (L.) Schott | Ghetkachu       | Herb  | FL, AF, SJ  | All Upazilas | V   | Robayda 693  |

**Commelinaceae** Mirb.

| Scientific name | Bangla name     | Habit | Habitat     | Distribution | Use | RSE (JUH) |
|-----------------|-----------------|-------|-------------|--------------|-----|-----------|
| Commelina benghalensis L. | Kanchira       | Herb  | RS, FL, ML, SJ | All Upazilas | V, M | Robayda 524 |
| C. diffusa Burm. f. | -               | Herb  | RS, FL, SJ  | P, B         | -   | Robayda 2014 |
| C. erecta L. | Jata kanchira  | Herb  | RS, FL, SJ  | All Upazilas | -   | Robayda 312  |
| C. longifolia Lam. | Pani Kanchira  | Herb  | AF, FL      | R, S         | -   | Robayda 1346 |
| C. suffruticosus Blume | -               | Herb  | SJ, RS, FL  | NS           | -   | Robayda 2803 |
| Cyanotis axillaris (L.) D. Don ex Sweet | -               | Herb  | AF, SJ, RS  | B, R         | -   | Robayda 1206 |
| C. cristata (L.) D. Don | -               | Herb  | AF, RS, FL  | P, S         | -   | Robayda 2849 |
| Flossoeca scandens Lour. | -               | Herb  | FL, SJ      | P, S         | -   | Robayda 2324 |
| Murdannia loriformis (Hask.) R.S. Rao & Kannamthy | Kandul/Kureli | Herb  | RS, FL      | NS, B        | -   | Robayda 728  |
| M. nudiflora (L.) Brenan | -               | Herb  | RS, FL      | All Upazilas | -   | Robayda 1954 |
| Scientific name                          | Bangla name | Habit | Habitat | Distribution | Use | RSE (JUH)  |
|----------------------------------------|-------------|-------|---------|--------------|-----|------------|
| *M. spirata* (L.) G. Brückn.           | -           | Herb  | RS, FL  | P            | -   | Robayda 1205 |
| **Cyperaceae** Juss.                   |             |       |         |              |     |            |
| *Bulbostylis barbata* (Rottb.) C.B. Clarke | -           | Herb  | ML, RS  | P            | SB  | Robayda 2979 |
| *Cyperus alopecuroides* Rottb.         | -           | Herb  | WL, ML  | P            | -   | Robayda 2858 |
| *C. compressus* L.                     | Chanch      | Herb  | AF, FL, RS | All Upazilas | -   | Robayda 496 |
| *C. cuspidatus* Kunth                  | -           | Herb  | WL, RS, FL, AF | NS, B, M | -   | Robayda 181 |
| *C. cyperoides* (L.) Kuntze            | -           | Herb  | WL, AF, FL | R, B         | -   | Robayda 2987 |
| *C. diffusum L.*                       | Behua       | Herb  | AF, WL, ML, FL | All Upazilas | -   | Robayda 914 |
| *C. digitatus* Roxb.                   | -           | Herb  | WL, AF, ML | S            | -   | Robayda 540 |
| *C. distans* L. f.                     | Pani Malanga | Herb  | AF, WL, RS | All Upazilas | -   | Robayda 1637 |
| *C. exaltatus* Retz.                   | -           | Herb  | RS, AF, WL | All Upazilas | -   | Robayda 125 |
| *C. haspan* L.                        | -           | Herb  | WL, AF, FL | S, NS, R     | -   | Robayda 192 |
| *C. imbricatus* Retz.                  | Burethi     | Herb  | WL, AF, FL | NS           | DU  | Robayda 2056 |
| *C. iria* L.                           | Barachucha  | Herb  | WL, AF   | B, M, P      | DU  | Robayda 1678 |
| *C. procerus* Rottb.                   | -           | Herb  | FL, WL, AF | NS           | DU  | Robayda 465 |
| *C. rotundas* L.                       | Mutha       | Herb  | RS, FL, ML | NS, S        | M   | Robayda 472 |
| *Eleocharis dulcis* (Burm. f.) Trin. ex Hensch. | -       | Herb  | WL       | R            | -   | Robayda 3025 |
| *Fimbriatya acuminata* Vahl            | -           | Herb  | WL, RS   | S, M, NS     | -   | Robayda 170 |
