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## HORTICULTURAL PLANT DIVERSITY OF HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY CAMPUS, DINAJPUR

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# HORTICULTURAL PLANT DIVERSITY OF HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY CAMPUS, DINAJPUR

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**ABSTRACT**

Asaduzzaman M, Iqbal TMT, Kabir MA, Mahmood S (2016) Horticultural plant diversity of Hajee Mohammad Danesh Science and Technology University campus, Dinajpur. *J. Innov. Dev. Strategy.* 10(1), 31-35.

A taxonomic survey work was carried out during March, 2015 to prepare a comprehensive database of the horticultural plant diversity of the Hajee Mohammad Danesh Science and Technology University. The appraisal visibly pinpoints that there were in total, 5,134 plant specimens of 382 species and 84 families. The floras had an assorted assemblage of just 13 gymnosperms but 369 (84 monocots + 285 dicots) angiosperms species. A sum of 285 species from 66 families was dicots but only 84 species and 14 families were monocots. Again, the campus hosted 215, 76, 32, 31, 18 and 10 species of ornamental, fruit, timber and forest, plantation, medicinal, and spice species, respectively. Thus, the green campus was substantially covered with various horticultural plant species.

***Key words:*** *horticulture, plant diversity, angiosperm, gymnosperm, HSTU, Dinajpur*

## INTRODUCTION

Plant genetic resources (PGRs) are the most important elements of biodiversity behind life systems on this unique orb. Those possessions are global assets of immeasurable values of present as well as future generations, sources of improved crop yield and quality, and finally, represent the very foundation of the humans' survival (FAO 1994; ZEF 1998). Regrettably, many of the vital PGRs are in the greatest threat of extinction than ever before due to over-exploitations, abolition and squeezing of their natural habitats. Moreover, the losses of PGRs threaten agriculture, forestry, medicine, ecology and in the long run the humanity itself (FAO 1984). Saving of biodiversity becomes a global concern and its conservation is an intrinsic responsibility for mankind (IUCN 2011).

Botanical Gardens are the safest arenas for live collection and conservation of rare, endangered and threatened plant species. FAO (1996) has suggested to strengthen Botanical Gardens, arboreta, horterium etc. linked with universities and research institutes for collection and conservation of rare and endangered plant genetic resources and to promote education and public awareness about those. The world's first Botanical Garden was set in Pisa, Italy in 1544 to teach her medical students about live medicinal plants (Chakraverty 1997). In Bangladesh, after the first inventory report of the Baldha Garden of the Dhaka City (Chaudhury 1975), some reports have also been published on species diversity of different institutes (Chowdhury 1990; Chowdhury 1996). Hajee Mohammad Danesh Science and Technology University (HSTU) was incepted in 2002 and took plantation programs each year for its campus including its Botanical Garden. The prime aims of those programs were to satisfy academic and research needs, creation of species as well as genetic diversities, eye catching adornment of the campus, ecological balance, utilization of fallow lands and finally, fiscal gain. However, there is no well-documented information about horticultural plant diversity is available of this institute. But such documentation is utmost vital for quick access to its horticultural PGRs for the organization itself as well as other similar institutes. So, the present work was carried out to prepare a comprehensive database of the horticultural plant diversity of the HSTU.

## MATERIALS AND METHODS

**Description of the study area:** The HSTU campus is located 7 km from the district town of Dinajpur, Bangladesh. Geographical position of the campus is located on longitude 88°65′ E and 25°69′ N latitude. The soil is the Non Calcareous Brown Flood Plain developed from the Himalayan Piedmont and Tista Flood Plain deposits (Torofder *et al*. 1993). The topography of the whole campus is almost similar enjoying the sub-tropical climate having sandy loam soil with a pH of 5.8, total N 0.05%, available P 30 ppm, available K 0.18 me/100g (Rahman *et al*. 1998) and proper drainage facilities.

**Data collection methods**: The study was carried out during March, 2015. Initially, the campus was tentatively divided into six blocks, which were: Zone A = Residential area, Zone B = Administration area, Zone C = Farm area, Zone D = Student dormitory area, Zone E = Botanical garden and Zone F = Campus of the Veterinary and animal science Faculty. In each block, species wise plants were counted physically. The natural system of classification derived by the Bentham-Hooker system, was adopted to stratify the species as it is simple, descriptive and easy to access (Hassan 1995). Every species was identified, checked, cross checked and recorded in the format. All available approaches were adopted for identification and checking of the species. It is vital to note that, the saplings having the age of more than one year were taken into account for data collection. In addition, only perennial species were noted. Furthermore, for herbs, their presence was noted as a single species, not counted numerically. Again, weeds and lower plant species were excluded for the study.

