

**PRELIMINARY TAXONOMIC STUDY ON HOMESTEAD FLORA OF
FOUR DISTRICTS OF BANGLADESH: LILIOPSISIDA
(MONOCOTYLEDONS) AND PTERIDOPHYTA**

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Abstract

This study provides basic taxonomic data on Liliopsida (monocotyledons) and Pteridophyta of the representative homestead areas of Dhaka, Gazipur, Manikganj and Tangail districts of Bangladesh. The monocotyledons and pteridophytes, growing naturally in the homestead areas, are composed of total 137 and 16 species under 84 and 13 genera belonging to 22 and seven families, respectively. A total of 20, 13, 19 and 17 species respectively, occur exclusively in the homesteads of Dhaka, Gazipur, Manikganj and Tangail districts and only 22 species are common there. Poaceae with 53 species is the largest family and *Cyperus* with 12 species is the largest genus in monocotyledons. Pteridaceae with eight species and *Pteris* with three species are the better represented family and genus, respectively in pteridophytes. Total 136 species are appeared as herbs that are followed by 11 species of trees and six species of shrubs. A total of 119 species are documented as economically useful. This study identifies a number of active threats to the flora of the study area, and suggests to launch adequate management and awareness building programs for the homestead people in order to ensure effective conservation and sustainable use and development of plant genetic resources in the homestead areas of this region.

Introduction

The flora of a region, a country or a geographical boundary represents the overall plant population or all the plants existing there. It variously contributes in economic, environmental, ecological, social and aesthetic issues locally, regionally and globally in different magnitudes. Bangladesh harbors a rich flora (approx. 5000; Khan, 1977), mostly in its forests, plainlands, hills, and wetlands, however, the floristic composition in some major areas of this country is not yet well-known. Homestead is an operational unit, in which a number of crops are grown with livestock, poultry and fish production mainly for the purpose of the farmer's basic needs (Leuschner and Khaleque, 1987). Homestead represents a land use system involving deliberate management of multipurpose trees and shrubs in intimate association with seasonal vegetables (Fernandes and Nair, 1990). Bangladesh harbors 26.41 million homesteads occupying 0.748 million hectares of land (Mannan, 2013). In this country, homestead forests comprise 2% (2951.40 km²) of its total land area, which spreads over 20 million homesteads (Salam *et al.*, 2000). It is estimated that about 70% of timber, 90% of firewood, 48% of sawn and veneer logs, and almost 90% of bamboo requirements are met from homestead forests (Uddin *et al.*, 2002).

The large-scale floristic studies conducted by Hooker (1872-1897), Prain (1903) and Bangladesh National Herbarium (Khan, 1972-1987), and the Encyclopedia of Bangladesh flora compiled by Ahmed *et al.*, (2008-2009) cover the homestead areas. Some sporadic floristic

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inventories have also been carried out in different urban and rural areas of this country that cover the homestead areas too (Khan *et al.*, 1985; Huq, 1986 and 1988; Hassan and Mazumder, 1990; Alam *et al.*, 2006; Rahman, *et al.*, 2009; Alam and Sarker, 2011; Roy *et al.*, 2013; Rahaman *et al.*, 2015; Haque *et al.*, 2018). However, none of these studies focused on the homestead forests or floras of the study area except Haque *et al.*, 2018 who studied the tree species of twelve villages of Gopalpur upazila in Tangail district. Some other studies (Uddin *et al.*, 2002; Alam *et al.*, 2005; Miah and Hussain, 2010; Muhammed *et al.*, 2013; Islam *et al.*, 2015; Rahaman *et al.*, 2015; Roy and Khan, 2020) were carried out on the homestead forests in different regions of Bangladesh. But except the recent study of Roy and Khan (2020) on the dicotyledons of the homestead areas of Dhaka, Gazipur, Manikganj and Tangail districts, these studies do not exclusively cover the homestead flora of this region.

The region of Dhaka, Gazipur, Manikganj and Tangail districts supports a rich homestead flora including herbs, shrubs, trees, climbers, epiphytes, parasites and also a plenty of hydrophytes. Besides other plant groups, monocotyledons and pteridophytes are also the important components of homestead flora, biodiversity, natural habitats and ecosystems of this region. Many monocotyledons and pteridophytes occurring in this region are important in economic, ethno-medicinal, environmental, social and aesthetic points of view (Uddin *et al.*, 1998; Uddin *et al.*, 2008; Sarker and Hossain, 2009). However, the indigenous floristic elements of this region are in risk because of the clearing or eradication of natural vegetation, habitat degradation and fragmentation, lack of awareness in the local people, and absence of proper management strategies and programs. Considering these facts, the scope and need of conducting floristic studies on the angiosperms of this region, including monocotyledons and pteridophytes, is rationally prevailing. Therefore, this study has been conducted to explore and document the monocotyledons and pteridophytes growing in the homestead areas of Dhaka, Gazipur, Manikganj and Tangail region, and to prepare a preliminary taxonomic checklist providing the basic information on these plant groups of this region.

Materials and Methods

The study area lies in Dhaka, Gazipur, Manikganj and Tangail districts that are located in central Bangladesh, in between 23°38'–24°48'N and 89°41'–90°42'E (BBS, 2011). In this study, data were collected from the representative homesteads of these districts from 2013 to 2018, mostly in rainy and winter seasons. A total of 280 homesteads per district, total 1120 homesteads belonging to 40 villages of 20 upazilas of four districts, composing an area of about 4.64 sq km., were visited through 240 field trips (Fig. 1, Roy and Khan, 2020).

Four categories of homesteads, old joint, old isolated, new joint and new isolated, were selected from each district for better representation of the homesteads following a preliminary reconnaissance survey. The old homesteads selected for this study were 20 years to 80 years old and the new ones were five years to less than 20 years old. The selected homesteads of each of the four districts were equal in number, more or less homogenous and located in plain land areas in order to promote reasonable comparison. Representative specimens of each species with flowers and fruits (monocots) or sporangia (pteridophytes) were collected during the field trips. The collection, preparation, pressing, drying, mounting, and storing of representative plant specimens were completed following routine herbarium methods (Jain and Rao, 1977; Hyland, 1972). The collected specimens were identified through consulting the experts, taxonomic descriptions and keys available in the relevant literatures (Hooker, 1872-1897; Wu *et al.*, 1995-2013), and matching with relevant voucher specimens preserved at Jahangirnagar University Herbarium (JUH), and Bangladesh National Herbarium (DACB).

