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STATUS OF ENDEMIC PLANTS OF BANGLADESH AND CONSERVATION MANAGEMENT STRATEGIES

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Abstract

The present study was aimed at recognizing the status of 28 endemic plants of Bangladesh and determining their conservation management strategies. These endemics belong to 17 angiosperm families and constitute about 0.78% of the total species of the country. Of these endemics, 2 species were least concern, 10 rare and 7 endangered, and need to give immediate conservation priority. Another 9 endemics were assessed to be extinct since no report of collection for more than 100 years was available and could not be traced in the wild. An enumeration of these endemics is presented, each cited with updated nomenclature, bangla names, type, habit, ecology, potential values, places and status of occurrence, threats to the species, conservation status for sustainable management strategies. List of examined specimens of these endemics, wherever available, is also provided. Photographs of 24 endemics are also presented.

Key words: Endemic plants, conservation management strategies, Bangladesh

Introduction

When a species is restricted to its distribution in a particular region or location then it is regarded a true endemic. It is not easy to recognize endemic taxa of a region unless isolated by geographical or temporal barriers, like, Madagascar, Andaman Islands and Sri Lanka (Rahman and Rashid, 2012). Also it is very difficult to evaluate endemism within the political boundary of Bangladeshsince the country lies within the Indian Floristic Region as of Takhtajan (1986) and surrounded from 3 sides by India (Rahman and Rashid, 2012). The

south eastern part of Bangladesh lies in the Indo-Burma biodiversity hotspot while the central and north-west parts lie in the upper gangetic plain.

The concept of endemism depends on the knowledge of the geographical range of a species. Usually, a newly discovered species is found only in a limited site, and considered a site of national endemic until it rediscovers from another country or region.

The number of angiosperm plants of Bangladesh is about 5000 (Khan, 1972), of which over 80% are identical to the Indian flora (Rahman *et al.*, 2010; Rahman and Rashid, 2012). Ahmed *et al.* (2007-2010) recorded 3,611 plant species under 199 families in the recently published Encyclopaedia of Flora and Fauna of Bangladesh. The Indian flora lists about 15000 plant species ofwhich 5725(33.5%) are endemics (Chatterjee, 1940). More than 10% Indian endemics werefound to be distributed to Nepal, Bangladesh and Myanmar since these countries lie within thearea of Indian Floristic Region of Takhtajan, 1986 (Rahman and Rashid, 2012).

Many Asian countries, like, China, India and Malaysia have published the inventory of endemic taxa and made recommendations for conservation management (Ahmedullah and Nayar, 1986; Chatterjee, 1940; Huang, 2011; Nayar, 1980). It is felt necessary to make a complete inventory of the endemic plants of Bangladesh with determination of current status and conservation management strategies for sustainability of the environment.

Materials and Methods

The world's floristic literature, such as, the World Checklist of Selected Plant families (www. WCSP), Kew Index, IPNI (urn: lsid: ipni.org: names: 901173-1.) including most related national and regional Floras of Bhutan (Grierson and Long, 1987-1999), Ceylon (Dassanayake and Fosberg, 1980-1997), China (Li *et al.*, 2002-), India (Sharma *et al.*, 1993; Sharma and Balakrishnan, 1993; Sharma and Sanjappa, 1993; Hajra *et al*., 1997), Malesiana (Wilde, 1988-89; Holttum, 1959-78; Holttum, 1991), Myanmar (USNH, 2003), Nepal (Press *et al*., 2000), Pakistan (Nasir and Ali, 1972-83), Thailand (Santisuk and Larsen, 1997-2005) have been consulted to check the distribution of the plants of Bangladesh, recorded to date in Roxb. (1814, 1832), Wall. (1828-49), Hook.f. (1872-1897), Kurz (1877), Prain (1903), Heinig (1925), Raizada (1941), Cowan (1928), Sinclair (1956), Khan (1972-1987), Alam (1988), Dey *et al*. (1998), Das and Alam (2001), Ahmed *et al.* (2007-2010) and Rahman (2013, 2013a, 2013b).

The herbarium specimens of these endemic taxa including types available at BM, E, K, CAL, DACB, DUSH (Dhaka University Salar Khan Herbarium), BFRIH (Herbarium of

Bangladesh Forest Research Institute), HCU (Herbarium of Chittagong University), BCSIRH (Herbarium of Bangladesh Council of Scientific and Industrial Research, Chittagong) and MCCSH (Herbarium of Murari Chand College, Sylhet) have been examined. The type specimens of these endemics, so far detected, have also been studied. The specimens preserved at HCU, collected by the author himself through field investigations since 1983, have been thoroughly examined, and the specimens belonging to these endemics are cited as specimens examined. Photographs of 11 endemics, found in the wild, have been taken during field investigations. The species which have not been found in the wild but available only as herbarium specimens are photographed.

The evaluation and inventory with determination of overall conservation status of these endemic taxa of the flora of Bangladesh is based on the author's own field investigations, examination of herbarium specimens and thorough survey of relevant floristic literature.

An enumeration of these endemic taxa is prepared. In the enumeration, species are arranged in alphabetical order. Each species is cited with updated nomenclature, synonyms, bangla names, type localities, habit, ecology, potential values, places of occurrence, status of occurrence, threats to the species, conservation status and recommendations for conservation management. List of examined specimens of each species with their locations is also presented. Two photoplates of 21 endemics composed of the photographs of 5 herbarium specimens, 5 drawings and 11 field plants are provided.

Results and discussion

The study revealed that out of 3,611 plant species of Bangladesh, 28 are endemic at or below species level which is about 0.78% of the total species. No endemics at generic or supra-generic level could be recognised from Bangladesh. Among these, 4 are tree species, 2 shrubs, 1 undershrub, 2 parasites, 2 woody climbers and 17 herbs. The endemics were recorded from greater Sylhet (5 species), Chittagong (7 species), Cox's Bazar (2 species), Hill Tracts (10 species), Tangail (2 species), Dhaka-Jamalpur-Pabna (1 species) and Mymensing (1 species) districts.

Assessment of conservation status revealed that 10 endemics are categorized as extinct since no report of second collection have been made after type collections for more than 100 years. On the other hand, remaining 18 endemics are categorised as endangered, rare and least concern by 6, 10 and 2 species respectively.