## RESULTS AND DISCUSSION

**Total number of plants as well as plant species:** The green campus of HSTU is very proud to be a generous host of in total 5,134 plants representing 382 species, 270 genera and 84 families (Table 1). It would not be an exaggeration to highlight that the floras of this university site were congregated having neither help of any donor agencies nor through exchange programs with any organizations. The numbers of gymnosperms were 4, 6, 13 and 347 while those of angiosperms were 80, 264, 369 and 4,787 for the family, species and plant levels, respectively (Table 1). So, it seemed that plants of those two contrast groups were disproportionately lodged here. But the reality was quite different as the numbers of gymnosperms were fairly limited in the nature compared to those of angiosperms. Monocot families (Tables 1), genera and species were few (14, 64 and 84, correspondingly) than its opponent dicots (66, 200 and 285, correspondingly). Whereas Hossain *et al.* (2009) documented 192 horticultural species of 141 genera and 98 families in the Horticultural Farm of Bangladesh Agricultural University (BAU).

**Fruit species:** The fruit species of the campus was glorified with much diversity (Tables 1) as the site was quite congenial of having fruit plants of 31 families (3 monocots+28 dicots) and 76 species (8 monocots+68 dicots). In addition, there were 2,138 fruit plants (282 monocots+1,856 dicots). Furthermore, there were some awe-inspiring fruit species, e.g. baobab, sour sop, plum, Chinese cherry, prickly pear etc. In terms of monocots (Tables 1), the campus was a sanctuary of fruits of 3 families, 8 species and 282 plants. As far as dicot species were concerned (Table 1), the campus scoped to lodge fruits of 28 families, 68 species and 2,138 plants. Again, irrespective of types, the uppermost numbers of fruit plants were: jackfruit (408) goes behind by mango (355), cocoanut (270), litchi (167) and guava (159). Fruits of some other plant species are also edible. But those were cited under different captions (medicinal) as the key uses of those were merely therapeutic, e.g. aonla, horitoki, bahera, etc. In addition, fruits of some rattan species were edible, which was also present here. But those species were shown under timber and forest plants (Table 1). In a nutshell it can be said that the existing scenario is noteworthy. Similar study was also reported in the Horticultural Farm and Botanical Garden of BAU and RU campus (Chowdhury 1991; Khandaker 1999; Hossain *et al.* 2009). Hossain *et al.* (2009) recorded 65 fruit species in the Horticulture Farm of BAU which were from 38 genera and 25 families.

**Plantation crops:** The campus had accommodated 7 plantation crops with 10 species from 6 families (Tables 1); of those 6 families, 2 are monocots while 4 are dicots. Again, out of those 10 species, 5 were trees while 4 were herbs and only 1 i.e. betel leaf was vine (Table 1). The scenario of plantation crops was also quite reasonable. But cocoa (*Threobroma cacao*, Sterculiaceae) was not obtainable in this green campus. Nevertheless, as a plantation crop, the value of cocoa is unparallel. So, this species should be lodged here with necessary thrusts. Note that, this plant is found rarely in Bangladesh at BAU (Hossain *et al.* 2009).

