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DISCOVERY OF THREE ANGIOSPERM NEW RECORDS FOR BANGLADESH FROM LAWACHARA NATIONAL PARK UNDER MOULVIBAZAR DISTRICT

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Abstract

This paper deals with three species of angiosperm new records for Bangladesh from the forest of Lawachara National Park under Moulvibazar district. These are: *Alchornea mollis* Bentham *ex* Müller-Argoviensis, *Ancistrocladus tectorius* (Loureiro) Merrill, and *Ilex glomerata* King. Updated nomenclature, important synonyms, description, ecology, geographical distribution and photographs are provided for each species.

Introduction

Floristic surveys of Bangladesh need to be conducted at a regular interval for getting updated information. In Bangladesh, floristic survey on many areas/ forests/ ecosystems is yet to be completed. Bangladesh National Herbarium (BNH) has been engaged in floristic survey of the country since her establishment. The main mandatory work of BNH is to prepare an inventory of the plant resources for the country. To date, BNH has completed about 40% of total floristic area for exploration as far as plant survey is concerned. The lists are not complete and constantly updated with more exploration and discovery of new species. Conducting floristic survey in an area/forest/ecosystem maximizes the likelihood of locating new species/records and special plant species that may be present. Recently a number of new species and new records were added to the list of Bangladesh flora (*i.e*. Uddin and Hassan, 2009; Khatun *et al*., 2010; Alfasane *et al*., 2010; Mia *et al*., 2011; Rahman *et al*., 2011; Uddin *et al*., 2012; Ara and Hassan, 2012; Rahman and Yusuf, 2012 & 2013; Rahman *et al*., 2014). Those discoveries highlight the need for making intensive efforts for locating, documenting and conserving of such species. Recently, BNH has under taken a number of floristic study programs at different forest areas of the country and Lawachara National Park is one of them.

Lawachara National Park is located in the North-eastern part of Bangladesh under Kamalganj Upazila of Moulvibazar district and the area is managed by Moulvibazar Forest Range of the Sylhet Forest Division. It lies between 24°30´- 24°32´ N and 91°37´- 91°39´ E and covering an area of 1250 ha. Previously, it was a part of West Bhanugach reserve forest (Green, 1990; Ahsan, 2007). In 1996, the area was declared as a national park through a Gazette Notification (PBM (S-3) 7/96/367 on 07 July 1996) under the Forest Act. The topography of Lawachara National Park is mostly undulating with slopes and hillocks. Many water courses (locally called *chara*) pass through and around the numerous hillocks (locally called *tila* of height about 10-30 m). The soils of the park are brown, sandy clay loam to clay loam of Pliocene origin (Stevens, 1986). The area enjoys a moist tropical climate characterized by a period of high precipitation from April to September and five months of relatively dry period from November to March. Average annual precipitation is 3334 mm and average temperature varies between 33.2°C - 13.6°C (Ibrahim *et al*., 2012).

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Lawachara National Park is situated in one of the most flourishing territory of the country. The area originally supported an indigenous vegetation cover of mixed tropical evergreen forest (Alam 1988). However, almost all of the original forest cover has been removed or altered. The old plantations of 1920's have developed a multi-storied structure, including naturally occurring trees, vigorous growth of climbers and undergrowth species. Only few small patches of such natural forests are seen today. The present forest is of a semi-evergreen type and the canopy height varies from 10-30 m. The park is rich in angiosperm diversity. Uddin and Hassan (2010) reported 374 angiosperm species under 264 genera and 84 families from the park area based on their preliminary study. The top canopy of the forest consists of a number of tall tree species (i.e. *Dipterocarpus turbinatus*, *Tectona grandis*, *Artocarpus chaplasha*, *Tetrameles nuduflora*, *Hopea odorata*, *Dillenia pentagyna*, *Lophopetalum fimbriatum*, *Pygeum acuminatum*, *Lagerstroemia speciosa*, and *Ficus variegata*) and the middle canopy consists of a number of evergreen tree species (i.e. *Elaeocarpus floribundus*, *Quercus spicata*, *Castanopsis tribuloides*, *Chukrassia tabularis*, *Ficus racemosa*, *Toona ciliata*, *Aphanamixis polystachia*, *Xylia dolabiformis*). Under the shade of the middle canopy a luxurious growth of herb, shrub, epiphyte and climbers are seen.

The main goal of this floristic survey was to discover new plant species for the country and floristic novelties within the park boundaries. This report describes the methods and results of floristic surveys conducted on Lawachara National Park by the authors.