Our evaluation on the endemism and distribution of endemics revealed that 7 plants as regarded endemic to Bangladesh by Khan *et al*. (2001) and Ahmed *et al.* (2007-2010) and 11 plants by Pasha (2012) have a wider range of distribution in India, Myanmar, China, Vietnam, Laos, Singapore, Java and some other countries (Ahmed *et al*., 2009; Hook.f., 1886; Hu and Daniel, 2011; Khan *et al.,* 2001; Rahman and Rashid, 2012) and these are: *Carex caespititia* Nees (Cyperaceae) - distributed to China; *Cissus sicyoides* Roxb. (Vitaceae) - distributed to India, Maxico, Central America and the Caribbean; *Cleistanthus oblongifolius* (Roxb.) Muell.-Arg. Euphorbiaceae) - distributed to India, Java and Singapore; *Croton clorocalyx* Muell.-Arg. (Euphorbiaceae) - distributed to India; *Corypha taliera* Roxb. (Arecaceae) - endemic to India and extended its distribution to Bangladesh; *Gymnostechium listeri* Prain (Acanthaceae) - distributed to China and Vietnam; *Lithocarpus acuminata* (Roxb.) Rehder (Fagaceae) - distributed to Myanmar; *Myroneuron clarkei* Hook.f. and *Ophiorhiza villosa* Roxb. (Rubiaceaea) - distributed to India; *Phrynium imbricatum* Roxb. (Marantaceae) - distributed to Myanmar, Thailand, Vietnum, Laos and China; *Vernonia thomsonii* Hook.f. (Rubiaceae) - distributed to Myanmar. Moreover, *Cleistanthus oblongifolius* (Roxb.) Muell.-Arg. and *Cissus sicyoides* Roxb. as regarded endemic by Pasha (2012) are the synonyms of **Cleistanthus chartaceus** Muell.-Arg. and **C. verticillata** (L.) Nicolson and C.E. Jarvis respectively (Hook.f., 1886; French *et al*., 2003). **Corypha taliera** Roxb. was first reported from Bengal by W. Roxburgh in 1919, and known to grow wildly in a village near Shanti Niketan in Birbhum district of W. Bengal, India, and later discovered from Dhaka University campus area (Khan *et al*., 2001).

Enumeration of endemic taxa

Ampelygonum salarkhanii Hassan in *Bangladesh J. Bot.* 20(2): 245 (1991). **Fig. 1**
Hassan in *Encyclopedia of Flora and Fauna of Bangladesh* 9: 397 (2009).

Family Polygonaceae

Synonym: Not available. *Bangla name*: *Girishobhansak.*
Type: Bandarban, Chimbuk hill, 1990, Hassan *s.n.* (DACB DUSH).
Habit: Perennial bushy undershrub.
Ecology: Hilly areas.
Potential value: Used as leafy vegetable by the tribal people.
Occurrence: Bandarban (*Chimbuk, Ruma*).
Status of occurrence: Least Concern (lc).
Threat to the species: Habitat destruction.
Conservation status: Found only in Bandarban district and could not be traced to any other localities. Mistakenly its distribution was shown to India, China and Myanmar in Ahmed *et*

al. (2009) but there is no report of its occurrence in the Floras of India (Sharma *et al.*, 1993), China (Li *et al*., 2004) and Myanmar (USNH, 2003).
*Conservation measures taken***:** None
Conservation measures proposed: *In-situ* conservation management required immediately.
Herbarium specimens: Bandarban: Ruma, 27.02.2011, Rahman *et al*. 7954 (HCU).

Boesenbergia islamii Yusuf & Rahman in *Saudi. J. Biol. Sci*. 10 (1): 51 (2003). **Fig.2**
Yusuf in *Encyclopedia of Flora and Fauna of Bangladesh* 12: 466 (2008).
Family Zingiberaceae

Synonym: Not available; *Bangla name*: Not available.
Type: Chittagong, Chunati, Near forest beat office, 02.10.1997, Yusuf & Rahman, 1019 (BCSIRH: holo., HCU: iso.).
Habit: Small rhizomatous herb.
Ecology: Partial shade on the hilly forest floor.
Potential value: Medicinal and ornamental (as pot plant).
Occurrence: Chittagong (*Chunati, Sitakundu*).
Status of occurrence: Endangered (EN).
Threat to the species: Habitat destruction.
Conservation status: It has been rediscovered from SitakunduChandranath hill of Chittagong by the author in 2009. It is seemed to be lost from the type locality due to habitat destruction (Rahman, 2013).
*Conservation measures taken***:** Grown in Chittagong University Botanic Garden.
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required immediately.
Herbarium specimens: Chittagong, Sitakunda, Chandranath hill, 31.08.2009, Rahman *s.n*. (HCU) and type specimen is also available at BCSIRH and HCU.

Croton chittagongensis Chakrab. & N.P. Balakr. in *Proc. Indian Acad. Sci., Pl. Sci*. 92: 365, f. 2. (1983). *Bull. Bot. Surv. India* 34: 40 (1992; publ. 1997). **Fig.24**
Family Euphorbiaceae

Synonym: Not available; *Bangla name*: Not available.
Type: Chittagong Hill Tracts, Mainamukh, 09 May 1939, Dent 72 (CAL).
Habit: Small tree.
Ecology: Hill slopes in forests.
Potential value: Wild life supporting plant.
Occurrence: Rangamati (*Mainamukh*).
Status of occurrence: Extinct (EX), could not be traced after 1939.
Threat to the species: Data Deficient (DD).
Conservation status: It has not been reported from elsewhere since its type collection was made from Chittagong Hill Tracts, Mainamukh by Dent (1939). It could not be traced to any localities even type location during our search since independence of Bangladesh in 1972.
*Conservation measures taken***:** None
Conservation measures proposed: Further search to locate this plant, if exists, is to be continued and appropriate conservation measure to be taken accordingly.
Herbarium specimen: Only type specimen is available at CAL.

Curcuma bakerii Rahman & Yusuf in *Plantae Discoverie* 1: 21 (2012). **Fig.5**
Family Zingiberaceae

Synonym: Not available. *Bangla name*: *Ban-halud*.
Type: Tangail, Madhupur Sal forest,14.05.1996, Rahman & Yusuf 938 (BCSIRH: holo, HCU: iso).