Table 1. Family wise portrait of the species and plants of HSTU campus

| Sl. nos. | Family names | Category wise number of species (and plant nos.) | | | | | | Total species (no.) | Total plants (no.) | % of total plants |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Fruits | Ornamentals | Spices | Plantation | Medicinal | Timber | | | |
| **A) Gymnosperms** | | | | | | | | | | |
| 1 | Araucariaceae | - | 2 (11) | - | - | - | - | 2 | 11 | 0.22 |
| 2 | Casuarianaceae | - | 1 (5) | - | - | - | - | 1 | 5 | 0.09 |
| 3 | Cupressaceae | - | 2 (316) | - | - | - | - | 2 | 316 | 6.16 |
| 4 | Cycadaceae | - | 8 (15) | - | - | - | - | 8 | 15 | 0.29 |
| Total gymnosperms | | | 13 (347) | - | - | - | - | 13 | 347 | 6.76 |
| **B) Monocots** | | | | | | | | | | |
| 1 | Acoraceae | - | - | 1 (1) | - | - | - | 1 | 1 | 0.01 |
| 2 | Amaryllidaceae | - | 7 (7) | - | - | - | - | 7 | 7 | 0.14 |
| 3 | Araceae | - | 9 (9) | - | - | - | - | 9 | 9 | 0.18 |
| 4 | Bromeliaceae | 1 (1) | 3 (3) | - | - | - | - | 4 | 4 | 0.08 |
| 5 | Cannaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 6 | Commelinaceae | - | 2 (2) | - | - | - | - | 2 | 2 | 0.02 |
| 7 | Cyperaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 8 | Gramineae | - | 2 (2) | 1 (1) | 4 (4) | - | - | 7 | 7 | 0.14 |
| 9 | Liliaceae | - | 11 (14) | - | - | 2 (2) | - | 13 | 16 | 0.32 |
| 10 | Marantaceae | - | 8 (8) | - | - | - | - | 8 | 8 | 0.15 |
| 11 | Musaceae | 3 (3) | 4 (4) | - | - | - | - | 7 | 7 | 0.14 |
| 12 | Palmae | 4 (278) | 8 (23) | - | 2 (292) | - | 5 (5) | 19 | 598 | 11.64 |
| 13 | Pandanaceae | - | 1 (1) | 1 (1) | - | - | - | 2 | 2 | 0.02 |
| 14 | Zingiberaceae | - | 1 (1) | 2 (2) | - | - | - | 3 | 3 | 0.05 |
| Total monocots | | 8 (282) | 58 (76) | 5 (5) | 6 (296) | 2 (2) | 5 (5) | 84 | 666 | 12.97 |