The nomenclatural databases (TROPICOS, 2010; The Plant List, 2013; International Plant Names Index, 2015) and relevant literatures (Khan and Rahman, 1989-2002; Rahman, 2003; Rahman and Khanam, 2003; Khanam and Ara, 2007-2008; Ara and Khan, 2009; Huq, 1986a; Siddiqui *et al.*, 2007; Ahmed *et al.*, 2008, Ahmed *et al.*, 2008-2009; Jacson, 1893-1955; Wu *et al.*, 1995-2013 and Watson *et al.*, 2011) were consulted for knowing the valid and updated nomenclature of each taxon. The families of pteridophytes have been placed first and arranged following the classification system of Pichi (1977) and those of the monocotyledons according to Cronquist's system (Cronquist, 1981). The families Amaryllidaceae and Colchicaceae, not included in Cronquist (1981)'s System, are placed besides their close family Liliaceae. The genera and species under each family have been arranged alphabetically. All voucher specimens are housed at JUH. The similarities in species composition in the homesteads of four districts have been measured following Jaccard coefficient (Jaccard, 1912).

Results and Discussion

During this study, a total of 153 species under 97 genera and 29 families of monocotyledons and pteridophytes were found in the visited homestead areas of central region of Bangladesh (Table 1). Among these species, 137 (89.54%) were monocotyledons and the rest 16 (10.46%) were pteridophytes. Total 13 of these families were monogeneric and monospecific, 13 families were represented by two or more than two (2–10) species and only three families by more than 10 species. In the homesteads of the study area, the herbaceous species were found in highest number and percentage (136 species; 88.89%), followed by tree (11 species; 7.19%) and shrubby (six species; 3.92%) species. Among the herbaceous species, 14 were climber, five were aquatic (in wetlands) and three were epiphytic. The number of monocot species extant in the homesteads of the study area enumerated by this study is higher than the total number of Angiosperm species reported from few plain land areas of this country by some studies, such as Kibria and Anik (2010), Begum *et al.* (2013) and Muhammed *et al.* (2013), but relatively lower than that recorded by Kabir and Webb (2009) in respect to the size of sampling area.

The enumeration of monocot species in the homesteads of the study area seems higher than that reported from few other areas of this country by Sajib *et al.* (2016), Shetu *et al.* (2018) and Uddin and Hassan (2012) in respect to the size of sampling area. The number of pteridophyte species found in the homesteads of the study area seems similar to that reported by Sarker and Hossain (2009) from greater Mymensingh district. In contrast, this enumeration is lower than that reported from other areas by some previous studies (Rahman *et al.*, 2015; and Uddin *et al.*, 2008) that might be due to the relatively smaller homestead area covered by this study, various natural, anthropogenic and biogeographical influences, drivers or threats, functioning in these area, and the approaches and intenseness of the studies as well.

In the homesteads of the study area, Poaceae with 53 species of 36 genera was recognized as the largest family in monocotyledons that was followed by Cyperaceae with 23 species of seven genera and Araceae with 12 species belonging to eight genera. *Cyperus* L. with twelve species was found as the largest genus, which was followed by *Dioscorea* L. with six species, *Eragrostis* Wolf, *Fimbristylis* Vahl and *Bambusa* Schreb. with five species each, and *Brachiaria* (Trin.) Griseb., *Commelina* L. and *Murdannia* Royle with four species each. In pteridophytes, Pteridaceae with eight species of five genera was recognized as the largest family that was followed by Polypodiaceae and Thelypteridaceae with two species of two genera each.

During this study, the composition and distribution of monocotyledonous species in the visited homestead areas of four districts were found as notably variable. This study has documented a total of 83, 65, 75 and 73 species of monocotyledons in the visited homesteads of

Table 1. A taxonomic checklist of monocolledonous and pteridophytic species in the visited homestead areas of Dhaka, Gazipur, Manikganj and Tangail districts.