Habit: Rhizomatous herb.
Ecology: Partial shade in forested areas.
Potential value: Rhizome used as spice mixed with turmeric.
Occurrence: Tangail (*Madhupursal forest*).
Status of occurrence: Endangered (EN).
Threat to the species: Habitat destruction, land use change.
Conservation status: Specimens outside type locality could not be traced yet.
*Conservation measures taken***:** None
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required immediately.
Herbarium specimens: Type specimens available at BCSIRH and HCU.

Curcuma hookerii Rahman & Yusuf in *Plantae Discoveries* 1: 23 (2012). **Fig.4**
Family Zingiberaceae

Synonym: Not available; *Bangla name*: *Janglihalud*.
Type: Chittagong, Barabkundu, 18.04.1994, Rahman & Yusuf 867 (BCSIRH: holo.; HCU: iso.).
Habit: Rhizomatous herb.
Ecology: Partial shade on hill slope of rain forests.
Potential value: Substitute of turmeric.
Occurrence: Chittagong (*Bariadhala hill*).
Status of occurrence: Rare (R).
Threat to the species: Habitat destruction, land use change.
Conservation status: It has been located to occur with a small community in both type locality and Bariadhala of Chittagong. No specimenfrom outside of Chittagong has been reported.
*Conservation measures taken***:** None
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required immediately.
Herbarium specimens: Type specimens are available at BCSIRH, HCU); Chittagong Bariadhala hill slopes, 02. 04. 1998, Rahman *et al.* 2773, 2774 (HCU).

Curcuma roxburghii Rahman & Yusuf in *Bangladesh J. Plant Taxon*. 19(1): 80 (2012).
Fig.7

Synonym: Not available. *Bangla name*: *Janglihalud*. **Family Zingiberaceae**
Habit: Rhizomatous herb.
Type: Rangamati, Rangapani, 08.07.1993, Rahman & Yusuf 803 (BCSIRH: holo.; HCU: iso.).
Ecology: Partial shade on high hill slope of rain forests.
Potential value: Substitute of turmeric.
Occurrence: Chittagong (*Rangunia*) and Rangamati (*Rangapani*).
Status of occurrence: Rare (R).
Threat to the species: Habitat destruction.
Conservation status: Besides type locality, a very small size of population of this plant has been traced to a second location in Chittagong by the author himself in 1998.
*Conservation measures taken***:** Grown in Botanic Gardens of Chittagong University and BCSIR Laboratory, Chittagong.
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required immediately.
Herbarium specimens: Type specimens are available at BCSIRH, HCU); Chittagong, Razarhat, Rangunia, 03 06 1998, Rahman *et al.* 3248 (HCU).

Curcuma wallichii Rahman & Yusuf in *Bangladesh J. Plant Taxon*.19(1): 82 (2012). **Fig.6**

Synonym: Not available; *Bangla name*: *Haldigaas*. **Family Zingiberaceae**
Type: Moulvi Bazar, Srimangal, Lawachara forest, 16.07.1993, Rahman & Yusuf 813 (BCSIRH, HCU).
Habit: Rhizomatous herb.
Ecology: Hill slopes of rain forests.
Potential value: Substitute of turmeric.
Occurrence: Moulvi Bazar (*Lawachara forest*).
Status of occurrence: Rare (R).
Threat to the species: Habitat destruction.
Conservation status: Apart from type locality, no other location of its occurrence could be traced yet. Population size in the type locality is small.
*Conservation measures taken***:** Grown in Botanic Gardens of Chittagong University and BCSIR Laboratory, Chittagong.
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Only type specimens are available at BCSIRH and HCU.

Curcuma wilcockii Rahman & Yusuf in *Bangladesh J. Plant Taxon*.19(1): 83 (2012). **Fig.3**
Family Zingiberaceae
Synonym: Not available. *Bangla name*: *Ban haldi*, *shati*
Type: Tangail, Madhupursal forest, Rasulpur, 21.08.1993, Yusuf & Rahman 838 (BCSIRH, HCU).
Habit: Rhizomatous herb.
Ecology: Moist forest in partial shades.
Potential value: Rhizome used as spice with turmeric.
Occurrence: Tangail (*Madhupur sal forest*).
Status of occurrence: Rare (R).
Threat to the species: Habitat destruction.
Conservation status: No collection, outside type locality, could be made yet.
*Conservation measures taken***:** Grown in Botanic Garden of BCSIR Laboratory, Chittagong.
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required immediately.
Herbarium specimens: Only type specimens are available at BCSIRH and HCU.

Cuscuta chittagongensis Sen Gupta *et al*., in *Bangladesh J. Bot*. 12(1): 33-36 (1983). **Fig.16**
Khan & Khanam in *Fl. Bangladesh* 55: 3 (2003); Khanam in *Encyclopedia of Flora and Fauna of Bangladesh* 7: 327 (2008). **Family Cuscutaceae**
Synonym: Not available. *Bangla name*: *Pahari swarnalata*.
Type: Rangamati, Myanimukh, 24.12.1956, Khan 234A (DACB).
Habit: Twining parasite.
Ecology: Parasites on trees.
Potential value: Medicinal.
Occurrence: Bandarban (*Chimbuk hill*), Rangamati (*Myanimukh*) and Sylhet (Beyani Bazar).
Status of occurrence: Least concern (lc).
Threat to the species: Habitat destruction.
Conservation status: It was rediscovered from Sylhet in 1979 and Bandarban in 1983. Although its occurrence in Chittagong (*loc. non cit.*) has been mentioned in Khan & Khanam (2003) and Khanam (2008), there is no specimen from Chittagong available in any herbaria. No location in Chittagong could be traced yet.

*Conservation measures taken***:** None
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Bandarban: Chimbuk hill, 27.11.1983, Khan *et al.*, K.6518 (DACB); Rangamati: Myanimukh, 24.12.1956, Khan, 234A (DACB: type), Kalampoli, Chittagong-Rangamati road, 23.02.1979, Huq H.4341 (DACB); Sylhet: Beyani Bazar, 01.02.1979, Huq 4196 (DACB).

Cyperus pilosus Vahl *var.* **polyantha** C.B. Clarke in *J. Linn. Soc. Bot*. 21: 151 (1884). Uddin in *Encyclopaedia of Flora and Fauna of Bangladesh* 11: 204 (2007).