**Cont.**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **C) Dicots** | | | | | | | | | | |
| 1 | Acanthaceae | - | 7 (8) | - | - | 2 (2) | - | 9 | 10 | 0.19 |
| 2 | Amaranthaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 3 | Anacardiaceae | 4 (363) | - | - | - | 1 (1) | 1 (2) | 6 | 366 | 7.10 |
| 4 | Annonaceae | 3 (27) | 3 (312) | - | - | - | - | 6 | 339 | 6.70 |
| 5 | Apiaceae | - | - | - | - | 1 (1) | - | 1 | 1 | 0.01 |
| 6 | Apocynaceae | 1 (10) | 12 (41) | - | - | 3 (9) | - | 16 | 60 | 1.16 |
| 7 | Araliaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 8 | Asclepiadaceae | - | - | - | - | 1 (1) | - | 1 | 1 | 0.01 |
| 9 | Averrhoaceae | 2 (17) | - | - | - | - | - | 2 | 17 | 1.17 |
| 10 | Bignoniaceae | - | 9 (19) | - | - | 1 (1) | - | 10 | 20 | 0.39 |
| 11 | Bixaceae | - | - | 1 (3) | - | - | - | 1 | 3 | 0.06 |
| 12 | Bombaceae | 1 (1) | 1 (2) | - | - | - | 1 (1) | 3 | 4 | 0.08 |
| 13 | Cactaceae | 1 (1) | 3 (3) | - | - | - | - | 4 | 4 | 0.08 |
| 14 | Caprifoliaceae | - | 2 (5) | - | - | - | - | 2 | 5 | 0.10 |
| 15 | Caricaceae | 1 (1) | - | - | - | - | - | 1 | 1 | 0.01 |
| 16 | Chenopodiaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 17 | Combretaceae | 1 (6) | 1 (2) | - | - | 3 (62) | - | 5 | 70 | 1.46 |
| 18 | Compositae | - | 1 (1) | - | - | 1 (1) | - | 2 | 2 | 0.03 |
| 19 | Convolvulaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 20 | Crassulaceae | - | - | - | - | 1 (1) | - | 1 | 1 | 0.01 |
| 21 | Dilleniaceae | 1 (7) | - | - | - | - | - | 1 | 7 | 0.17 |
| 22 | Dipterocarpaceae | - | - | - | - | - | 1 (6) | 1 | 6 | 0.14 |
| 23 | Ebenaceae | 1 (3) | - | - | - | - | - | 1 | 3 | 0.12 |
| 24 | Elaeocarpaceae | 1 (31) | - | - | - | - | - | 1 | 31 | 0.60 |
| 25 | Ericaceae | - | 1 (3) | - | - | - | - | 1 | 3 | 0.06 |
| 26 | Euphorbiaceae | 2 (14) | 11 (47) | - | 1 (3) | 2 (36) | - | 16 | 100 | 1.94 |
| 27 | Flacourtiaceae | 2 (6) | - | - | - | - | - | 2 | 6 | 0.11 |
| 28 | Guttiferae | 3 (4) | 1 (3) | - | - | - | - | 4 | 7 | 0.14 |
| 29 | Labiatae | - | 1 (1) | 3 (3) | - | 1 (1) | - | 5 | 5 | 0.10 |
| 30 | Lauraceae | 1 (1) | - | 3 (3) | - | 1 (1) | - | 5 | 5 | 0.10 |
| 31 | Lecythiadaceae | - | 1 (3) | - | - | - | - | 1 | 3 | 0.06 |
| 32 | Leguminosae | 2 (18) | 21 (174) | - | - | - | 9 (92) | 32 | 284 | 5.53 |
| 33 | Logianaceae | - | - | - | - | 1 (1) | - | 1 | 1 | 0.01 |
| 34 | Lythraceae | - | 1 (8) | - | - | 1 (5) | 1 (13) | 3 | 26 | 0.50 |
| 35 | Magnoliaceae | - | 3 (10) | - | - | - | - | 3 | 10 | 0.19 |
| 36 | Malvaceae | - | 6 (31) | - | - | - | - | 6 | 31 | 1.95 |
| 37 | Malpighiaceae | - | 2 (4) | - | - | - | - | 4 | 2 | 0.03 |
| 38 | Melastomaceae | - | 2 (5) | - | - | - | - | 2 | 5 | 0.10 |
| 39 | Meliaceae | - | - | - | - | 1 (251) | 4(719) | 5 | 970 | 18.90 |
| 40 | Moraceae | 3 (414) | 6 (23) | - | - | 1 (2) | 4 (22) | 14 | 461 | 8.98 |
| 41 | Moringaceae | - | - | - | - | 1 (4) | - | 1 | 4 | 0.04 |
| 42 | Myrtaceae | 7 (249) | 5 (30) | 2 (2) | - | - | 1(101) | 15 | 382 | 7.44 |
| 43 | Nyctiginaceae | - | 1 (7) | - | - | 1 (1) | - | 2 | 8 | 0.15 |
| 44 | Oleaceae | - | 6 (28) | - | - | - | - | 6 | 28 | 0.55 |
| 45 | Orchidaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 46 | Passifloraceae | 1 (1) | - | - | - | - | - | 1 | 1 | 0.01 |
| 47 | Piperaceae | - | - | 3 (9) | 1 (1) | - | - | 4 | 10 | 0.19 |
| 48 | Plumbaginaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 49 | Poligonaceae | - | 2 (2) | - | - | - | - | 2 | 2 | 0.03 |
| 50 | Punicaceae | 1 (6) | - | - | - | - | - | 1 | 6 | 0.12 |
| 51 | Rhamnaceae | 2 (25) | - | - | - | - | - | 2 | 25 | 0.48 |
| 52 | Rosaceae | 5 (14) | 2 (32) | - | - | - | - | 7 | 46 | 0.88 |
| 53 | Rubiaceae | - | 8 (59) | - | 1 (4) | - | 2 (14) | 11 | 77 | 1.50 |
| 54 | Rutaceae | 11 (154) | 2 (9) | 1 (5) | - | - | - | 14 | 168 | 3.27 |
| 55 | Santalaceae | - | - | - | - | 1 (1) | - | 1 | 1 | 0.01 |
| 56 | Sapindaceae | 2 (169) | - | - | - | 1 (1) | - | 3 | 170 | 3.31 |
| 57 | Sapotaceae | 3 (11) | 2 (61) | - | - | - | - | 5 | 72 | 1.40 |
| 58 | Saxifragaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 59 | Scorphulariaceae | - | 1 (1) | - | - | - | - | 1 | 1 | 0.01 |
| 60 | Smiliaceae | - | - | - | - | 1 (1) | - | 1 | 1 | 0.01 |
| 61 | Solanaceae | - | 3 (10) | - | - | - | - | 3 | 10 | 0.19 |
| 62 | Sterculiaceae | 3 (14) | 1 (1) | - | - | 1 (3) | - | 5 | 18 | 0.35 |

| **Cont.** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 63 | Tiliaceae | 2 (6) | - | - | - | - | - | 2 | 6 | 0.11 |
| 64 | Theaceae | - | 1 (2) | - | 1 (161) | - | - | 2 | 163 | 3.16 |
| 65 | Verbenaceae | - | 8 14) | - | - | 1 (1) | 2 (28) | 11 | 43 | 0.85 |
| 66 | Vitaceae | 1 (1) | - | - | - | 1 (1) | - | 2 | 2 | 0.03 |
| Total dicots | | 68 (1574) | 144 (967) | 13 (25) | 4 (169) | 30 (389) | 26 (998) | 285 | 4,122 | 80.27 |
| **Grand total** | | **76 (1856)** | **215 (1388)** | **18 (30)** | **10 (465)** | **32 (391)** | **31 (1003)** | **382** | **5,134** | **100.00** |