| *F. dichotoma* (L.) Vahl               | -           | Herb  | AF, WL   | S, M         | -   | Robayda 621 |
| *F. ferruginea* (L.) Vahl              | -           | Herb  | AF, WL, ML | NS           | SB  | Robayda 2049 |
| *F. quinquaedalis* (Vahl) Kunth        | Bara javani | Herb  | AF, WL   | NS, S, M, B  | -   | Robayda 172 |
| *Kyllinga brevifolia* Rotth.           | -           | Herb  | FL, AF, RS | M, P, S, R  | Fd  | Robayda 970 |
| *K. nemoralis* (J.R. Forst. & G. Forst.) Dandy (Dandy) ex Hutch. & Dalziel | -       | Herb  | RS, FL   | All Upazilas | -   | Robayda 323 |
| *K. odorata* Vahl                      | -           | Herb  | RS, FL   | All Upazilas | -   | Robayda 2390 |
| Scientific name                          | Bangla name | Habit | Habitat | Distribution | Use | RSE (JUH) |
|------------------------------------------|-------------|-------|---------|--------------|-----|-----------|
| Pyreus pumilus (L.) Nees                 | -           | Herb  | WL      | S            | SB  | Robayda 191|
| *P. stramineus* C.B.Clarke              | -           | Herb  | RS, FL  | NS, M        | -   | Robayda 2723|
| Schoenoplectus juncoides (Roxb.) Palli  | -           | Herb  | WL, AF, ML | P        | -   | Robayda 1440|
| *S. supinus* (L.) Palla                  | -           | Herb  | AF, WL, FL | S        | -   | Robayda 180 |
| Poaceae Barnhart                        |             |       |         |              |     |           |
| *Apluda matica* L.                      | -           | Herb  | RS, SJ, ML | R        | Fd  | Robayda 3078|
| *Arundo donax* L.                       | Nal         | Herb  | FL, ML  | All Upazilas | Fd, DU | Robayda 625 |
| *Axonopus compressus* (Sw.) P. Beauv.   | Carpet grass | Herb | RS, FL, ML | All Upazilas | SB  | Robayda 214 |
| *Bambusa baicooa* Roxb.                 | Borak Bans  | Herb  | SJ, FL  | All Upazilas | DU  | Robayda 1319|
| *B. jaintiana* Majundar                  | Tengra bans/Chip bans | Herb | SJ, FL  | S, M, B    | DU  | Robayda 2228|
| *B. nutans* Wall. ex Munro              | Mahal Bans  | Herb  | SJ, RS  | M, B, S    | DU  | Robayda 72 |
| *B. vulgaris* Schrad. ex J.C. Wendl.    | Jaoa Bans   | Herb  | SJ      | S          | DU  | Robayda 2227|
| *Brachiaria brianzanka* (Hochst. ex A. Rich.) Staph | -          | Herb  | AF      | R          | SB, Fd | Robayda 3135|
| *B. distachya* (L.) Staphf               | Cori ghas   | Herb  | FL, ML  | P, B        | SB, Fd | Robayda 892|
| *B. kurzii* (Hook. f.) A. Camus          | -           | Herb  | RS, SJ  | R          | Fd  | Robayda 3026|
| *Cenotoceras lappacea* (L.) Desv.        | -           | Herb  | RS, WL  | S          | Fd  | Robayda 59 |
| *Chloris barbata* Sw.                    | -           | Herb  | RS, FL, AF | P        | Fd  | Robayda 598|
| *C. virgata* Sw.                        | -           | Herb  | RS      | NS         | Fd  | Robayda 559 |
| *Chrysopogon aciculatus* (Retz.) Trin.   | Premkanta   | Herb  | RS, FL  | S, R       | SB, DU | Robayda 1822|
| *C. zizanioides* (L.) Roberty            | Bena, Bena-mul | Herb | ML, FL  | NS, R       | OI, DU | Robayda 2381|
| *C. fulves* (Spreng.) Chiov.            | -           | Herb  | RS, FL  | P          | Fd  | Robayda 288|
| *Coix lacerma-jobi* L.                   | Kaich Gota  | Herb  | FL, SJ  | B, M       | Fd  | Robayda 2596|
| *Cymodon dactylon* (L.) Pers.            | Durbaghnas  | Herb  | RS, FL  | All Upazilas | Fd  | Robayda 290|
| *Cytococcus oxyphyllum* (Hochst. ex Steud.) Staphf | -          | Herb  | SJ, FL  | M          | Fd  | Robayda 1058|

