

FLORISTIC COMPOSITION AND SPECIES DIVERSITY
OF H.S.T.U. CAMPUS, DINAJPUR

A THESIS

BY

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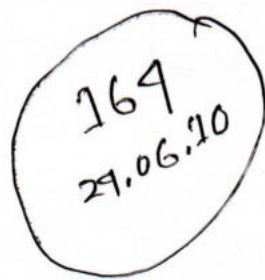
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Hajee Mohammad Danesh Science and Technology University
Dinajpur

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A Thesis

**Submitted to the Department of Horticulture
Hajee Mohammad Danesh Science and Technology University
Dinajpur**

In partial fulfillment of the requirements for the degree of

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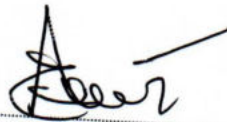
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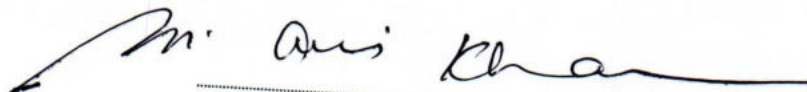
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May 2009

DEDICATION

TO,

BELOVED PARENTS

AND

THE BEST HALF

ABSTRACT

A taxonomic survey work was carried out during March, 2009 to explore the richness of the plant resources of H.S.T.U. Campus, Dinajpur. The aims of the survey was to prepare an inventory of those incalculable possessions according to their 6 main utilities in a users' friendly data access system, to have tips for sensible management of those assets and finally, to suggest means for their further perfection. The appraisal visibly pinpoints that there were in total, 5,134 plant specimens of 382 species, 270 genera 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 of 200 genera from 66 families was dicots but only 84 species, 64 genera 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. In gymnosperms, thuja had the highest number (314) of plants; in dicots, mahogany was the dominating species (490) while in monocots, betel nut (283) was the leading one. In general, the topmost numbers of plants were: mahogany (490) followed by jackfruit (408), mango (355), thuja (314), weeping fir (300), betel nut (283), cocoanut (270), neem (251), bead tree (188) and litchi (167). However, some species were represented by only one sample, e.g. baobab, allspice, kapok, camphor, agor, taikor, African tulip, ritha etc. The Premise also accommodated some rare species- agor, allspice, anjan, African tulip, baobab, brownia, canon ball tree, camphor, kapok, ritha, thaikor, sour sop etc. Hence, plant luxuries regarding taxonomic aspects were quite amazing. Yet, anthropogenic plant formations were found as some species, e.g. mango, jackfruit, mahogany, neem, bead tree etc. were built-in almost each year in the plantation programs instead of wild as well as other diversified species. So, proposals were set for plantation programs for preservation of endemic, rare and threatened plant assets and to defend the genetic multiplicities.

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CHAPTER 1

INTRODUCTION

Plant genetic resources (PGRs) are the most important elements of biodiversity behind life systems on this ~~planet~~ ^{Planet Earth}. 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). And once a species is extinct, the genes it possessed are lost forever.

The very term biodiversity is the total of intra specific genes (genetic diversity), species (inter specific diversity) and ecosystems (ecosystem diversity). Species diversity, the most usual indicator of biodiversity today, can be assessed in many ways. Nonetheless, scientists all over the orb have not settled down on any single means. But the number of plant species in a region or community- its species richness- is one of the vital dimensions. The "Taxonomic diversity" is also considered as the

relationships of species to one other. As per the declaration adopted in the Conservation of Biological Diversity and the United Nation's Conference on the Environment and Development (The Earth Summit) in Rio de Janeiro in 1992, saving of biodiversity becomes a global concern. So, FAO (1996) has suggested to strengthen Botanical Gardens, arboreta, hortorium 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.

Live collection with special emphasis on plant diversity and conservation of rare, endangered and threatened plant species is becoming vital day by day. In that link, Botanical Gardens are the safest arenas. So, various institutions establish such gardens keeping in view specific aims, which are need-based of the day. The world's first Botanical Garden was set in Pisa, Italy in 1544 to teach her medical students about live medicinal plants (Chakraverty, 1997). Nonetheless, with the passage of time and changing concepts, the goals of Botanical gardens are also modifying, e.g. aiding in taxonomic studies; as a centre of recreation; protection and introduction arena of both endemic and exotic money-making species; and last but not least as the horticultural and agro-forestry research centres. Presently, it has been expounded convincingly that, the primary roles of such gardens should be the major centres of saving those species, which

have attained various degrees of threats and to organize public awareness and ecological education. However, due to inadequate scope of *in situ* conservation, various institutes in many countries have fortified *ex situ* conservation of rare and endangered plant genetic resources in their Botanical Gardens, arboreta and field gene banks for perpetuation, and also providing education and research with a ready access facilities to a wide range of plant genetic materials. Note that at present about 1,800 Botanical gardens and arboreta located in nearly 150 countries are conserving nearly 80,000 plant species (Rahman, 2007).

In neighboring India, directories of her Botanical Gardens are accessible (Chakraverty, 1997). In Bangladesh, an inventory was first in print for the Baldah Garden- the plant-wonderland of the Dhaka city (Chaudhury, 1975). Chowdhury (1990) explored the plant species of the Rajshahi University (R.U.) Site. Chowdhury (1996) assessed the tree resources of the Bangladesh Academy for Rural Development campus (B.A.R.D.), Comilla. Talukder (1999) studied the plant multiplicities of the Bangladesh Agricultural University (B.A.U.) campus. Moreover, Khandaker (1999) appraised the plant genetic resources of the Botanical Garden of the Bangladesh Agricultural University. Even, Islam (2004) assessed the species diversities of the Singra forest, Dinajpur.