**Spices and aromatic species:** About 18 perennial spice species of both monocots (5) and dicots (13) were listed from the university premise. Those were from 10 families (4 monocot + 6 dicot) and 12 genera (4 monocot + 8 dicot) (Tables 1). Moreover, herb, tree and vine these 3 kinds of species were accessible. Hossain *et al.* (2009) listed only 4 spices plant species under 4 genera and 4 families in the Horticultural Farm of BAU. Spices are exclusive reward of the nature to season different food items. There are about 200 spice species worldwide, majorities of which are winter annuals. But about 18 perennial spice species are available in HSTU campus. Another eye catching thing was that 3 notable tree spices were obtainable in the campus- wild cassia, allspice and curry leaf. In addition, 2 tree spices remained unidentified: those were locally called (i) pan bilash/pan bahar (probably *Clausena heptaphylla*) and (ii) gunail (perhaps *Aegialitis rotundifolia*).

**Medicinal species:** Under the medicinal species, in total 391 plants were listed from 32 species and 25 families (Tables 1). It was also lucid from the Table 1 that there were 10 herbs, 19 trees and 3 vines. Species with the highest number of plants were recorded in neem (251) followed by aonla (31) and arjun (18). The showground also hosted 6 extra ordinary plants, e.g camphor, nux-vomica, piyal, ritha, santalum and tanpura. Moreover, other species were also used medicinally and several of those were also present here but cited under different groups in this section according to their major utilities. Similar study was also conducted in the Farm of Horticulture of BAU where a total of 32 medicinal plant species were registered in the Horticultural Farm of BAU under 29 genera and 24 families (Hossain *et al.* 2009).

**Timber and forest species:** A total of 1,003 timber and forest plants were listed under 31 species and 11 families (Tables 1). The Leguminosae family had the topmost number of genera (7) and species (9) but accommodates only 84 plants. Oppositely, the highest number of plants was recorded for mahogoni (490) followed by bead tree (188) and eucalyptus (101). Again, the campus gathered 5 species of rattan. It can be concluded that this section was not so rich compared to BAU and RU campuses (Chowdhury 1991; Khandaker 1999; Hossain *et al.* 20009). So, more diversified timber and forest species should be gathered in this green campus.

**Ornamental plant species:** A total of 1,389 ornamental plants were displaying beauties (Tables 1) in this congenial arena on behalf of 215 species and 58 families. Of those 215 species 71, 49, 68, 9 and 17 were trees, shrubs, herbs, vines and lianas (Table 1). Again, Leguminosae had the largest number of species (21) covering 174 plants. The highest number of plants listed are weeping fir (260) succeeded by Thuja (184). Here, gymnosperms, angiosperms, herbs, shrubs, trees, vines and lianas - all the 6 kinds of plants are present. The campus has gathered some very notable ornamental species, e.g. adenium, African tulip, anjon, disanthus, gustavia, mandhablata, jahuri champa, konok champa, ornamental pineapple, ornamental banana, rhododendron, sambucas etc. In a nutshell, it could be unequivocally concluded that the campus is very rich in ornamental species compared to Horticulture Farm of BAU where 44 ornamental plant species under 34 genera and 25 families were reported by Hossain *et al.* (2009). But no aquatic species is available in this campus. Again, orchids, cacti and roses are very poor in number so, some important species must be added to the list.

## CONCLUSION

The evaluation visibly highlights that there were in total 5,134 plant samples representing 382 species from 84 families. The floras had an assorted assemblage of only 13 gymnosperms but 369 angiosperms. A sum of 285 species of 200 genera from 66 families was noted under dicots but only 84 species, 64 genera and 14 families from monocots. Numerically, dicots dominate monocots. Again, the campus hosted 215, 76, 32, 31, 18 and 10 species of ornamental, fruit, timber and forest, plantation, medicinal, and spice species, respectively. The green campus was substantially covered with various plant species, which act not only as an element of biodiversity conservation but also act as an unique center for horticultural education and research activities. However, the total species collection should be further diversified, particularly the broad wild genetic pool, which are still available in the nature. It is also suggested to boost-up the protection of endemic, rare and threatened wild horticultural plant resources and to defend diversity of the domain.

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