Khanam and Khan
| Scientific name                              | Bangla name | Habit | Habitat | Distribution | Use | RSE (JUH) |
|---------------------------------------------|-------------|-------|---------|--------------|-----|-----------|
| Dactyloctenium aegyptium (L.) Willd.        | Makra       | Herb  | AF, FL  | NS, R        | Fd  | Robayda 2724 |
| Digitaria bicornis (Lam.) Roem. & Schult.   | -           | Herb  | RS, SJ  | NS, P, R     | Fd  | Robayda 280 |
| D. ciliaris (Retz.) Koeler                  | -           | Herb  | RS, FL, AF| NS           | Fd  | Robayda 2053 |
| D. ischaemum (Schreb.) Muhl.                | -           | Herb  | FL, AF  | P            | -   | Robayda 2985 |
| D. sanguinalis (L.) Scop.                   | Makunjali   | Herb  | FL, RS, AF | P, S, M     | Fd  | Robayda 161 |
| D. setigeru Roth                            | -           | Herb  | RS, FL, ML | P, NS      | Fd  | Robayda 291 |
| D. ternata (A. Rich.) Stapf                 | -           | Herb  | RS, FL  | NS, B        | Fd  | Robayda 543 |
| Echinochloa colona (L.) Link                | Shama Ghas  | Herb  | RS, AF, FL, ML | All Upazilas | -   | Robayda 538 |
| Eleusine indica (L.) Gaertn.                 | Ghora Dubboher | Herb  | RS, FL, AF| All Upazilas | SB  | Robayda 182 |
| Eragrostis ciliaris (All.) Vignolo ex. Janch.| -            | Herb  | RS, SJ  | S            | Fd  | Robayda 3095 |
| E. ciliaris (L.) R. Br.                     | -           | Herb  | RS, FL  | S            | Fd  | Robayda 410 |
| E. tenella (L.) P. Beauv. ex Roem. & Schult. | Koni Ghas   | Herb  | RS, AF, FL | All Upazilas | Fd  | Robayda 1938 |
| E. unioides (Retz.) Nees                    | -           | Herb  | RS, FL  | All Upazilas | Fd, GM | Robayda 2929 |
| Eriochloa procera (Retz.) C.E. Hubb.        | -           | Herb  | RS, FL  | All Upazilas | Fd  | Robayda 3068 |
| Hygropyza aristata (Retz.) Nees ex Wight & Arn. | -       | Herb  | RS, FL  | All Upazilas | Fd  | Robayda 3065 |
| Ichnanthus pallens (Sw.) Munro ex Benth.    | -           | Herb  | RS, FL  | All Upazilas | Fd  | Robayda 2665 |
| Imperata cylindrica (L.) Rauesch.            | Chhan       | Herb  | RS, FL  | All Upazilas | SB  | Robayda 683 |
| Isanche globosa (Thumb.) Kuntze             | -           | Herb  | AF, FL  | M            | Fd  | Robayda 1137 |
| Leersia hexandra Sw.                        | Arali ghas  | Herb  | RS, FL, ML | P, S       | Fd  | Robayda 702 |
| Leptochloa chinensis (L.) Nees              | -           | Herb  | RS, FL  | M, R, P      | Fd  | Robayda 1900 |
| Opismenus burmanni (Retz.) P. Beauv.        | -           | Herb  | RS, FL  | M, R, P      | Fd  | Robayda 1900 |
| O. compositus (L.) P. Beauv.                | Gohur       | Herb  | RS, FL  | M, P         | -   | Robayda 1565 |
| Oryza sativa L.                             | Dhan        | Herb  | RS, FL, ML | P, B      | -   | Robayda 2183 |
| Panicum brevifolium L.                      | -           | Herb  | RS, FL  | P, R         | Fd  | Robayda 3136 |
| P. humile Steud.                            | -           | Herb  | RS, FL  | P, R         | Fd  | Robayda 3136 |
| Scientific name                                      | Bangla name | Habit | Habitat | Distribution | Use | RSE (JUH) |
|------------------------------------------------------|-------------|-------|---------|--------------|-----|-----------|
| P. incomplex Trin.                                   | -           | Herb  | FL, ML  | R, NS        | -   | Robayda 2388 |
| P. luzonense J. Preisl                              | -           | Herb  | FL      | B            | -   | Robayda 2819 |
| P. maximum Jacq.                                    | Gini ghas   | Herb  | AF, FL  | S            | Fd  | Robayda 184 |
| P. notatum Retz.                                     | -           | Herb  | RS, SJ, AF | NS, P, R     | -   | Robayda 701 |
| P. paludosum Roxb.                                   | Borali      | Herb  | WL, ML  | P            | -   | Robayda 682 |
| P. repens L.                                        | -           | Herb  | RS, SJ  | P            | -   | Robayda 2988 |
| P. milicaceous L.                                   | -           | Herb  | RS, AF  | S            | Fd  | Robayda 216 |
| Paspalidium flavidum (Retz.) A. Camus               | Karin Ghas  | Herb  | RS, FL  | P, NS        | Fd  | Robayda 740 |
| Paspalum distichum L.                               | -           | Herb  | ML, WL  | P, NS        | SB  | Robayda 2984 |
| P. scrobiculatum L.                                 | Goicha      | Herb  | FL, WL  | NS, S, P     | M   | Robayda 217 |
| Phragmites karka (Retz.) Trin. ex Steud.            | Nalkhagra   | Herb  | ML, WL  | NS           | Fd  | Robayda 483 |
| Rottboellia cochinchinensis (Lour.) Clayton          | Bara Swati  | Herb  | AF, RS  | NS, R        | -   | Robayda 2052 |
| Saccharum officinarum L.                            | Aakh        | Herb  | ML      | P, NS        | Ju, Sg | Robayda 751 |
| Saccoiolepis indica (L.) Chase                      | -           | Herb  | RS, FL  | S            | Fd  | Robayda 219 |
| S. interrupta (Wild.) Stapf.                        | -           | Herb  | FL, AF  | P            | Fd  | Robayda 2996 |
| S. myosuroides (R. Br.) Chase ex E.G. Camus         | -           | Herb  | ML, AF  | P            | -   | Robayda 725 |
| Setaria barbata (Lam.) Kunth                        | -           | Herb  | RS, ML  | S            | -   | Robayda 218 |
| Sorghum bicolor (L.) Moench                         | Dedhan, Jowar | Herb  | AF (cu) | NS           | FG  | Robayda 2061 |
| Sporobolus dianthus (Retz.) P. Beauv.               | Bina Joni   | Herb  | RS, AF  | B, NS        | Fd  | Robayda 2387 |
| S. indicus (L.) R. Br.                              | -           | Herb  | RS, AF  | S            | -   | Robayda 1495 |
| Urochloa setigera (Retz.) Stapf                     | -           | Herb  | RS, AF  | R, S         | -   | Robayda 2897 |
| Zea mays L.                                         | Bhutta      | Herb  | AF (cu) | NS           | FG  | Robayda 2433 |
| Bromeliaceae Juss.                                  |             |       |         |              |     |           |