Family Cyperaceae

Synonym: Not available; *Bangla name*: Not available.
Type: Mymensingh, *loc. non cit*., 1868, C.B. Clarke *s.n.* (K)
Habit: Stoloniferous perennial herb.
Ecology: Open wet places, grassland, swamps, deciduous forest floors and rice fields.
Potential value: Not known.
Occurrence: Mymensingh (*loc. non cit*.).
Status of occurrence: Extinct (EX), could not be traced after 1886.
Threat to the species: Data deficient (DD).
Conservation status: No report of second collection is yet available since its type collection made by C.B. Clarke from Mymensingh in 1868.
*Conservation measures taken***:** None.
Conservation measures proposed: It is to be located, if exist, then *in-situ* or *ex-situ* conservation management to be taken as appropriate.
Herbarium specimens: No specimen, except type, is available.

Dalbergia confertiflora Benth. *var*. **listeri** Thoth. In *Bull. Bot. Surv. Ind.* 17(1-4): 66-67 (1975). Rezia in *Encyclopedia of Flora and Fauna of Bangladesh* 8: 51 (2009).

Family Fabaceae

Synonym: Not available. *Bangla name*: Not available.
Type: Bangladesh, Chittagong, *loc. non cit*., in 1876, Lister *s.n*. (CAL).
Habit: Large woody climber.
Ecology: Grows in red soil areas.
Potential value: Not known.
Occurrence: Chittagong (*loc. non cit*.).
Status of occurrence: Extinct (EX), could not be traced after 1876.
Threat to the species: Data Deficient (DD).
Conservation status: No report of its occurrence, after type collection, is yet available. No locality could be traced during field trips to Chittagong since independence of Bangladesh in 1971.
*Conservation measures taken***:** None.
Conservation measures proposed: Further search is to be continued to locate this plant, if exist, for taking appropriate conservation management.
Herbarium specimens: No specimen in Bangladesh, except type at CAL, is available.

Globba rahmanii Yusuf in *J. Econ. Taxon. Bot*. 28(1): 87-90 (2004). **Fig. 10**
Yusuf in *Encyclopedia of Flora and Fauna of Bangladesh* 12: 482 (2008).

Family Zingiberaceae

Synonym: Not available. *Bangla name*: Not available.
Type: Khagrachari, Dheghinala-Marissha road, Teen tila, 30.08.1997, Rahman & Yusuf 1878 (BCSIRH, HCU).

Habit: Small rhizomatous herb.
Ecology: Partial shade on high hill slope of rain forests.
Potential value: Ornamental (could be grown as pot plant).
Occurrence: Chittagong (*Bariadhala, Sitakundu*), Khagrachari (*Dheghinala*), Rangamati (*Barkal*).
Status of occurrence: Rare (R).
Threat to the species: Habitat destruction, changing of land use.
Conservation status: Two more locations, outside type locality, are known. Population size in both localities found to be very small.
*Conservation measures taken***:** Grown in Botanic Garden of BCSIR Laboratory, Chittagong.
Conservation measures proposed: *In-situ* conservation management required.
Herbarium specimens: Chittagong: Sitakundo, 03.10.1969, Das 4 (BFRIH); Bariadhala-Hazarikhil, 06.10.1997, Rahman & Yusuf 1020 (BCSIRH and HCU); Rangamati: Barkal R. F. 12.06.1983, Huq *et al.,* H.5751 (DACB).

Gomphostemma salarkhaniana Khanam & Hassan in *Bangladesh J. Bot.* 32 (1):63-64 (2003). **Fig. 18**
Khanam & Hassan in *Fl. Bangladesh* 58: 31 (2008); Khanam in *Encyclopediaof Flora and Fauna of Bangladesh*8: 282 (2009). **Family Lamiaceae**
Synonym: Not available; *Bangla name*: Not available.
Type: Sylhet, Tamabil, 13.10.1973, Khan *et al.,* K.3296 (DACB).
Habit: Aromatic herb.
Ecology: Shady forest areas.
Potential value: Medicinal.
Occurrence: Sylhet (*Tamabil, Jaintapur, Jafflong*).
Status of occurrence: Rare (R).
Threat to the species: Habitat destruction and restricted distribution.
Conservation status:It occurs in and arround type locality by a small fragmented population size.
*Conservation measures taken***:** None.
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Sylhet: Tamabil, 13.10.1973, Khan *et al.* K.3296 (DACB: type), Jaintapurand Jafflong 19.10.1986, Huq & Mia 7873 and 7887(DACB).

Hedyotis thomsonii Hook.f., *Fl. Brit. India* 3:63 (1880). **Fig. 9**
Rahman & Das in *Encyclopedia of Flora and Fauna of Bangladesh* 10: 72 (2009).
Family Rubiaceae
Synonym: Not available. *Bangla name*: Not available.
Type: East Bengal, *loc. non cit*., collected in 1851, J. D. Hooker *s.n.* (K).
Habit: Annual herb.
Ecology: Open areas beside rivers and lakes.
Potential value: Not known.
Occurrence: Bank of the river Meghna and Mahanudde (Hook.f., 1880), Sylhet (*Jafflong, Tamabil*) and Bandarban (*Jiban nagar*).
Status of occurrence: Rare (R).
Threat to the species: Habitat destruction.
Conservation status: Khan and Hassan rediscovered this plant in 1973 from Jafflong and Tamabil areas of Sylhet after its type collection was made by Hook.f. in 1851. Later Huq *et al*., in 1981 also collected this plant from same locality. Very recently in 2011, Rahman *et al*., rediscovered it from Bandarban hill district.

*Conservation measures taken***:** None.
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Sylhet: Jafflong, 13.10.1973, Khan & Hassan K.3294 and Tamabil, 29.04.1981, Huq *et al.* H.5082 (DACB); Bandarban: Jiban nagar, on the way to Balipara bazar, 12.05.2011, Rahman *et al.* 8639 (HCU).

Iodes thomsoniana Baill. in *Adansonia* 10:270 (1872). **Fig. 21**
Hook.f., *Fl. Brit. India*1: 596 (1875); Huq in *Encyclopedia of Flora and Fauna of Bangladesh* 8: 257 (2009). **Family Icacinaceae**
Synonym: Not available. *Bangla name*: Not available.
Type: Chittagong, *loc. non cit*., in 1851, Hook.f. & Thom., *s.n*. (K).