Materials and Methods

Floristic survey was conducted by the authors at different seasons between 2009 and 2014. All areas of the park were surveyed by walking along the forest trails and springs (*charas*) to record all species encountered. At least one set of voucher specimen of each different species encountered in flowering state was collected, pressed and transported to the BNH for drying. Collection of voucher specimens were conducted in a manner that is consistent with conservation ethics. At each collection, location, date, habit and any other notable ecological characteristics were recorded. Both fresh materials and herbarium specimens were studied to identify the species by the first author using available taxonomic resources *viz.* literatures, herbarium specimens and botanical illustrations. Digital imagery of the species was also used to supplement plant identification and document their habitats. The new records are based on 4 specimens and all of them are deposited at DACB after labeled properly.

Results and Discussion

Two hundred thirty-eight plant specimens were collected from the park area by the authors in the course of their taxonomic study during the period of 2009-2014. In the process, four angiosperm species were encountered for which no herbarium specimens had ever been collected from the country. Later on, those species have been identified as *Alchornea mollis* Bentham *ex* Müller-Argoviensis, *Ancistrocladus tectorius* (Loureiro) Merrill and *Ilex glomerata* King. Three specific taxa in the following list belong to 3 genera and 3 families. Those species are being described here to be new report for Bangladesh as they have never been mentioned in any publication on the flora covering the present territory of Bangladesh (*i.e.* Hooker, 1872-1897; Kurz, 1877; Prain, 1903; Heinig, 1925; Cowan, 1926; Cowan and Cowan, 1929; Kanjilal *et al*., 1934-1940; Raizada, 1941; Datta and Mitra, 1953; Sinclair, 1956; Alam, 1988; Mia and Khan, 1995; Das and Alam, 2001; Rahman 2004a,b and 2008; Hassan, 2008; Habib, 2008).

Detailed taxonomic accounts including photographs of all the species is given below and entries are arranged in alphabetical order.

1. Alchornea mollis Bentham *ex* Müller-Argoviensis, Linnaea 34: 168. 1865. Hook.f., Fl. Brit. India 5: 420. 1887. (**Fig. 1**)

Euphorbiaceae

Stipellaria mollis Bentham, Hooker's J. Bot. Kew Gard. Misc. 6: 3. 1854, not Klotzsch (1848).

Dioecious shrubs or small trees, 3-4 m tall; branchlets gray puberulent. Leaves broadly ovate, cordate to rhomboid or suborbicular, 8-16 × 6-13 cm, base rounded, truncate or shallowly cordate, apex cuspidate-acuminate, margins serrulate to cuspidate-dentate, papery, pellucid-dotted, softly pubescent beneath, abaxially puberulent, palmately 3-nerved with large glands at base, stipels filiform, 3-5 mm long, pilose; stipules lanceolate, 5-6 mm long, pilose; petiole 8-20 cm long. Male inflorescences 1-3 at leafless node, unbranched racemes, puberulent; bracts triangular, 1-2 mm. Male flowers 9-11 per bract; pedicel ca. 1.5 mm long; calyx glabrous, splitting irregularly, ca. 1.5 mm long, subglabrous; stamens 8. Female inflorescences terminal, unbranched racemes, 8-10 cm long, puberulent; bracts lanceolate, 3-5 mm long. Female flowers: pedicel ca. 2 mm long; sepals 5 or 6, lanceolate, 3-4 mm, puberulent, glandular at base; ovary globose, tomentose; styles 3, filiform, 6-8 mm, connate at base. Capsule subglobose, ca. 10 mm in diam., faintly 3-lobed, softly grey tomentose. Seeds compressed-ovoid, ca. 7 mm diameter, rugose. Flowering and fruiting: April-August.

Fig. 1. *Alchornea mollis* Bentham *ex* Müller-Argoviensis

Ecology: Primary and secondary forests, hill valleys and streamsides; between 300-600 m altitude.

Distribution: Bhutan, India, Nepal and China.

Specimen examined: **Moulvibazar**: Harinchara, Srimangal, 24 vi 2014, Bushra Khan and MEH Khokan B3241 (DACB).

Note: Alchornea Swartz is a genus of about 50 species occurring mainly in tropical and subtropical regions of the world (Huaxing and Gilbert, 2008). From Bangladesh, Rahman (2008) listed only one species (*viz. Alchornea tiliifolia* (Benth.) Muell.-Arg.) under the genus.

2. Ancistrocladus tectorius (Loureiro) Merrill, Lingnan Sci. J. 6: 329. 1928. (**Fig. 2**)

Ancistrocladaceae

Bembix tectoria Loureiro, Fl. Cochinch. 1: 282. 1790.

Ancistrocladus carallioides Craib, Bull. Misc. Inform. Kew 1925: 19. 1925.