| Ananas comosus (L.) Merr.                           | Anarash     | Herb  | RS (cu) | NS           | Fr, M | Robayda 1502 |
| Musaceae Juss.                                      |             |       |         |              |     |           |
| Musa paradisiaca L.                                 | Kola        | Herb  | RS, AF  | All Upazilas | Fr  | Robayda 1782 |
| Scientific name                                      | Bangla name | Habit | Habitat | Distribution | Use | RSE (JUH)  |
|------------------------------------------------------|-------------|-------|---------|--------------|-----|------------|
| Zingiberaceae Martinov                               |             |       |         |              |     |            |
| Alpinia zerumbet (Pers.) B.L. Burtt & R.M. Sm.      | Bara Elachi | Herb  | SJ, FL  | B            | O   | Robayda 2418 |
| Curcuma longa L.                                     | Halad       | Herb  | AF, FL (cu) | P, S  | Sp  | Robayda 791  |
| C. zedoaria (Christm.) Roscoe                       | Shoti       | Herb  | RS, FL, SJ | B, M  | BF, M | Robayda 2302 |
| Hedychium coronarium J. Koenig                      | Dolon Chapa | Herb  | ML, FL  | M            | O, M | Robayda 2510 |
| Zingiber officinale Roscoe                          | Ada         | Herb  | FL, ML (cu) | All Upazilas | Sp, M | Robayda 1036 |
| Z. zerumbet (L.) Roscoe ex Sm.                       | Bon Ada     | Herb  | SJ, RS  | B, M         | M   | Robayda 2649 |
| Costaceae Nakai                                     | Keomul      | Herb  | RS, SJ  | M, B, R      | M   | Robayda 1874 |
| Chellocostus speciosus (J. Koenig) C.D. Specht      |             |       |         |              |     |            |
| Cannaceae Juss.                                     |             |       |         |              |     |            |
| Canna indica L.                                     | Kalabati    | Herb  | RS, FL  | All Upazilas | O, M | Robayda 655  |
| Marantaceae R. Br.                                  |             |       |         |              |     |            |
| Maranta arundinacea L.                              | Shitalpati  | Herb  | ML, RS  | B, M         | BF, DU | Robayda 2617 |
| Schumannianthus dichotomus (Roxb.) Gagnep.          | Tikhur Ararut | Herb  | ML, FL  | M            | DU  | Robayda 2530 |
| Pontederiaceae Kunth                                |             |       |         |              |     |            |
| Eichhornia crassipes (Mart.) Solms                  | Kachuripana | Herb, aq | WL      | All Upazilas | GM, Fd | Robayda 1012 |
| Monochoria hastata (L.) Solms                       | Baranukha   | Herb  | WL, AF  | P, M, S, R   | -   | Robayda 197  |
| M. vaginalis (Burm. f.) C. Presl                    | Chhotonukha | Herb  | WL, AF  | R            | M   | Robayda 3118 |
| Hyposidaceae R. Br.                                 |             |       |         |              |     |            |
| Curculigo orchioides Gaertn.                        | Talmuli     | Herb  | SJ      | B, M, P      | M   | Robayda 57  |
| Asphodelaceae Juss.                                 |             |       |         |              |     |            |
| Aloe vera (L.) Burm. f.                             | Gritakumari | Herb  | FL (pl) | NS, M        | O, M | Robayda 2504 |
| Scientific name                                      | Bangla name  | Habit | Habitat | Distribution | Use | RSE (JUH) |
|------------------------------------------------------|--------------|-------|---------|--------------|-----|-----------|
| **Amaryllidaceae** J. St.-Hil.                       |              |       |         |              |     |           |
| *Allium cepa* L.                                      | Peaj         | Herb  | AF, ML  | P, R, S      | V, Sp | Robayda 1479 |
| *A. sativum* L.                                       | Rasun        | Herb  | AF, ML  | P            | Sp, M | Robayda 1603 |
| *Crinum asiaticum* L.                                 | Sukhdatshan  | Herb  | FL, SJ  | P, M         | O, M | Robayda 754  |
| *Zephyranthes carinata* Herb.                         | Golapi Ghasphul | Herb | RS, FL  | B, P, NS     | O    | Robayda 2503 |
| **Asparagaceae** Juss.                                |              |       |         |              |     |           |
| *Asparagus racemosus* Wildl.                          | Shatamuli    | Herb  | RS, ML  | NS           | M    | Robayda 475  |
| *Cordyline fruticosa* (L.) A. Chev.                   | Patabahar    | Shrub | FL (pl) | M, B         | O    | Robayda 1733 |
| *Dracaena reflexa* Lam.                               | -            | Shrub | RS, SJ  | NS, M        | O    | Robayda 2457 |
| *D. spicata* Roxb.                                    | -            | Shrub | SJ, RS, FL | B, S | -       | Robayda 2190 |
| *Sanseveria trifasciata* Prain                        | Sutahara     | Herb  | RS, FL  | B, NS        | M    | Robayda 1499 |
| **Smilacaceae** Vent.                                 |              |       |         |              |     |           |
| *Smilax ovalifolia* Roxb. ex D. Don                    | Kumariilata  | Shrub, cl | SJ, FL | M, B        | M    | Robayda 2189 |
| **Dioscoreaceae** R. Br.                              |              |       |         |              |     |           |
| *Dioscorea alata* L.                                   | Chupri alu   | Herb, tw | RS, SJ | M, NS       | V    | Robayda 1037 |
| *D. bulbifera* L.                                     | Mou Alu      | Herb, tw | RS, SJ, FL | All Upazilas | V    | Robayda 2322 |
| *D. hamiltonii* Hook. f.                              | Thakan budo  | Herb, tw | SJ, FL | S, M        | V    | Robayda 128  |
| *D. kamoensensis* Kunth                               | Erabera Lata | Herb, tw | SJ, RS | All Upazilas | -   | Robayda 2630 |
| *D. pentaphylla* L.                                   | Jhum Alu/Kanta Alu | Herb, tw | SJ, RS, FL | R, B, P | V    | Robayda 2401 |
| **Orchidaceae** Juss.                                 |              | Herb  | SJ, FL  | M, P, S     | O    | Robayda 563  |
| *Geodorum densiflorum* (Lam.) Schltr.                  | -            |       | SJ, FL  | M, P, S     | O    | Robayda 563  |