Habit: Climber.
Ecology: Evergreen forest.
Potential value: Not known.
Occurrence: Chittagong (*loc. non cit*.).
Status of occurrence: Extinct (EX), could not be located after 1851.
Threat to the species: Data Deficient (DD).
Conservation status: Its type was collected from Chittagong by Hook.f. & Thom in 1851 and since then no report of its collection from elsewhere is yet available.
*Conservation measures taken***:** None
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. If found, both *in-situ* and *ex-situ* conservation management to be taken immediately.
Herbarium specimens: No specimen is available in any herbaria of Bangladesh

Knema bengalensis W.J. de Wilde in *Blumea* 25(2): 413 (1979). **Fig. 14**
Khan *et al., Red Data Book of Vascular Plants of Bangladesh* 103 (2001);
Islam & Hossain in *Encyclopedia of Flora and Fauna of Bangla*desh 9: 241 (2009).
Family Myristicaceae
S*ynonym*: Not available. *Bangla name*: *Khude Barala*.
Type: Cox's Bazar, Dulahazra, 31.12.1957, M. S. Khan 511 (DACB).
Habit: Medium tree.
Ecology: Mixed evergreen forest, on the edges of forest.
Potential value: Wild life supporting plant, fire wood.
Occurrence: Cox's Bazar (*Dulahazra, Ramu Upper Rezu*).
Status of occurrence: Rare (R)/Endangered (EN). Could not be relocated either type locality or Upper Rezu Reserve forest after 1999.
Threat to the species: Habitat destruction.
Conservation status: After type collection, M.S. Khan relocated this plant at the Upper Rezu reserve forest of Ramu, Cox's Bazar in December 1999 (Khan, *et al.,* 2001 and Uddin *et al.* 2013).
*Conservation measures taken***:** None
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium Specimens: Cox's Bazar, Dulahazra, 31.12.1957, M.S. Khan 511 (DACB); Upper Rezu, 03.12.1999, Khan *et al.* 10210 (DACB).

Lagenandra gomezii (Schott) Bogner & N. Jacobsen in *Aqua Pl.* 49 (1987). **Fig. 15**
Khan *et al., Red Data Book of Vascular Plants of Bangladesh* 26 (2001); Ara in

Encyclopedia ofFlora and Fauna of Bangladesh 11: 62 (2007).

Family Araceae

Basionym: *Cryptocoryne gomezii* Schott (1857); Hook.f. (1893).
Synonym: Not available. *Bangla name*: *Ban-kachu*.
Type: Sylhet, Panchara, collected in1828 by W. Gomez, Wall. Cat. 8958 (K-W).
Habit: Rhizomatous herb
Ecology: In shady moist situations.
Potential value: Not known.
Occurrence: Greater Sylhet (*Panchara*).
Status of occurrence: Extinct (EX), could not yet be traced in the field after 1828.
Threat to the species: Data Deficient (DD).
Conservation status: No report of second collection of it from elsewhere is available since its type collection was made in 1828 by W. Gomez from greater Sylhet of Bangladesh.
*Conservation measures taken***:** None
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. If exists, both *in-situ* and *ex-situ* conservation management to be taken.
Herbarium specimens: None in any herbaria of Bangladesh. Only type specimen is available at K.

Limnophila cana Griff., *Notul*. 4:98 (1847). **Fig.11**
Hook.f., *Fl. Brit. India* 4: 269 (1884). Prain, *Bengal Pl*. 2: 569 (1903); Rahman, O. in *Encyclopedia of Flora and Fauna of Bangladesh* 10: 242 (2009).

Family Scrophulariaceae

Synonym: Not available. *Bangla name*: Not available.
Habit: Annual aquatic herb.
Type: East Bengal, *loc. non cit*., collected from the Jheels of Jumalpore, *loc. non cit*., Griffith *s.n.* (K).
Ecology: Stagnant water.
Potential value: Not knwn.
Occurrence: Dhaka (*loc. non cit*.), Jamalpur (*loc. non cit*.) and Pabna (*loc. non cit*.).
Status of occurrence: Extinct (EX), could not be traced.
Threat to the species: Data deficient (DD).
Conservation status: Type collection was made by Griffith from the Jheels of Jamalpurand later Hook.f. and T.Thom. also collected this plant from East Bengal (*loc. non cit*.). in 1851. It was then collected by C.B. Clarke from Dhaka and Pabna in 1868, and it was further reported from East Bengal (*loc. non cit*.) by Prain in 1903. Since then no report of its occurrence from elsewhere is available.
*Conservation measures taken***:** None.
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: None in any herbaria of Bangladesh. Only type specimen is available at K.

Litsea clarki Prain, *Bengal Pl*. 2:676 (1903).
Khan *et al*., *Red Data Book of VascularPlants of Bangladesh* 83 (2001); Mia in *Encyclopedia of Flora and Fauna of Bangladesh*8: 348 (2009).

Family Lauraceae

Synonym: Not available. *Bangla name*: Not available.
Type: Chittagong, Seetakundu, Prain *s.n*. (CAL).

Habit: Small evergreen tree.
Ecology: Semi evergreen forest.
Potential value: Not known.
Occurrence: Chittagong (*Sitakundu*).
Status of occurrence: Extinct (EX)/ Endangered (EN), could not be traced after 1903.
Threat to the species: Data deficient (DD).
Conservation status: No report of second collection from elsewhere in or out side Bangladesh is available.
*Conservation measures taken***:** None.
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: No specimen available in any herbaria of Bangladesh.

Mantisia salarkhanii Rahman & Yusuf in *Saud. J. Biol. Sci*. 9 (2): 105 (2002). **Fig. 12**
Yusuf in *Encyclopedia of Flora and Fauna of Bangladesh* 12: 497 (2008).

Family Zingiberaceae

Synonym: Not available. *Bangla name*: *Pathari-ada*, *Kew-kheya* (Marma).
Type: Bandarban, Alikadam, Guishap Jiri, 3.5.1998, Rahman & Yusuf 2891 (BCSIRH, HCU).
Habit: Perennial rhizomatous herb.
Ecology: Shady, moist and steep hill slopes.
Potential value: Medicinal.
Occurrence: Bandarban (*Guishap Jiri, Ali Kadam*).
Status of occurrence: Endangered (EN).
Threat to the species: Habitat destruction.
Conservation status: It has been rediscovered from Jibannagar reserve forest near Bolipara bazar of Thanch, Bandarban in 2011. Beside type locality, two other locations in Bandarban district have been traced with a fewer number of populations. It has not been located yet outsideBandarban hill district.
*Conservation measures taken***:** None.
Conservation measures proposed: Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Bandarban: Alikadam, Guishap Jiri, 3.5.1998, Rahman & Yusuf 2891 (type: BCSIRH, HCU); Thanchi road, 03.05.1998, Rahman *et al.* 2891a (HCU); Jiban nagar reserve forest, near Bolipar bazar, 12.05.2011, Rahman *et al*. 8581 (HCU).