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl./Fr time | Use | RSE |
|--|------------------------|------------|-------|------------|------|----------------------|-------|---------|
| PTERIDOPHYTA | | | | | | | | |
| Marsileaceae | | | | | | | | |
| <i>Marsilea quadrifolia</i> L. | Sushnishak | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Jun-Oct Fr. U | W | GKR2014 |
| Lygodiaceae | | | | | | | | |
| <i>Lygodium flexuosum</i> (L.) Sw. | Lata Dhekia | D, T | H | Fp | O | Fl. Jun-Nov Fr. U | M | GKR1016 |
| Pteridaceae | | | | | | | | |
| <i>Adiantum philippense</i> L. | Goyali Lota, Kaljthant | D, G, M, T | H | Ah | C | Fl. Nov-Feb Fr. U | M | GKR0221 |
| <i>Aleuritopteris farinosa</i> (Forssk.) Fée | Lip Fern | G | H | Ah, Rs | O | Fl. Jun-Aug Fr. U | Or | GKR0877 |
| <i>Ceratopteris cornuta</i> (P. Beauv.) Lepr. | Unknown | G, T | H | Fp | O | Fl. May-Jul Fr. U | Or | GKR0258 |
| <i>C. thalictroides</i> (L.) Brongn. | Pani Dhekia | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Jun-Aug Fr. U | Or, V | GKR0639 |
| <i>Cheilosoria tenuifolia</i> (Burm. f.) Trevis. | Lip Fern | D, G | H | Ah, Fp, Rs | O | Fl. Jun-Sep Fr. U | Or | GKR0886 |
| <i>Pteris ensiformis</i> Burm. f. | Unknown | D, G, T | H | Ah, Rs | O | Fl. Apr-Sep Fr. U | V | GKR0256 |
| <i>P. vittata</i> L. | Dhekia | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Mar-Jul Fr. U | M | GKR1628 |
| <i>P. bitorita</i> L. | Fern | T | H | Rs | O | Fl. & Fr. U | W | GKR2036 |
| Dennstaedtiaceae | | | | | | | | |
| <i>Microlepis speluncae</i> (L.) T. Moore | Limpleaf Fern | M, T | H | Rs | O | Fl. & Fr. U | W | GKR0920 |
| Polypodiaceae | | | | | | | | |
| <i>Microsorium ensiforme</i> Schelpe | Unknown | G | H | Ah, Fp | O | Fl. & Fr. U | W | GKR2039 |
| <i>Pyrosia nuda</i> (Giesenh.) Ching | Unknown | G | H | Ah | O | Fl. & Fr. U | M | GKR2007 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|--|---------------|------------|-------|------------|------|----------------------|------------------|---------|
| Thelypteridaceae | | | | | | | | |
| <i>Ampelopteris prolifera</i> (Retz.) Copel. | Dhekishak | M, T | H | Fp, Rs | O | Fl. Sep-Dec Fr. U | V | GKR1714 |
| <i>Christella dentata</i> (Forssk.) Brownsey & Jermy | Unknown | G, M, T | H | Ah, Fp, Rs | O | Fl. & Fr. TY | Or | GKR2002 |
| Athyriaceae | | | | | | | | |
| <i>Diplazium esculentum</i> (Retz.) Sw. | Dhenkir Shaak | D, G, M, T | H | Ah, Rs | C | Fl. Jun-Aug Fr. U | V | GKR0190 |
| LILIOPSISIDA (Monocotyledons) | | | | | | | | |
| Alismataceae | | | | | | | | |
| <i>Sagittaria guayanensis</i> Kunth | Pani Kochu | D | H | Rs | O | Fl. & Fr. TY | Aw | GKR1627 |
| Aponogetonaceae | | | | | | | | |
| <i>Aponogeton appendiculatus</i> H.Bruggen | Unknown | M | H | Rs, Fp | O | Fl. Jul-Mar Fr. U | Or | GKR1177 |
| Areceaceae | | | | | | | | |
| <i>Areca catechu</i> L. | Supari | D, G, M | T | Ah | O | Fl. & Fr. TY | Fe, Fb, M | GKR0128 |
| <i>Borassus flabellifer</i> L. | Tal | D, G, M, T | T | Fp, Rs | C | Fl. Mar-Sep Fr. U | Fr, T | GKR1159 |
| <i>Calamus tenuis</i> Roxb. | Chanchibet | G | S | Ah, Rs | O | Fl. Mar-May Fr. U | Fb | GKR0832 |
| <i>Cocos nucifera</i> L. | Narikel | D, G, M | T | Fp, Rs | O | Fl. & Fr. TY | Fb, Fr, Mi, O | GKR0325 |
| <i>Elaeis guineensis</i> Jacq. | Palmtel | G, M, T | T | Fp, Rs | O | Fl. Sep-Oct Fr. U | O | GKR0642 |
| <i>Phoenix sylvestris</i> (L.) Roxb. | Khejur | D, G, M, T | T | Fp, Rs | C | Fl. Mar-May Fr. U | Fb, Fr, Or | GKR1282 |
| <i>Ravenala madagascariensis</i> Sonn. | Panthopadap | D, G, M, T | T | Ah | C | Fl. Sep-Nov Fr. U | Or | GKR1042 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|---|-----------------|----------|-------|------------|------|----------------------|--------------|---------|
| <i>Roystonea regia</i> (Kunth) O.F.Cook | Royalpalm | T | T | Rs | O | Fl. Mar-May Fr. U | Cm, O, Or | GKR2549 |
| Pandanaceae | | | | | | | | |
| <i>Pandanus foetidus</i> Roxb. | Keyakanta | M | T | Ah | O | Fl. Sep-Mar Fr. U | Ha | GKR1524 |
| <i>P. odoratus</i> Ridl. | Polau Pata | D, T | H | Fp | O | Fl. Jul-Oct Fr. U | M | GKR1024 |
| Araceae | | | | | | | | |
| <i>Alocasia acuminata</i> Schott | Mankachu | G, M | H | Rs | O | Fl. Apr-Jul Fr. U | V | GKR0882 |
| <i>A. formicata</i> (Roxb.) Schott | Kachu | D, M | H | Ah, Fp | O | Fl. Aug-Sep Fr. U | V | GKR1340 |
| <i>Caladium bicolor</i> (Aiton) Vent. | Elephant Ear | M | H | Ah | O | Fl. Jul-Sep Fr. U | M | GKR2441 |
| <i>Lasia spinosa</i> (L.) Thwaites | Kantakachu | M | H | Ah, Fp, Rs | O | Fl. Jul-Sep Fr. U | Fd | GKR0096 |
| <i>Pistia stratiotes</i> L. | Kachuripana | T | H | Rs | O | Fl. Jun-Aug Fr. U | Aw | GKR0301 |
| <i>Pothos scandens</i> L. | Sunat | G | S | Fp, Rs | O | Fl. & Fr. TY | W | GKR1990 |
| <i>Scindapsus aureus</i> (Linden & André) Engl. | Moneyplant | D | H | Rs | O | Fl. Apr-Jun Fr. U | Or | GKR1543 |
| <i>S. officinalis</i> (Roxb.) Schott | Guj-Pippul | T | S | Fp, Rs | O | Fl. Mar-Jun Fr. U | M | GKR0280 |
| <i>Syngonium podophyllum</i> Schott | Arrowhead Plant | G, M | H | Ah, Rs | O | Fl. Apr-Jun Fr. U | W | GKR0004 |
| <i>Typhonium flagelliforme</i> (Lodd.) Blume | Unknown | D, M, T | H | Ah, Rs | O | Fl. Jul-Sep Fr. U | M | GKR1082 |
| <i>T. sagittariifolium</i> Gagnep. | Unknown | D, M | H | Ah, Rs | O | Fl. Oct-May Fr. U | M | GKR0061 |