**LEGEND:** Habit. aq = aquatic, cl = climbing, tw = twiner. Habitat. AF = Agricultural Field, FL = Fallow Land, ML = Marginal Land, RS = Roadsides, SJ = Scrub Jungle, WL = Wet Land, cu = Cultivated, Pl = Planted. Distrib. = Distribution. B = Belabo, M = Monohordi, NS = Narsingdi Sadar, P = Palash, R = Raipura, S = Shibpur. Use. BF = Baby Food, DU = Domestic Use, Fd = Fodder, FF = Fish Feed, FG = Food Grain, Fr = Fruit, GM = Green Manure, Ju = Juice Yielding, M = Medicine, O = Ornamental, Ol = Oil, SB = Soil Binder, Sg = Sugar, Sp = Spice, T = Timber and V = Vegetable, RSE = Representative Specimens Examined.
Poaceae with 66 species of 37 genera was appeared as the largest family in the study area, followed by Cyperaceae with 26 species of seven genera, Araceae with 16 species of 11 genera, Commelinaceae with 11 species of four genera and Arecales with 10 species of eight genera. *Cyperus* L. comprising 13 species was the best-represented monocot genus in this area, which was followed by *Panicum* L. with nine species, *Digitaria* Haller with six species, *Commelina* L. and *Dioscorea* L. with five species each. Rest of the families of the study area were consisted of two or three species each. Most of the species (152 species; 90.48%) were herbs, and trees and shrubs comprised only eight species (4.76%) each. The fallow lands harboring the highest number of species (102 species) comprised the most common type of habitat for the monocots in the study area that were followed by roadsides (80 species), scrub jungles (56 species), agricultural fields (55 species), marginal lands (42 species) and wetlands (36 species). Thus, these data indicate that Narsingdi district is still rich in monocotyledonous species and most of which are herbs and grow in fallow lands and roadsides.