Ancistrocladus cochinchinensis Gagnepain, Lecomte, Not. Syst. 1: 115. 1909.

Ancistrocladus extensus (Wallich *ex* Planchon) Planch., Arn. Sci. Nat. 3, 13: 318. 1849.

Ancistrocladus hainanensis Hayata, Ic. Pl. Form. 3: 46. 1913.

Ancistrocladus harmandii Gagnepain, Notul. Syst. (Paris) 1: 114. 1909.

Ancistrocladus pinangianus King, J. As. Soc. Beng. 42, II: 137. 1893.

Scandent shrubs or trees, up to 10 m high; branches sympodial with a series of circinate woody hooks. Stipules tiny, mostly caducous with saddlelike scars on branches; Leaves crowded mostly immediately above the second hook, at the end of branchlets, sessile, blades elliptic to obovate-oblong, 7-30 × 3-5 cm, leathery, both surfaces frequently with small, white, orbicular pits, tapering towards the base, apex obtuse, acute or acuminate; nerves 4-8 pairs, midnerve abaxially prominent, impressed adaxially, lateral and reticulate tertiary veins tenuous, slightly prominent on both surfaces. Inflorescence panicle, between the crowded leaves, rarely lateral in the place of a tendril, dichotomously branched, 8-15 cm long. Bracts triangular to ovate, 0.2-2.4 × 0.2-1.5 mm, abaxially eglandular or with 1 or 2 circular glands, margin fimbriate-erose, apex acute. Pedicel 0.3-3.0 mm. Sepals 5, slightly unequal, suborbicular to elliptic-oblong, 3.2-5.5 mm, imbricate, at base shortly decurrent on ovary, outside eglandular or with 1-4 shallowly cupular glands below middle, inside with white orbicular small pits near base, apex rounded. Petals 5, connate basally, suborbicular to obliquely elliptic, 5-6 mm, apex acute, margins usually involute. Stamens in 1 whorl, 5 longer than others; filaments wider basally, dimorphic: shorter ones 0.3-1.2 mm, longer ones 1.1-2 mm. Ovary consisting of three carpels, fully inferior, 1 ovule per cell, basal, ascending with 2 integuments; styles 3, erect, ca. 1 mm; stigmas ca. 0.2 mm. Nut obconic, sides 5-ridged by decurrent margins of accrescent sepals, 5-9 × 5-10 mm in diam.; persistent sepals spreading, narrowly oblong-cuneate to spathulate, unequal, larger 3 sepals 3.3-5.5 × 1.0-2.0 cm, smaller 2 sepals 2-3(-4) × 0.5-1.2(-1.8) cm, veined, apex rounded. Seeds obconical with flat apex ca. 5 mm long. Flowering and fruiting: April-September.

Distribution: India (Andaman and Nicobar Islands), Myanmar, Thailand, Vietnam, China, Cambodia, Indonesia, Laos, Malaysia and Singapore.

Specimen examined: **Moulvibazar**: Lawachara National Park, Kamalganj, 13 v 2009, S.N. Uddin *et al.* N3684 (DACB); Madhabkundo Eco-park; 20 vi 2014; S.N. Uddin *et al.*, N5252 (DACB).

Note: Ancistrocladus Wallich is a genus of about 16-17 species occurring mainly in tropical Africa, India, Sri Lanka, SE Asia (Yinzheng and Gereau, 2007). From Bangladesh, Hassan (2008) listed only one species (*viz. Ancistrocladus wallichii* Planch.) under the genus.

Ecology: Evergreen tropical forests; 500-700 m.

Fig. 2. *Ancistrocladus tectorius* (Loureiro) Merrill.