Nothopegia acuminata J. Sinclair in *Bull. Bot. Soc. Bengal* 9 (2): 90 (1956). **Fig. 19**
Khan *et al*., *Red Data Book of vascular plants of Bangladesh* 14 (2001); Hassan in *Encyclopedia of Flora and Fauna of Bangladesh* 6: 114 (2008).

Family Anacardiaceae

Synonym: Not available. *Bangla names*: Not available.
Type: Cox's Bazar, Kelatuli chara, 17.03.1945, Sinclair 4039 (E).
Habit: Shrub.
Ecology: Rain forest near streams, fl. March (Sinclair, 1956).
Potential value: Not known.
Occurrence: Cox's Bazar (*Kelatulichara*).
Status of occurrence: Extinct (EX)/Endangered (EN), could not be located after 1945.
Threat to the species: Data Deficient (DD).
Conservation status: It has not been reported from elsewhere since its type collection was made from Cox's Bazar by Sinclair in 1945. We have not been able to collect this species from type locality or any other areas of Bangladesh.

*Conservation measures taken***:** None.
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Only type specimen is available at E.

Periploca acuminata Rahman & Wilcock in *Bot. J. Linn. Soc*. 110: 373-377 (1991). Rahman in *Encyclopedia of Flora and Fauna of Bangladesh* 6: 251 (2008). **Fig. 17**
Family Periplocaceae

Synonym: Not available. *Bangla name*: *Bish-lata*.
Type: Sylhet, Tamabil-Jafflong hill, 17.9.1987, Rahman & Hossain 56 (BM: holo, ABD, K and HCU: iso).
Habit: Extensive woody twiner.
Ecology: Primary forest and in scrub jungles.
Potential value: Medicinal/Poisonous.
Occurrence: Sylhet (*Tamabil-Jafflong*).
Status of occurrence: Rare (R)/Endangered (EN).
Threat to the species: Habitat destruction.
Conservation status: No report of occurrence out side Bangladesh is yet available.
*Conservation measures taken***:** None
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Only type specimen is available at ABD, BM, K and HCU.

Persicaria eciliata Hassan in *Bangladesh J. Plant Taxon*. 3(2): 87-89 (1996). **Fig.22**
Hassan in *Encyclopedia of Flora and Fauna of Bangladesh* 9: 405 (2009).
Family Polygonaceae

Synonym: Not available. *Bangla name*: *Bishkatali*.
Type: Rangamati, Kaptai, 1.11.1988, Hassan 1205 (DACB).
Habit: Perennial herb.
Ecology: Marshy areas.
Potential value: Not known.
Occurrence: Rangamati (*Kaptai*).
Status of occurrence: Rare (R)/Endangered (EN).
Threat to the species: Habitat destruction.
Conservation status: It has not been reported yet from elsewhere in and outside Bangladesh since its type was collected in 1988.
*Conservation measures taken***:** None.
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Only type specimen is available at DACB.

Rotala simpliciuscula (Kurz) Koehne in *Bot. Jahrb*. *Syst.*1:159 (1881). **Fig.13**
Khan *et al., Red Data Book of Vascular Plants of Bangladesh* 89 (2001); Khanam in *Encyclopedia of Flora and Fauna of Bangladesh* 8: 425 (2009). **Family Lythraceae**

Basionyms: *Ammannia simpliciuscula* Kurz (1871); Hook.f. (1872); Heinig (1925).
Bangla name: *Agasa*.
Type: Chittagong, *loc. non cit*., collected in 1851, Hook.f. & Thom. *s.n*. (K).
Habit: An amphibious, mat-forming annual herb.
Ecology: Moist rice fields and marshy lands.
Potential value: Not known.

Occurrence: Chittagong (*loc. non cit*.).
Status of occurrence: Extinct (EX), could not be collected after 1925.
Threat to the species: Data Deficient (DD).
Conservation status: It has not been reported from elsewhere outside Chittagong since Heinig (1925).
*Conservation measures taken***:** None.
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Only type specimen is available at K.

Tarenna scandens (Roxb.) Good in *Jour. Bot*., 64 (suppl. 2): 11 (1926). **Fig.20**
Rahman & Das in *Encyclopedia of Flora and Fauna of Bangladesh* 10: 148 (2009).
Family Rubiaceae

Synonym: *Webera scandens* Roxb. (1814 *nom. nud*.,1832); *Bangla name*: *Gujer-kota*
Type: Sylhet (Silhet), *loc. non cit*., M.R. Smith collected in 1812, *s.n*. (K).
Habit: Woody scandent shrub.
Ecology: Shady slopes.
Potential value: Fire wood.
Occurrence: Sylhet (*loc. non cit*.) and Rangamati (*Kaptai Rampahar*).
Status of occurrence: Endangered (EN).
Threat to the species: Habitat destruction and fire wood collection.
Conservation status: It was rediscovered from Rampahar reserve forest of Rangamati hill district by Rahman *et al.* in 1999 and 2011 after type collection from Sylhet by M.R. Smith in 1812 (Rahman *et al*., 2012).
*Conservation measures taken***:** None
Conservation measures proposed: Both *in-situ* and *ex-situ* conservations management required immediately.
Herbarium specimens: Rangamati:Kaptai, Rampahar, 06.09.1999, Rahman *et al.* 5703, 5704 (HCU); 03.06,2011, Rahman *et al.* 8701 HCU).