The similarities between the habitats of the study area in species composition, measured by Jaccard coefficient (Fig. 1), shows that roadside and fallow land habitats share the highest similarity (36.84%), whereas the roadsides and wetland the lowest (4.5%). The similarity in species composition in between other pairs of habitats fluctuates from 4.5% (Roadside and Wetland) to 36.84% (Fallow land and Scrub jungle).

| Similarities in Species Composition |
|------------------------------------|
| Wetland & Agri. Field               |
| Wetland & Fallow land              |
| Marginal land & SJ                 |
| Marginal land & Agri. Field         |
| Marginal land & Fallow land         |
| Marginal land & Wetland             |
| Agri. field & Scrub jungle          |
| Fallow land & Scrub jungle          |
| Fallow land & Agri. field           |
| Roadside & Scrub jungle             |
| Roadside & Agri. field              |
| Roadside & Wetland                  |
| Roadside & Marginal land            |
| Roadside & Fallow land              |

Fig. 1. Similarity in species composition in different habitats of Narsingdi district based on Jaccard coefficient (Jaccard, 1912).

In Narsingdi district, total 35 species, were commonly distributed in its all upazilas, 48 species in two upazilas, 27 species in three upazilas and only five species in four upazilas. 14 species were exclusively present in Palash, 12 in Shibpur, 11 in Narsingdi Sadar, seven in Raipura, six in Monohordi and only three in Belabo upazila. Monohordi upazila accommodated total 84 species, which was followed by Palash, Shibpur, Narsingdi Sadar, Belabo and Raipura upazilas harboring 81, 80, 79, 72 and 64 species, respectively. These data conclude that the monocot flora is richer in Palash, Belabo, Monohordi, and Shibpur upazilas, in comparison to that of Narsingdi Sadar and Raipura upazilas. However, if these species enumerations are considered in term of total
land areas of these upazilas, then their sequence turns in to Palash, followed by Belabo, Monohordi, Shibpur, Narsingdi Sadar, and Raipura upazilas. According to the data from Jaccard coefficient (Fig. 2), all of the six upazilas of Narsingdi district shares 39.77% similarity in their species composition, which indicates that the species composition in these upazilas are more different rather than similar. However, if the similarity is compared in between any pair of the upazilas only, it fluctuates remarkably, from 6.45% (in Belabo and Raipura upazilas) to 32.31% (in Monohordi and Belabo upazilas).

Fig. 2. Similarity in species composition in the upazilas of Narsingdi district based on Jaccard coefficient (Jaccard, 1912).

The enumeration of monocotyledonous species from the upazilas of Narsingdi district seems higher than that from some upazilas of few other districts reported by the previous studies (Islam et al., 2009; Rahman et al., 2012; Rahman et al., 2013; Sarker et al., 2013; Sajib et al., 2014; Mahmudah et al., 2017; Rahman et al., 2019). Considering the size of the study area, the monocotyledonal flora of whole Narsingdi district appears richer in comparison to those of Patuakhali district, Swandip Island and Rajshahi district, as reported by Sultana (2012), Sajib et al. (2015) and Rahman (2013), respectively, or even to that of mangrove forests (Rahman et al., 2015). Whereas, the monocotyledons of this district documented by this study is relatively poorer than those of few forest areas, viz. Sitapahar Reserve Forest (Uddin et al., 1998; Rashid and Chowdhury, 2013), Satchari National Park (Arefin et al., 2011), and Rajkandi Reserve Forest (Haque et al., 2018). The total number of monocot species (168) recorded from Narsingdi district is 17% of the total 988 species and that of monocot families (23) is 56.10% of the total 41 families reported for Bangladesh by Siddiqui et al. (2007) and Ahmed et al. (2008). It indicates that this floristic element of the study area is not negligible, though these proportions will be lower if the flora of Bangladesh is explored completely.

Most of the monocot species (117 species) recorded from the study area are economically useful. Majority of these species are useful as fodder (39 species) and medicinal (22 species), followed by domestic purpose (14 species), vegetable (13 species), ornamental (12 species), soil binding (nine species), spice (five species), oil yielding (four species), timber, fruit and food grain
(three species each), and juice yielding, green manure, baby food and fish feed (two species each). Among these species, 24 can be useful in two to three categories. These data show that the monocot species of the study area can notably contribute in socio-economic purposes and favor sustainable development in the region.

The study area harbored many aquatic habitats of different categories (ponds, beels, jheels, low lands, rivers), which appeared suitable for some common monocot species (Eichhornia crassipes, Sagittaria guayanensis, Ottelia alismoides, Pistia stratiotes, Lemma perpusilla, Hygroryza aristata, Phragmites karka) and most of them flourished there vigorously. Some species (Axonopus compressus, Cynodon dactylon, Commelina benghalensis, Colocasia esculenta, Murdania nudiflora, Eleusine indica, Bambusa balcooa, Bambusa nutans, Imperata cylindrica, Curcuma zedoaria, Eragrostis unioloides, Echinochloa colona) were commonly distributed among the upazilas of the study area with normal natural regeneration. In contrast, Geodorum densiflorum, Curculigo orchioides, Phoenix acaulis, Bulbostylis barbata, Apluda mutica, and Lasia spinosa were occasionally found in this area and assumed to be declining because of their poor regeneration.

The major functional threats to the flora of the study area identified during this study are (1) vegetation clearing, industrialization, unnecessary firing, unplanned agricultural extension, over exploitation of natural resources through multifarious human interferences; (2) habitat fragmentation and depletion as the consequence of various anthropogenic activities and few natural events; (3) soil erosion due to clearing of vegetation cover, heavy rainfall and flood; (4) invasion of some exotic species, viz. Acacia auriculiformis A. Cunn. ex Benth., Chromolaena odorata (L.) R.M. King & H. Rob., Eichhornia crassipes, Eucalyptus camaldulensis Dehn., Mikania cordata (Burm. f.) B.L. Rob. and Parthenium hysterophorus L; (5) poor regeneration in some species (Geodorum densiflorum, Curculigo orchioides, Phoenix acaulis); (6) lack of awareness in the local people about the importance and conservation of plant diversity; and (7) lack of proper management programs in favor of natural regeneration and conservation of plant diversity. Considering these facts, this study suggests to conduct adequate inventories, monitoring and research programs on the flora and plant diversity of this district for knowing and improving their status and to implement appropriate conservation measures and management programs in favor of the depleting plant genetic resources of this area in order to contribute for sustainable development there.