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|--|----------------------------|------------|-------|------------|------|----------------------|-----|---------|
| <i>T. trilobatum</i> (L.) Schott | Ghet Kochu | G, M, T | H | Ah, Rs | O | Fl. Jun-Jul Fr. U | V | GKR0883 |
| Commelinaceae | | | | | | | | |
| <i>Amisophacelus axillaris</i> (L.) R.S.Rao & Kammathy | Unknown | D, T | H | Fp | O | Fl. Aug-Oct Fr. U | Fd | GKR1280 |
| <i>Commelina benghalensis</i> L. | Kanchira, Dholpata | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Oct-Mar Fr. U | M | GKR0521 |
| <i>C. diffusa</i> Burm. f. | Kanchira | M | H | Ah, Fp | O | Fl. Oct-Mar Fr. U | W | GKR1406 |
| <i>C. erecta</i> L. | Kanchira | D, T | H | Ah, Fp, Rs | O | Fl. Jul-Sep Fr. U | W | GKR0977 |
| <i>C. longifolia</i> Lam. | Pani Kanchira | D, M, T | H | Ah, Fp, Rs | O | Fl. Oct-Mar Fr. U | W | GKR0066 |
| <i>Cyanotis cristata</i> (L.) D.Don | Kanainala, Jarbuti, Algusi | M | H | Rs | O | Fl. Jul-Nov Fr. U | W | GKR0161 |
| <i>Murdannia blumei</i> (Hassk.) Brenan | Nil Murdan | T | H | Rs | O | Fl. Sep-Feb Fr. U | W | GKR0982 |
| <i>M. scapiflora</i> (Roxb.) Royle | Unknown | G, M | H | Ah | O | Fl. Jun-Aug Fr. U | Fd | GKR0263 |
| <i>M. elata</i> (Vahl) G.Brückn. | Unknown | D, G | H | Ah, Fp, Rs | O | Fl. Jul-Sep Fr. U | Fd | GKR0473 |
| <i>M. spirata</i> (L.) G.Brückn. | Unknown | T, G | H | Ah | O | Fl. Aug-Nov Fr. U | Fd | GKR0764 |
| Eriocaulaceae | | | | | | | | |
| <i>Eriocaulon achniton</i> Körn. | Pipeworts | T | H | Rs | O | Fl. Aug-Nov Fr. U | Or | GKR1758 |
| Cyperaceae | | | | | | | | |
| <i>Bulbostylis barbata</i> (Rottb.) C.B. Clarke | Bulbobata /Watergrass | G | H | Ah | O | Fl. Feb-Sep Fr. U | G | GKR0368 |