3. Ilex glomerata King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 64: 135. 1895. (**Fig. 3**)

Aquifoliacea

Evergreen trees, up to 15 m tall; branchlets slender, longitudinally ridged and sulcate, glabrous or glabrescent; terminal buds narrowly conical. Leaves oblong or oblong-elliptic, rarely ovate-elliptic, 6-12 × 2-4 cm, base obtuse, cuneate, or rarely rounded, apex acuminate, acumen 8-15 mm, margins serrate or weavy, olivaceous when dry, shiny, leathery, both surfaces glabrous, midnerves impressed and glabrous above, lateral veins 8-10 pairs, raised beneath; stipules very minute, obscure; petiole 8-15 mm long, narrowly sulcate above, glabrous. Inflorescences fasciculate cymes, axillary, on second year's branchlets; bracts ovate, ciliate. Male inflorescences 1-3-flowered cymes, peduncles ca. 1 mm long; pedicels 1-2 mm long; bracteoles 2, basal, deltoid, ciliate. Male flower: calyx patelliform, ca. 2 mm in diameter, deeply 4-lobed, lobes deltoid or suborbicular, ciliate; corolla 7-8 mm in diameter, petals oblong, ca. 3.5 × 2.0 mm, basally slightly connate; stamens as long as petals, anthers oblong, ca. 1 mm long; rudimentary ovary subglobose, apex obtuse or subglobose. Female flowers: calyx 4-lobed; petals 4; staminodes sagittate or cordate, isomerous, alternating with petals, epipetalous; ovary superior, ovoid, 4-8-loculed, rarely pubescent; style rarely developed; stigma capitate, discoid, or columnar. Infructescences 1-fruited cymes; fruiting pedicels 1-3 mm long. Fruit a globose berry, 7-8 mm in diameter, red when ripe; persistent calyx explanate, ca. 2 mm in diameter, ciliate; persistent stigma flattened, discoid or navel-like. Pyrenes 4, oblong or subglobose, 5-7 × 4-5 mm, both ends obtuse, palmately striate and sulcate above, laterally reticulate, rugose and pitted, endocarp stony. Flowering and fruiting: April-November.

Ecology: Evergreen broad-leaved forests, forest margins, shrubby areas, mountain slopes; 200-900 m.

Distribution: Malaysia, Myanmar, Vietnam and China.

Specimen examined: **Moulvibazar**: Lawachara National Park; 13 v 2008, S.N. Uddin, N2956 (DACB).

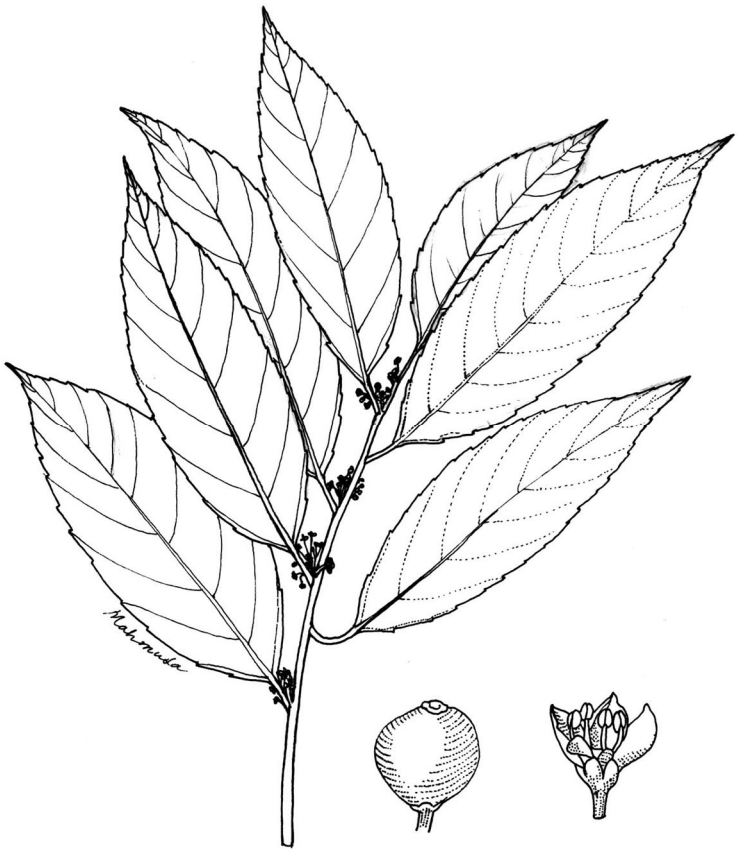

Fig. 3. *Ilex glomerata* King

Note: Ilex L. is a genus of about 500-600 species occurring mainly in tropical and subtropical to temperate regions of both the North and South Hemispheres, mainly in the tropical regions of Central and South America and Asia (Shukun *et al.*, 2008). From Bangladesh, Habib (2008) listed five species under the genus *viz. Ilex embelioides* Hook. f., *Ilex godajam* Colebr. *ex* Hook. f., *Ilex odorata* Buch.-Ham. *ex* D. Don, *Ilex triflora* Blume and *Ilex umbellulata* (Wall.) Loes.

This study added three new and rare plants like *Alchornea mollis* Bentham *ex* Müller-Argoviensis, *Ancistrocladus tectorius* (Loureiro) Merrill and *Ilex glomerata* King to the flora of Bangladesh. The significance of such field research is the detection of novel additions to a floristic region, which subsequently improve our understanding of plant biogeography as well as species diversity of the country. The purpose of the survey was to gather data on the floristic and

ecological diversity of the area, which can be used by the Forests Department for the management of park biodiversity.

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