This study provides important taxonomic data on the monocotyledonous species growing in Narsingdi district naturally. These information might be useful as the guiding database to track the trend of changes in species composition, diversity and vegetation of this plant group in course of time due to natural and anthropogenic stresses, contribute in studying animal diversity dependent on monocotyledonous species directly or indirectly, in undertaking appropriate biodiversity conservation initiatives and plant resource-based socioeconomic development and help in monitoring and estimating the impacts of climate change in this area.

Acknowledgements

The authors gratefully acknowledge the University Grants Commission of Bangladesh for awarding the PhD Fellowship to the first author for conducting her research including this study. They are grateful to the authority of Bangladesh National Herbarium (DACB) for allowing access to their libraries and relevant herbarium materials. The authors are also thankful to the Reviewers of the Journal for their critical review of the manuscript.
References

Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmed, M., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds). 2008. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 12, Asiatic Society of Bangladesh, Dhaka.

Angiosperm Phylogeny Group. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV”. Botanical Journal of the Linnean Society 181(1): 1–20. DOI:10.1111/boj.12385.

Arefin, M.K., Rahman, M.M., Uddin, M.Z. and Hassan, M.A. 2011. Angiosperm flora of Satchari National Park, Habiganj, Bangladesh. Bangladesh J. Plant Taxon. 18(2): 117–140.

BBS (Bangladesh Bureau of Statistics) 2011. Monthly Statistical Bulletin. Statistics Division, Ministry of Planning, Government of the People’s Republic of Bangladesh.

Bridson, D.M. and Forman, F. 1989. In: Bridson, D.M. and Forman, F. (Eds). The Herbarium Handbook. Royal Botanic Gardens, Kew, pp. 214.

Cronquist, A. 1981. An integrated system of classification of flowering plants. Columbia University Press, New York, pp. 1–1262.

Ghani, A. 1998. Medicinal Plants of Bangladesh with Chemical Constituents and Uses. Asiatic Society of Bangladesh, pp. 1–467.

Haque, A.K.M.K., Khan, S.A., Uddin, S.N. and Shetu, S.S. 2018. An annotated checklist of the Angiospermic flora of Rajkandi Reserve Forest of Moulvibazar, Bangladesh. Bangladesh J. Plant Taxon. 25(2): 187–207.

Hooker, J.D. 1872-1897. The Flora of British India, Vols. 1–7. L. Reeve & Co., Ashford, Kent, UK.

Huq, A.M. 1986. Plant Names of Bangladesh. Bangladesh National Herbarium, BARC, Dhaka, Bangladesh, pp. 1–289.

IPNI 2018. International Plant Names Index. Published on the Internet http://www.ipni.org, The Royal Botanic Gardens, Kew, Harvard University Herbaria & Libraries and Australian National Botanic Gardens. Accessed on 16 September 2018.

Islam, M.R., Uddin, M.Z. and Hassan, M.A. 2009. An Assessment of the Angiospermic Flora of Ramgarh Upazila of Khagrachhari District, Bangladesh. Bangladesh J. Plant Taxon. 16(2): 115–140.

Jaccard, P. 1912. The distribution of the flora of the alpine zone. New Phytologist 11: 37–50.

Jørgensen, P.M., Nee, M.H. and Beck, S.G. (Eds). 2014. Cat. Pl. Vasc. Bolivia, Monogr. Syst. Bot. Missouri Bot. Gard. 127(1–2): i–viii, 1–1744. Missouri Botanical Garden Press, St. Louis.

Khanam, R., Khan, S.A. and Rahim, A. 2020. Angiosperms in Narsingdi district of Bangladesh: Class Magnoliopsida. Bangladesh J. Plant Taxon. 27(1): 153–171.

Madagascar Catalogue, 2020. Catalogue of the Plants of Madagascar. Missouri Botanical Garden, St. Louis, U.S.A. [http://www.tropicos.org/Project/Madagascar. Accessed on 20 August 2020.

Mahmudah, Z., Islam, M.M, Haque, T. and Uddin, M.Z. 2017. Taxonomic Enumeration of Angiosperm Flora of Sreenagar Upazila, Munshiganj, Dhaka, Bangladesh. J. Asiat. Soc. Bangladesh, Sci. 43(2): 161–172.

Nasir, E. and Ali, S.I. (Eds). 1980–2005. Flora of Pakistan, Vols. 1–209. University of Karachi, Karachi, Pakistan.

Prain, D. 1903. Bengal Plants, Vols. 1 and 2. Reprint 1963. Botanical Survey of India, Calcutta.

Rahman, A.H.M.M. 2013. Angiospermic Flora of Rajshahi District, Bangladesh. American Journal of Life Sciences 11(3): 105–112.