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|--|------------------|------------|-------|------------|------|----------------------------|-----|---------|
| <i>Cyperus exaltatus</i> Retz. | Tata Ghasi | D, G | H | Ah | O | Fl. Aug-Dec Fr. U | M | GKR0451 |
| <i>C. babakan</i> Steud. | Unknown | T | H | Fp, Rs | O | Fl. & Fr. Jun-Oct Fr. U | W | GKR1566 |
| <i>C. cuspidatus</i> Kunth | Sagormukhi | D, T | H | Ah, Fp, Rs | O | Fl. Jul-Nov Fr. U | W | GKR1534 |
| <i>C. difformis</i> L. | Behua | M | H | Fp, Rs | O | Fl. & Fr. TY | Fd | GKR0361 |
| <i>C. distans</i> L. f. | Cocograss | D | H | Fp, Rs | O | Fl. Oct-Nov Fr. U | Fd | GKR0497 |
| <i>C. haspan</i> L. | Haspan Flatsedge | T | H | Ah, Fp, Rs | O | Fl. & Fr. TY | Or | GKR0893 |
| <i>C. iria</i> L. | Barachancha | D, G, M, T | H | Ah, Fp, Rs | C | Fl. & Fr. TY | G | GKR0133 |
| <i>C. kyllingia</i> Endl. | Badam Ghas | M | H | Ah, Rs | O | Fl. & Fr. TY | Fd | GKR0118 |
| <i>C. rotundus</i> L. | Muthaghas | D, G | H | Ah, Fp | O | Fl. Aug-Dec Fr. U | M | GKR1283 |
| <i>C. compressus</i> L. | Chancha | D, M, T | H | Ah, Fp, Rs | O | Fl. & Fr. TY | W | GKR1648 |
| <i>C. cyperoides</i> (L.) Kuntze | Aistagota, Aikha | G | H | Ah, Fp, Rs | O | Fl. Jun-Aug Fr. U | G | GKR0396 |
| <i>C. tenuiculmis</i> Boeckeler | Tonimutha | G | H | Fp, Rs | O | Fl. & Fr. May- Nov | W | GKR1440 |
| <i>Eleocharis dulcis</i> (Burm.f.) Trin. ex Hensch. | Mishiti Ghasi | D | S | Fp | O | Fl. & Fr. May-Oct | M | GKR1599 |
| <i>Fimbristylis dichotoma</i> (L.) Vahl | Baranirbishi | D | H | Fp, Rs | O | Fl. & Fr. Jul-Oct | G | GKR1292 |
| <i>F. falcata</i> (Vahl) Kunth | Unknown | T | H | Ah, Rs | O | Fl. Jun-Oct Fr. U | W | GKR1079 |
| <i>F. miliacea</i> (L.) Vahl | Unknown | D, G, T | H | Fp, Rs | O | Fl. Aug-Oct Fr. U | W | GKR1533 |
| <i>F. aestivalis</i> Vahl | Button Sedge | D, G, M | H | Ah, Fp, Rs | O | Fl. May-Aug Fr. U | W | GKR0076 |
| <i>F. squarrosa</i> Vahl. | Zumka Chech | T, M | H | Ah, Fp, Rs | O | Fl. Feb-Jun Fr. U | W | GKR1091 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|---|----------------|------------|-------|------------|------|-----------------------|-------|---------|
| <i>Chrysopogon aciculatus</i> (Retz.) Trin. | Chorkanta | D, G, T | H | Ah, Fp, Rs | O | Fl. Jun-Oct Fr. U | M | GKR1669 |
| <i>Coix lacryma-jobi</i> L. | Tosbi | D, G, M | H | Ah, Fp, Rs | O | Fl. Jul-Mar Fr. U | W | GKR0187 |
| <i>Cynodon dactylon</i> (L.) Pers. | Durba | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Mar-Oct Fr. U | M | GKR0538 |
| <i>Dactyloctenium aegyptium</i> (L.) Willd. | Crowfoot Grass | D, T | H | Ah, Fp, Rs | O | Fl. & Fr. TY | Fd, M | GKR1352 |
| <i>Digitaria bicornis</i> (Lam.) Roem. & Schult. | Unknown | M, G | H | Fp, Rs | O | Fl. Mar-Sep Fr. U | G | GKR0566 |
| <i>D. ciliaris</i> (Retz.) Koeler | Kokjachira | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Jul-Nov Fr. U | G | GKR0503 |
| <i>Echinochloa colona</i> (L.) Link | Shayma Ghas | D, G, M, T | H | Ah, Fp, Rs | C | Fl. & Fr. TY | Fd | GKR0504 |
| <i>E. stagnina</i> (Retz.) P. Beauv. | Dul, Parua | D | H | Ah | O | Fl. Mar-Sep Fr. U | G | GKR0551 |
| <i>Eleusine indica</i> (L.) Gaertn. | Kesla | D, G, M, T | H | Ah, Fp, Rs | C | Fl. & Fr. TY | G | GKR0483 |
| <i>Eragrostis coarctata</i> Stapf | Lovegrass | D, T | H | Fp, Rs | O | Fl. Oct-Apr Fr. U | Fd | GKR0492 |
| <i>E. japonica</i> (Thunb.) Trin. | Pond Lovegrass | D | H | Fp | O | Fl. & Fr. Jun- Nov | Fd | GKR0483 |
| <i>E. tenella</i> (L.) P. Beauv. | Konoi | T | H | Ah, Fp, Rs | O | Fl. Sep-Jan Fr. U | G | GKR0036 |
| <i>E. tenuifolia</i> (A. Rich.) Hochst. ex Steud. | Chiragrass | D, T | H | Rs | O | Fl. Mar-Sep Fr. U | G | GKR0628 |
| <i>E. unioloides</i> (Retz.) Nees ex Steud. | Chira Ghas | D, G, M, T | H | Ah, Fp, Rs | C | Fl. & Fr. TY | G | GKR1120 |
| <i>Hemarthria protensa</i> Steud. | Whip Grass | G, M | H | Ah | O | Fl. Aug-Oct Fr. U | Fd | GKR0397 |
| <i>Ichnanthus vicinus</i> (F.M. Bailey) Merr. | Unknown | T | H | Ah, Fp, Rs | O | Fl. Mar-Aug Fr. U | G | GKR0291 |
| <i>Imperata cylindrica</i> (L.) Raeusch. | Chhan | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Mar-Jul Fr. U | W | GKR0485 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|--|----------------------------|------------|-------|------------|------|----------------------|-------------------|----------|
| <i>Isachne globosa</i> (Thumb.) Kuntze | Swamp Millet | D | H | Ah, Rs | O | Fl. & Fr. TY | G | GKRR1601 |
| <i>Leersia hexandra</i> Sw. | Arali | D, T | H | Fp, Rs | O | Fl. & Fr. May-Dec | W | GKRR1700 |
| <i>Leptochloa panicea</i> (Retz.) Ohwi | Sprangle Top | D, G | H | Ah | O | Fl. Jul-Oct Fr. U | Fd | GKRR0393 |
| <i>Melocanna bambusoides</i> Trin. | Muli Bans | D, G, M, T | T | Bb | C | Fl. Apr Fr. Sep | Cm, Fb, Fe, Po | GKRR1379 |
| <i>Opismenus burmanni</i> (Retz.) P.Beauv. | Unknown | T, G | H | Ah, Fp, Rs | O | Fl. Sep-Nov Fr. U | Fd | GKRR0984 |
| <i>O. compositus</i> (L.) P. Beauv. | Gohur | M, T | H | Ah, Fp, Rs | O | Fl. & Fr. TY | Fd | GKRR0025 |
| <i>Oryza sativa</i> L. | Dhan | D | H | Fp | O | Fl. Feb-Apr Fr. U | Fo | GKRR1616 |
| <i>Ottochloa nodosa</i> (Kunth) Dandy | Unknown | D, T | H | Ah, Fp, Rs | O | Fl. & Fr. Jul-Sep | Fd | GKRR1001 |
| <i>Panicum auritum</i> J.Presl ex Nees | Unknown | D, M | H | Ah | O | Fl. & Fr. Aug-Oct | Fd | GKRR0429 |
| <i>P. incomitum</i> Trin. | Unknown | D, T | H | Rs | O | Fl. Jul-Mar Fr. U | Fd | GKRR0449 |
| <i>P. repens</i> L. | Dhani Ghas | D, M | H | Ah, Rs | O | Fl. Jul-Sep Fr. U | Fd | GKRR0431 |
| <i>Paspalidium flavidum</i> (Retz.) A. Camus | Yellow Watercrown Grass | M | H | Rs | O | Fl. Jul-Dec Fr. U | Fd | GKRR0073 |
| <i>P. punctatum</i> (Brum.) A. Camus | Watercrown Grass | D, M | H | Fp | O | Fl. Aug-Mar Fr. U | Fd | GKRR1637 |
| <i>Paspalum orbiculare</i> G.Forst. | Unknown | D, G | H | Fp | O | Fl. & Fr. TY | Fd | GKRR3191 |
| <i>Phragmites kar-ka</i> (Retz.) Trin. ex Steud. | Nal Khagra | D | H | Rs | O | Fl. & Fr. TY | W | GKRR1281 |
| <i>Rotboellia exaltata</i> L.f. | Itch Grass | M | H | Rs | O | Fl. Jul-Dec Fr. U | G | GKRR1206 |
| <i>Saccharum spontaneum</i> L. | Kash | T | H | Rs | O | Fl. Nov-Feb Fr. U | W | GKRR1733 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|---|----------------|------------|-------|------------|------|-----------------------|-------|---------|
| <i>Chrysopogon aciculatus</i> (Retz.) Trin. | Chorkanta | D, G, T | H | Ah, Fp, Rs | O | Fl. Jun-Oct Fr. U | M | GKR1669 |
| <i>Coix lacryma-jobi</i> L. | Tosbi | D, G, M | H | Ah, Fp, Rs | O | Fl. Jul-Mar Fr. U | W | GKR0187 |
| <i>Cynodon dactylon</i> (L.) Pers. | Durba | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Mar-Oct Fr. U | M | GKR0538 |
| <i>Dactyloctenium aegyptium</i> (L.) Willd. | Crowfoot Grass | D, T | H | Ah, Fp, Rs | O | Fl. & Fr. TY | Fd, M | GKR1352 |
| <i>Digitaria bicornis</i> (Lam.) Roem. & Schult. | Unknown | M, G | H | Fp, Rs | O | Fl. Mar-Sep Fr. U | G | GKR0566 |
| <i>D. ciliaris</i> (Retz.) Koeler | Kokjachira | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Jul-Nov Fr. U | G | GKR0503 |
| <i>Echinochloa colona</i> (L.) Link | Shayma Ghas | D, G, M, T | H | Ah, Fp, Rs | C | Fl. & Fr. TY | Fd | GKR0504 |
| <i>E. stagnina</i> (Retz.) P. Beauv. | Dul, Parua | D | H | Ah | O | Fl. Mar-Sep Fr. U | G | GKR0551 |
| <i>Eleusine indica</i> (L.) Gaertn. | Kesla | D, G, M, T | H | Ah, Fp, Rs | C | Fl. & Fr. TY | G | GKR0483 |
| <i>Eragrostis coarctata</i> Stapf | Lovegrass | D, T | H | Fp, Rs | O | Fl. Oct-Apr Fr. U | Fd | GKR0492 |
| <i>E. japonica</i> (Thunb.) Trin. | Pond Lovegrass | D | H | Fp | O | Fl. & Fr. Jun- Nov | Fd | GKR0483 |
| <i>E. tenella</i> (L.) P. Beauv. | Konoi | T | H | Ah, Fp, Rs | O | Fl. Sep-Jan Fr. U | G | GKR0036 |
| <i>E. tenuifolia</i> (A. Rich.) Hochst. ex Steud. | Chiragrass | D, T | H | Rs | O | Fl. Mar-Sep Fr. U | G | GKR0628 |
| <i>E. unioloides</i> (Retz.) Nees ex Steud. | Chira Ghas | D, G, M, T | H | Ah, Fp, Rs | C | Fl. & Fr. TY | G | GKR1120 |
| <i>Hemarthra protensa</i> Steud. | Whip Grass | G, M | H | Ah | O | Fl. Aug-Oct Fr. U | Fd | GKR0397 |
| <i>Ichnanthus vicinus</i> (F.M. Bailey) Merr. | Unknown | T | H | Ah, Fp, Rs | O | Fl. Mar-Aug Fr. U | G | GKR0291 |
| <i>Imperata cylindrica</i> (L.) Raensch. | Chhan | D, G, M, T | H | Ah, Fp, Rs | C | Fl. Mar-Jul Fr. U | W | GKR0485 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|--|------------------------------|------------|-------|------------|------|-----------------------|---------------|---------|
| <i>Sacciolepis interrupta</i> (Willd.) Stapf | Unknown | G | H | Rs | O | Fl. Jun-Dec Fr. U | W | GKR1991 |
| <i>Setaria glauca</i> (L.) P. Beauv. | Wild Millet | D | H | Rs | O | Fl. May-Jul Fr. U | G | GKR1306 |
| <i>Sorghum bicolor</i> (L.) Moench | Jowar | D, M | H | Ah | O | Fl. Jun-Oct Fr. U | C | GKR1276 |
| <i>Sporobolus diandrus</i> (Retz.) P. Beauv. | Benajoni | G, M, T | H | Ah, Fp, Rs | O | Fl. Aug-Oct Fr. U | G | GKR0253 |
| <i>Thyrsostachys oliveri</i> Gamble | Rangi Bansh | G | H | Ah | O | Fl. Nov Fr. Feb | Fa, Fb, Fe | GKR1609 |
| <i>Urochloa panicoides</i> P. Beauv. | Urochloa Grass, Liverseed | D | H | Rs | O | Fl. Jul-Nov Fr. U | G | GKR1361 |
| <i>Vetiveria zizanioides</i> (L.) Nash | Bena, Khas-Khas | D, M | H | Ah, Fp, Rs | O | Fl. Jul-Dec Fr. U | M | GKR1164 |
| <i>Zea mays</i> L. | Bhutta | D, T | H | Rs | O | Fl. May-Oct Fr. U | C | GKR1023 |
| Strelitzaceae | | | | | | | | |
| <i>Heliconia psittacorum</i> L.f. | Heliconia | T | H | Fp, Rs | O | Fl. Sep-Dec Fr. U | Or | GKR1731 |
| Musaceae | | | | | | | | |
| <i>Musa acuminata</i> Colla | Bichi Kola | D, G, M, T | T | Ah, Fp, Rs | C | Fl. & Fr. TY | Fr | GKR0339 |
| <i>M. sapientum</i> L. | Kancha Kola | D, G, M, T | T | Ah, Ep | C | Fl. & Fr. TY | Fr, V | GKR0737 |
| Zingiberaceae | | | | | | | | |
| <i>Alpinia calcarata</i> (Haw.) Roscoe | Unknown | G | H | Ah, Rs | O | Fl. May-Dec Fr. U | V | GKR1996 |
| <i>A. nigra</i> (Gaertn.) Burtt. | Tara | M | H | Ah, Fp | O | Fl. & Fr. Jan- May | V | GKR1865 |
| <i>Curcuma domestica</i> Valetton | Holud | D, G | H | Ah, Fp | O | Fl. Aug-Sep Fr. U | S | GKR1261 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|---|----------------------------|----------|-------|---------|------|-----------------------|-----|---------|
| <i>C. zedoaria</i> (Christm.) Roscoe | Shathi | M | H | Ah, Fp | O | Fl. Jun-Aug Fr. U | M | GKR0001 |
| Costaceae | | | | | | | | |
| <i>Costus speciosus</i> (J.Koenig) Sm. | Keomul | D | H | Fp | O | Fl. & Fr. Jul-Oct | M | GKR0726 |
| Cannaceae | | | | | | | | |
| <i>Canna indica</i> L. | Kolabati | M | H | Ah | O | Fl. & Fr. Aug- Oct | Or | GKR1409 |
| Marantaceae | | | | | | | | |
| <i>Clinogyne dichotoma</i> (Roxb.) Salisb. | Murta,Pati Bet | M | H | Rs | O | Fl. May-Jun Fr. U | Fb | GKR2086 |
| <i>Maranta arundinacea</i> L. | Sagu | G, T | H | Rs | O | Fl. Jun-Aug Fr. U | Fo | GKR0234 |
| Pontederiaceae | | | | | | | | |
| <i>Monochoria vaginalis</i> (Burm.f.) C.Presl | Chotanakha, Panee Kachu | D | H | Fp | O | Fl. Mar-Jul Fr. U | Aw | GKR1621 |
| <i>M. hastata</i> (L.) Solms | Baranukha | G | H | Fp, Rs | O | Fl. Mar-Jun Fr. U | Aw | GKR0792 |
| Amaryllidaceae | | | | | | | | |
| <i>Crinum asiaticum</i> L. | Sukdarson, Go-Rasun | M | H | Rs | O | Fl. Aug-Dec Fr. U | M | GKR0107 |
| <i>Scadoxus multiflorus</i> (Martyn) Raf. | Foot Ball Lily | M | H | Rs | O | Fl. Jun-Jul Fr. U | Or | GKR1834 |
| Liliaceae | | | | | | | | |
| <i>Zephyranthes grandiflora</i> Lindl | Lily | T | H | Rs | O | Fl. Jul-Aug Fr. U | Or | GKR5018 |
| Colchicaceae | | | | | | | | |
| <i>Gloriosa superba</i> L. | Ulatchandal | M | H | Ah | O | Fl. Jul-Dec Fr. U | M | GKR0093 |