Taxillus thelocarpus (Hook.f.) Alam in *Bangladesh J. Bot.* 14 (1): 32 (1985). **Fig. 23**
Alam in *Fl. Bangladesh* 33: 13 (1986); Khan *et al*., *Red Data Book of Vascular Plants of Bangladesh* 87 (2001); Alam in *Encyclopedia of Flora and Fauna of Bangladesh* 8: 403 (2009). **Family Loranthaceae**

Basionyms: *Loranthus thelocarpus* Hook.f. (1886); Prain (1903); Heinig (1925).
Synonym: *Scurrula thelocarpa* Danse (1929). *Bangla name*: Not available.
Type: Chittagong, Kazike hat, 1851, Hook.f & Thom. *s.n.* (K).
Habit: An aerial parasite.
Ecology: Grown as parasite on woody plants.
Potential value: Not known.
Occurrence: Chittagong (*Kazike hat, Baraiadhala-Hazarikhil*).
Status of occurrence: Endangered (EN).
Threat to the species: Habitat destruction.
Conservation status: Hook.f. (1886) named and reported this plant as *Loranthus thelocarpus* on the basis of type collection of J.D. Hooker and T.Thomson from Chittagong in 1951. After type collection, Huq *et al.,* rediscovered this plant from Bariadhal-Hazarikhil area of Chittagong in 1978.Since then no other report of its occurrence elsewhere in and outside Bangladesh is yet available. It was later transferred to *Taxillus* by Alam (1985).
*Conservation measures taken***:** None
Conservation measures proposed: Further search to locate this plant in recorded areas is to be continued and both *in-situ* and *ex-situ* conservation management to be taken immediately.

Herbarium specimens: Chittagong, Baraiadhala-Hazarikhil, 29.10.1978, Huq *et al.* H.3910 (DACB, BFRIH).

Trigonostemon praetervisus Airy Shaw in *Kew Bull*. 37: 121 (1982).
N.P. Balakr. & Chakrab. in *Candollea* 46: 625 (1991). **Family Euphorbiaceae**

Synonym: Not available. *Bangla name*: Not available.
Type: Silhet (Sylhet), *loc. non cit*., Wall. Cat. 8001 (K-W).
Habit: Large shrub or small tree.
Ecology: Periphery of semi-evergreen forests.
Potential value: Wild life supporting plant, fire wood.
Occurrence: Sylhet (*loc. non cit*.).
Status of occurrence: Extinct (EX), could not be traced after1828.
Threat to the species: Data deficient (DD).
Conservation status: It has not been reported from elsewhere since its type collection was made from Sylhet in 1828 (Wall Cat. 8001).
*Conservation measures taken***:** None
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimen: Only type specimen is available at Kew (K-W).

Zingiber salarkhanii Rahman & Yusuf in *Bangladesh J. Plant Taxon*. 20(2):2013. **Fig. 8**
Family Zingiberaceae

Synonym: Not available. *Bangla name*: *Jangliada.*
Type: Chittagong, Sitakundu, Chandranath hill, 13.08.1993, Rahman & Yusuf 825 (BCSIRH, HCU).
Habit: Perennial rhizomatous herb.
Ecology: Shady, moist and steep hill slopes.
Potential value: Rhizome used spice with zinger.
Occurrence: Chittagong (*Sitakundu*).
Status of occurrence: Endangered (EN).
Threat to the species: Habitat destruction, over exploitation.
Conservation status: No report of second collection from elsewhere is yet available. It occurs only in the type localitywith a small population size.
*Conservation measures taken***:** Grown in Botanic Garden of BCSIR Laboratory, Chittagong.
Conservation measures proposed: Further search to locate this plant in and around type locality is to be continued. Both *in-situ* and *ex-situ* conservation management required.
Herbarium specimens: Chittagong: Sitakundu, Chandranath hill, 13.08.1993, Rahman & Yusuf 825 (BCSIRH, HCU).