Rahman, M.O., Begum, M. and Ullah, M.W. 2013. Angiosperm Flora of Sadar Upazila of Munshiganj District, Bangladesh. Bangladesh J. Plant Taxon. 20(2): 213–231.

Rahman, M.O. and Hassan, M.A. 1995. Angiospermic flora of Bhawal National Park, Gazipur (Bangladesh). Bangladesh J. Plant Taxon. 2(1&2): 47–80.

Rahman, M.O., Antara, R.T., Begum, M. and Hassan, M.A. 2012. Floristic diversity of Dhamrai upazila of Dhaka with emphasis on medicinal plants. Bangladesh J. Bot. 41(1): 71–85.
Rahman, M.O., Sayma, N.J. and Begum, M. 2019. Angiospermic flora of Gafargaon upazila of Mymensingh district focusing on medicinally important species. Bangladesh J. Plant Taxon. 26(2): 269–283.

Rahman, M.S., Hossain, M.G., 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.

Rashid, M.H.U. and Chowdhury, M.A.I. 2013. Additions to the Angiosperm Flora in the Sitapahar Reserve Forest of Kaptai, Rangamati, Bangladesh. Bangladesh J. Plant Taxon. 22(1): 17–41.

Schatz, G. E., Andriambololonera, S., Lowry II, P.P., Phillipson, P.B., Rabarimanarivo, M., Raharilala, J.I., Rajaonary, F.A., Rakotonirina, N., Ramananjahary, R.H., Ramandimbisoa, B., Randrianasolo, A., Ravololomanana, N., Taylor, C.M. and Brinda, J.C. 2020. Catalogue of the Plants of Madagascar. Missouri Botanical Garden, St. Louis, U.S.A. [http://www.tropicos.org/Project/Madagascar. Accessed on 20 July 2020.

Sajib, N.H., Uddin, S.B. and Islam, M.M. 2014. Angiospermic Plant Diversity of Subarnachar Upazila in Noakhali, Bangladesh. J. Asiat. Soc. Bangladesh, Sci. 40(1): 39–60.

Sajib, N.H., Uddin, S.B. and Pasha, M.K. 2015. Angiospermic Plant Diversity of Swandip Island Chittagong, Bangladesh. J. Asiat. Soc. Bangladesh, Sci. 41(2): 133-153.

Sarker, K., Islam, M.R., Uddin, M.Z., and Hassan, M.A. 2013. Angiosperm Flora of Manikgonj Sadar Upazila, Bangladesh. J. Asiat. Soc. Bangladesh, Sci. 39(2): 147–166.

Shetu, S.S., Khan, S.A. and Uddin, S.N. 2018. Checklist of Angiosperms extant in Mirpur area of Dhaka City, Jahangirnagar University J. Biol. Sci. 7(2): 47–64.

Siddiqui, K.U., Islam, M.A., Ahmed, Z.U., Begum, Z.N.T., Hassan, M.A., Khondker, M., Rahman, M.M., Kabir, S.M.H., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds). 2007. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 11. Asiatic Society of Bangladesh, Dhaka, Bangladesh.

Singh, H.B. and Subramaniam, B. 2008. Field Manual on Herbarium Techniques. National Institute of Science Communication and Information Resources, pp. 1–297.

Sultana, M. 2012. Taxonomic and ethnobotanical studies on the angiospermic flora of Patuakhali district In Bangladesh Ph.D. Thesis (Unpublished). Department of Botany, University of Dhaka.

The Plant List. 2013. The Plant List, a working list of all plant species. Version 1.1 <http://www.thepantlist.org/>. Accessed on 01 January 2020.

TROPICOS 2017. Tropicos.org. Missouri Botanical Garden, Saint Louis, Missouri, USA. WWW.tropicos.org. Accessed on 25 August 2020.

Uddin, S.N., Khan, M.S., Hassan, M.A. and Alam, M.K. 1998. An annotated checklist of angiospermic flora of Sitapahar at Kaptai in Bangladesh. Bangladesh J. Plant Taxon. 5(1): 13–46.

Van Valkenburg, J.L.C.H. and Buntiapraphatsara. N. (Eds). 2002. Plant Resources of South–East Asia, No. 12(2). Medicinal and Poisonous Plants 2. Prossea Foundation, Bogor, Indonesia, pp. 1–782.

Wu, Z.Y. and Raven, P.H. (Eds). 2000. Flora of China, Vol. 24. Missouri Botanical Garden Press, St. Louis, USA.

Wu, Z.Y., Raven, P.H. and Hong, D.Y. (Eds). 2006-2010. Flora of China, Vols. 22, 23 and 25. Missouri Botanical Garden Press, St. Louis, USA.

Zuloaga, F.O., Morrone, O., Belgrano, M.J., Marticorena, C. and Marchesi, E. (Eds). 2008. Catálogo de las plantas vasculares del Cono Sur. Monogr. Syst. Bot. Missouri Bot. Gard. 107(1–3): i–xcvi, i–3348.

(Manuscript received on 16 June, 2020; revised on 17 November, 2020)