| Scientific Name | Local Name | District | Habit | Habitat | Occ. | Fl/Fr time | Use | RSE |
|---|----------------------------------|------------|-------|---------|------|----------------------------|-----|---------|
| Smilacaceae | | | | | | | | |
| <i>Smilax ovalifolia</i> Roxb. ex D. Don | Kumarikanta | D | H | Ah | O | Fl. Jan-Apr Fr. U | M | GKR1691 |
| <i>S. perfoliata</i> Lour. | Bagh Asora Lota | D | S | Fp | O | Fl. & Fr. Apr- Oct | M | GKR1323 |
| Dioscoreaceae | | | | | | | | |
| <i>Dioscorea belophylla</i> (Pram) Voigt ex Haines | Chupri Alu | M, G | H | Ah | O | Fl. Jul-Oct Fr. U | V | GKR0193 |
| <i>D. bulbifera</i> L. | Gash Aalu, Pita Aalu, Mou Alo | D, G, M, T | H | Ah, Rs | C | Fl. Sep-Oct Fr. U | V | GKR1117 |
| <i>D. hamiltonii</i> Hook. f. | Pagla Aalu | D | H | Ah | O | Fl. Oct-Dec Fr. U | W | GKR1693 |
| <i>D. kamoensis</i> Kunth | Unknown | D, T | H | Ah | O | Fl. Jul-Sep Fr. Sep-Nov | M | GKR1027 |
| <i>D. pentaphylla</i> L. | Jhumalu, Kanta Alu | M, G | H | Ah, Rs | O | Fl. Sep-Dec Fr. U | W | GKR0194 |
| <i>D. tomentosa</i> J. Koenig ex Spreng. | Unknown | T | H | Ah, Rs | O | Fl. & Fr. Jul-Dec | V | GKR0926 |
| Orchidaceae | | | | | | | | |
| <i>Vanda tessellata</i> (Roxb.) Hook. ex G. Don | Rasna | T | H | Rs | O | Fl. Jun-Aug Fr. U | Or | GKR1745 |