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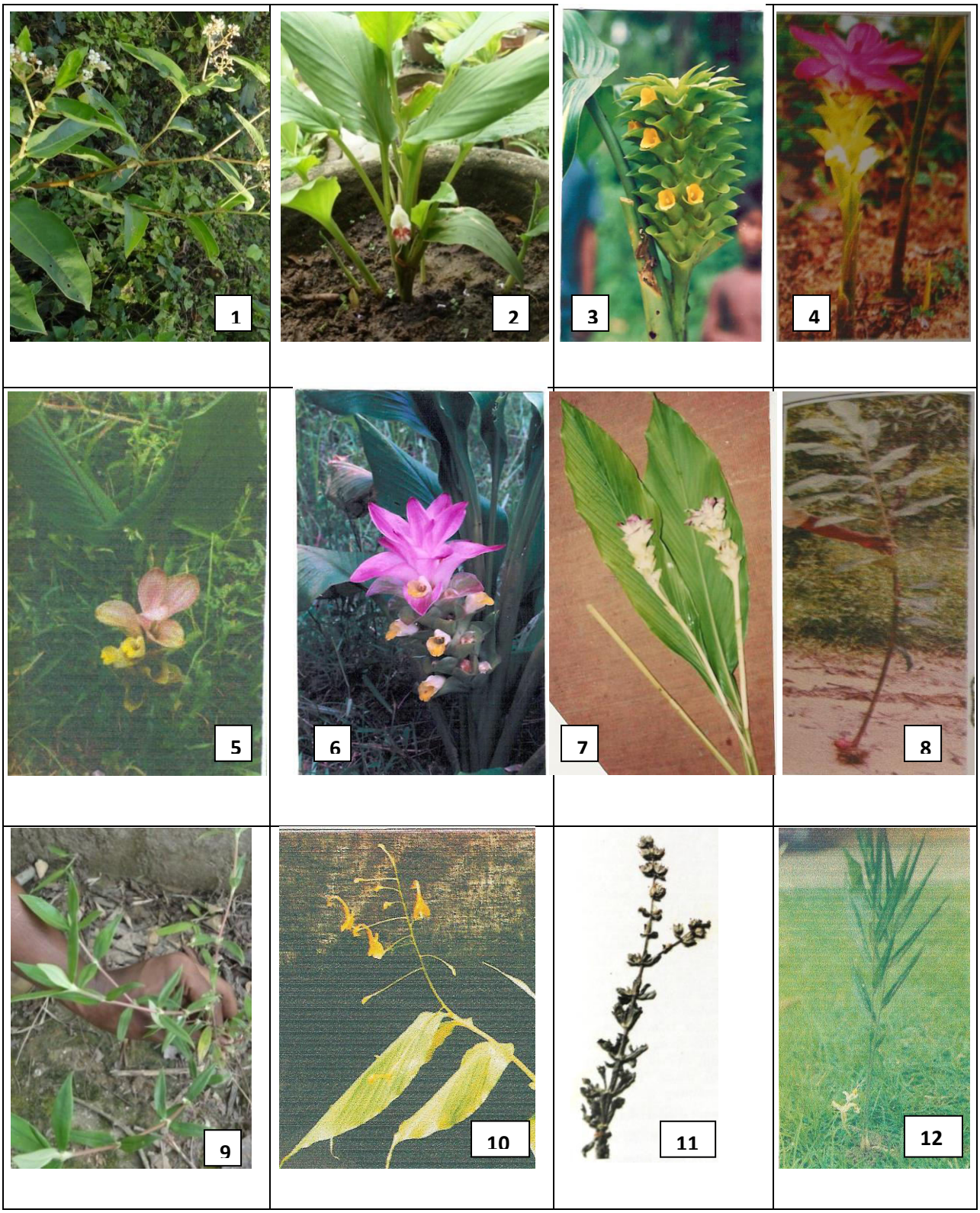
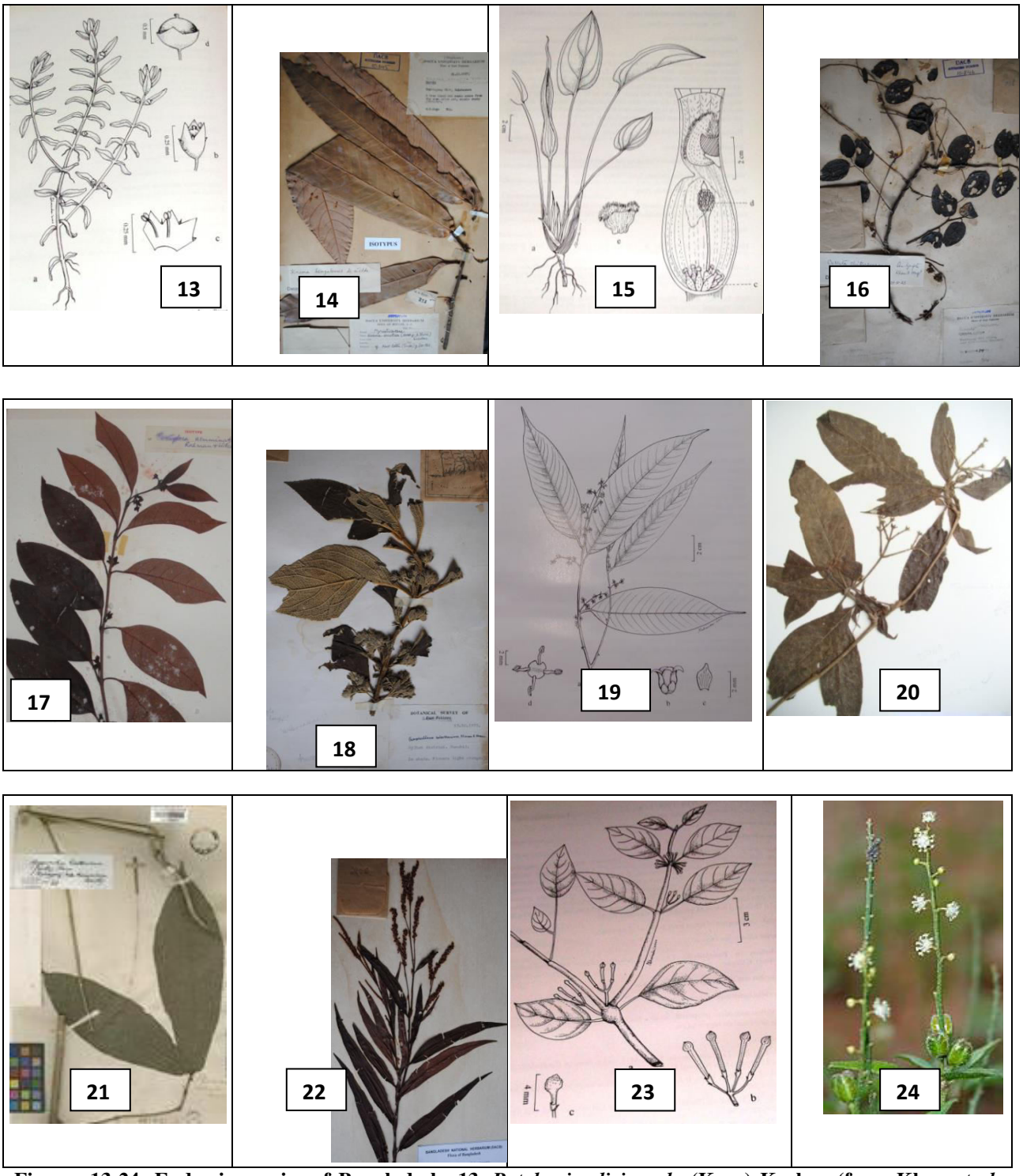


Figures 1-12: Endemic species of Bangladesh. 1. *Ampelygonum salarkhanii* Hassan; 2**.** ***Boesenbergia islamii*** **Yusuf & Rahman; 3. *Curcuma wilcockii* Rahman & Yusuf; 4. *Curcuma hookerii* Rahman & Yusuf; 5. *Curcuma bakerii* Rahman & Yusuf; 6. *Curcuma wallichii* Rahman & Yusuf; *7*. *Curcuma roxburghii* Rahman & Yusuf; 8. *Zingiber salarkhanii* Rahman & Wilcock; 9. *Hedyotis thomsoni* Hook.f.; 10. *Globba rahmanii* Yusuf; 11. *Limnophila cana* Griff.; 12. *Mantisia salarkhanii* Rahman & Yusuf .**



Figures 13-24: Endemic species of Bangladesh: 13. *Rotala simpliciuscula* (Kurz) Koehne (from Khan *et al*. 2001); 14. *Knema bengalensis* WJ de Wilde; 15. *Lagenandra gomezii* (Schott) Bogner & Jacobsen (from Khan *et al*. 2001); 16. *Cuscuta chittagongensis* Sen Gupta *et* al.; 17. *Periploca acuminata* Rahman & Wilcock; 18. *Gomphostemma salarkhaniana* Khanam & Hassan; 19. *Nothopegia acuminate* J. Sinclair (from Khan *et al*. 2001); 20. *Tarenna scandens* Roxb.; 21. ***Iodes thomsoniana*** **Baill.*; 22. Persicaria eciliata* Hassan; 23. *Taxillus theolocarpa* (Hook.f.) Alam (from Khan *et al*. 2001); 24. *Croton chittagongensis* Chakrab. & N.P. Balakr.**