LEGEND: **District:** D = Dhaka, G = Gazipur, M = Manikganj, T = Tangail; **Habit:** H = Herb, S = Shrub, T = Tree; **Habitat:** Rs = Road side, Ah = Adjoining open area except house yard, Bb = Bamboo bush, Ep = Edge of the pond, Fp = Fallow place; **Occ.** (= Occurrence): C = Common, O = Occasional, R = Rare; **Fl./Fr.** **Time:** Fl. = Flowering time, Fr. = Fruiting time, TY = Throughout the year, U = Unknown; **Use:** C = Cereals, Fa = Fishing apparatus, Fb = Fiber, Fe = Fence, Fr. = Fruit, Ha = Handicrafts, Po = Poles, T = Timber, W = Wild, M = Medicinal, Mi = Musical instrument, Aq = Aquatic weed, S = Spice, O = Oil, Or = Ornamental, Fd = Fodder, V = Vegetable; **RSE** = Representative Specimens Examined (All housed in JUH).

Dhaka, Gazipur, Manikganj and Tangail districts, respectively. Among these species, total 20, 13, 19 and 17 species were found to occur exclusively in the homesteads of Dhaka, Gazipur, Manikganj and Tangail districts, respectively, and only 22 species were common in these districts. Whereas, total 63 species of Dhaka, 52 species of Gazipur and 56 species of Manikganj and Tangail districts each were recognized as overlapping in the remaining other districts.

The similarity in species composition in the homesteads of four districts (Jaccard, 1912) was $\geq 50\%$ in between any pair of these districts, whereas, only 24% when all of the four districts were compared together (Fig. 1). The highest similarity in species composition (54%) was appeared in between Gazipur and Manikganj districts, and the lowest (50%) in Dhaka-Manikganj and Manikganj-Tangail districts. The similarities in between the homesteads of any two upazilas of Dhaka district in species composition varied from 20.5% (Dhamrai and Dohar upazilas) to 41.1% (Dhamrai and Keraniganj upazilas). Accordingly, in Gazipur district it varied from 13% (Sreepur and Gazipur Sadar upazilas) to 50% (Kapasias and Kaliakoir upazilas), in Manikganj district from 16.1% (Saturia and Daulatpur upazilas) to 39.2% (Ghior and Manikganj Sadar upazilas) and in Tangail district from 14.2% (Nagorpur and Tangail Sadar upazilas) to 46.6% (Basail and Mirzapur upazilas).

The similarity between any of the three pairs of habitats, namely fallow land and road side, road side and open area adjacent to the house (OAAH), fallow land and OAAH, in species composition was 50–57% (Jaccard, 1912), whereas, it was only 34.6% among fallow land, roadside, and OAAH (Fig. 2). The highest similarity in species composition (57%) was found in between road side and fallow land, and the lowest (3.4%) in bamboo bush and adjoining open area except house yard.

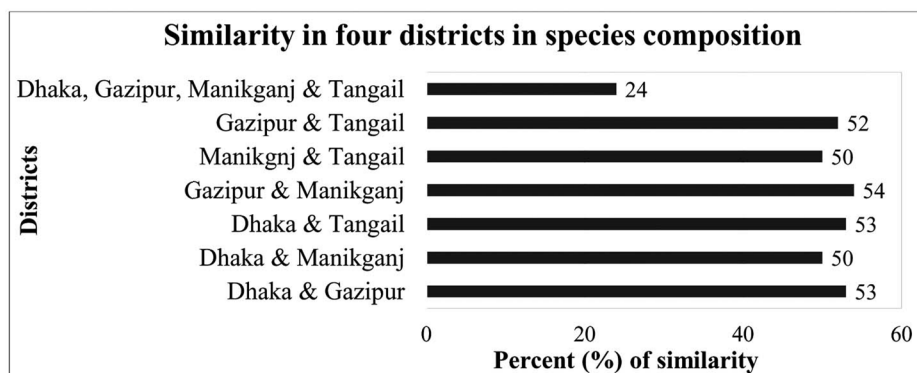


Fig. 1. Similarities in species composition in the homesteads of four districts based on Jaccard coefficient (Jaccard, 1912).

A total of 119 species recorded from the homesteads of the study were documented as economically useful. The major categories of these species were medicine (25 species), fodder (25 species), grass (21 species), ornamental (18 species), vegetable (13 species), fiber (10 species), fence (8 species), poles (5 species), construction material (5 species), fruit (4 species) and oil (3 species) producers. Among these economically useful species, only two were useful in four economic categories, seven species in three categories and six species in two categories. At least 25 of these species (*Adiantum philippense*, *Areca catechu*, *Typhonium flagelliforme*, *Commelina benghalensis*, *Eleocharis dulcis*, *Chrysopogon aciculatus*, *Cynodon dactylon*, *Cyperus exaltatus*, *Dactyloctenium aegyptium*, *Crinum asiaticum*, *Gloriosa superba*, *Smilax ovalifolia* and *Vetiveria*

zizanioides) used as medicinal were observed as naturalized to the study area. Besides, a good number of ornamentals (*Aleuritopteris farinosa*, *Aponogeton appendiculatus*, *Ceratopteris cornuta*, *Cheilosoria tenuifolia*, *Christella dentata*, *Eriocaulon achiton*, *Scadoxus multiflorus* and *Vanda tessellata*) and fruit yielding (*Cocos nucifera*, *Musa acuminata*, *M. sapientum* and *Phoenix sylvestris*) species were also found to grow naturally in the homesteads of the study area with regeneration. In contrast, about 36% of the medicinal plant species (*Pyrrosia nuda*, *Scindapsus officinalis*, *Eleocharis dulcis*, *Curcuma zedoaria*, *Costus speciosus*, *Crinum asiaticum*, *Dioscorea kamoensis*, *Gloriosa superba*, *Smilax ovalifolia* and *S. perfoliata*) were found to be declining in the homestead areas of the four districts.

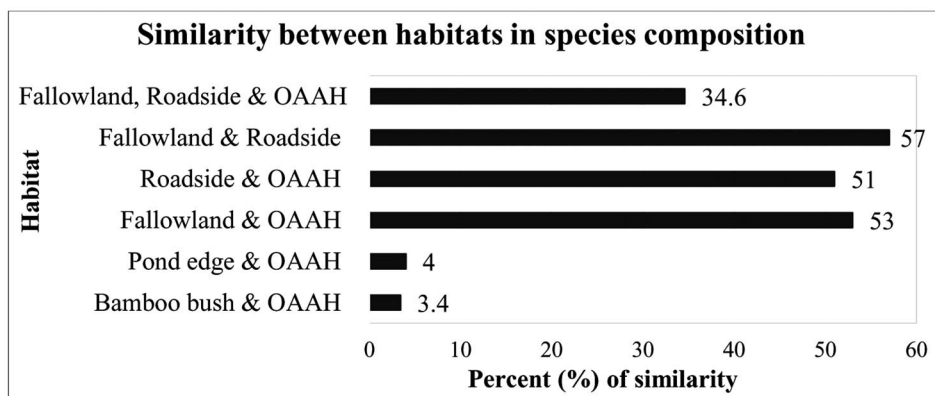


Fig. 2. Similarity between the homestead habitats of the study area in species composition based on Jaccard coefficient (Jaccard, 1912; OAAH = open area adjacent to the house).

Homestead flora could appear as an operational means for both economic well-being and biodiversity conservation in Bangladesh. The monocotyledons and pteridophytes, growing in diverse habitats, are playing a crucial role in the local economy, environment, ecosystem and society in the homestead areas. The data delivered by this study will be helpful in designing, managing, conservation and sustainable utilization and development of plant genetic resources in the homesteads of Bangladesh.

Continued degradation, and in some cases complete eradication, of indigenous floristic elements and natural vegetation as the consequences of multifarious anthropogenic activities, especially unplanned urbanization, modern agriculture, industrialization and settlements, direct consumption of plants through massive collection of firewood, timber and herbal plants, and few natural events including soil erosion, rain fall and flood, posed strong threats to the existence, productivity and diversity of the monocotyledonous and pteridophytic species in the visited homestead areas. Additionally, habitat destruction and fragmentation by anthropogenic activities and natural events, invasion of exotic species (*Mikania cordata*, *Parthenium hysterophorus*), lack of consciousness in the local people including the homestead owners, and absence of proper management and safeguard systems were distinguished as the functional threats to the monocot and pteridophytic flora of the study area.

In order to minimize these threats, appropriate and adequate management and conservation approaches and strategies, and enough awareness building and motivation programs should be launched for the protection of plant genetic resources, including the monocots and pteridophytes, in the homestead areas of this region. Conservation of homestead flora in Bangladesh should be of

immense importance, because this country has only 11.08% forest area (Mannan, 2013), which is far below the international standard (25%), and the rate of decreasing forest cover is higher than that of natural regeneration and artificial formation of new forests in this country. Besides, it is also necessary to conduct the revisionary and monitoring studies on the homestead flora of this region periodically to update the information, because the flora of a region is a dynamic resource, and a floristic study is never truly and absolutely completed.

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