Conversely, Hajee Mohammad Danesh Science and Technology University (H.S.T.U.) was incepted on 08/04/2002 and took plantation programs each year for its campus including its Botanical Garden opened on 18/12/2006. 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. Sadly, there was no inventory regarding the plant multiplicities of the campus including the Botanical Garden. But such a publication is utmost vital for quick access to its PGRs for the organization itself as well as other similar institutes. So, the present piece of survey work was carried out on the plant resources of the campus with the following objectives:

- To prepare a comprehensive database of the plant genetic resources of the campus with their taxonomic identities and foremost uses.
- To explore the plant richness of the campus with special reference to rare and endangered species.
- To have facts for various academic, research and extension institutes to swap plant species, seeds and to share experiences etc.
- To suggest proliferation of endangered and rare species
- To appraise their health conditions for perpetuation tips and finally,
- To pave possible means for further perfection in terms of conservation of the biodiversity.

CHAPTER 2

REVIEW OF LITERATURE

Different authors explored the assorted spots of Bangladesh for their floristic compositions and species richness. The conclusions of those assessments are appraised and presented in this episode selectively under different captions for ease of access.

2.1. Plant collection of the Baldah Garden, Dhaka

The Baldah Garden, the plant wonderland vis-à-vis a mini Botanical Garden of the Dhaka city, was inceptioned in 1909 as a personal property of Narayan Roy Chaudrury- an altruistic naturalist. Finally, in 1962, it was handed over to the Department of Forestry, Government of Bangladesh.

Chaudhury (1975) appraised the floras of the Garden. It was quite amazing that, there were 15,000 plants from 672 species of 339 genera representing 87 plant families. It housed not only a rich cross-section of the floras of the republic, but also a wide collection of about 50 countries too. Many of the exotic and rare species procured represented varied climatic zones and lots of those were cultured, and multiplied there artificially. Few of the exciting species were *Adansonia digitata*, *Maranta* spp., *Anthurium* spp., poplas, pothos, *Amherstia* spp., etc. It is still the most exciting appeal for the *ex situ* conservation of rare species; as well as to naturalists, academicians, scientists and tourists of various ages and places.

2.2. Endangered and threatened plant species of Bangladesh

The domain has unique geographical site, i.e. $20^{\circ} 25'$ to $26^{\circ} 38'$ N and $88^{\circ} 01'$ to $92^{\circ} 40'$ E, plenty of rainfall- about 200cm/annum and an enjoyable temperature of 10 to 35°C (Iqbal *et al.*, 2001). Hence, it is rich in plant biodiversity than many other realms. The republic had nearly 5,000 angiosperm species including 545 medicinals. The mountain ecosystems had about 2,260 species out of 5,000 together with 30 bamboos, 8 rattans and 130 fiber species. But many of those were threatened due to losses or shrinkage of their habitats. A total of some 45 forest species were listed endangered (Khan, 1991, and Haq and Banik, 1992). Hassan (1997) also reported some endangered and threatened plant species, e.g. planchon (*Ancistracladus wallichii*), ban-shupari (*Areca triandra*), cycas (*C. pectinata*), kadam bet (*Calamus erectus*), chhottee bet mera (*Calliandra umbrosa*), modan mosta (*Dehaasia kurzii*), doli grajan (*Dipterocarpus gracillis*), ban jalpai (*Elaeocarpus ganitrus*), homalium (*Homalium schlichii*), depthal (*Garcinia xanthochymus*), kuruad pata (*Licuala peltata*), jangli am (*Mangifera longipes*), urium (*Mangifera sylvatica*), mankhona (*Pajanelia longifolia*), jigar (*Pithecellobium angulatum*), ram shupari (*Pinanga gracilis*), banshpata (*Podocarpus neriifolia*), joygga gola (*Prunus ceylanica*), chalmugra (*Hydnocarpus kurzii*), chundul (*Tetrameles nudiflora*), lata am (*Willughbeia edulis*), boilam (*Anisoptera glabra*), han sak (*Xanthophyllum flavescens*) and lasuagarjan (*Vatica lanceifolia*).

2.3. Fruit and nut species

Das (1987) enlisted some 60 species of edible fruits and nuts, which were common in forests and villages thickets. The minor edible fruit species were hog plum (*Spondia dulcis*), Indian black berry (*Syzygium cumini*), bel (*Aegle marmelos*), wood apple (*Feronia limonia*), velvet apple (*Diospyros discolor*), tamarind (*Tamarindus indica*), date palm (*Phoenix sylvestris*), palmyra palm (*Borassus flabellifer*), Indian ber (*Zizyphus mauritiana*). Those were important for providing local people with much needed nutrients, firewood and cash income. Unfortunately, many of those are now in the greatest threat of extinction. Other underutilized fruit species along with gene pools of many fruit and nut crops were *Dillenia pentagyna*, *Diospyros peregrina*, *Spondias pinnata*, *Suregada multiflora*, *Anacardium occidentale*, *Antidesma ghaesmbilla*, *Artocarpus lakoocha*, *Baccaurea ramiflora*, *Bauhinia vahlii*, *Ficus macrophylla*, *Flacourtia jangomas*, *Syzygium fruticosum*, *S. fruticosa*, *Zizyphus oenoplea*, *Z. rugosa*, *Z. oenoplea* and *Terminalia catappa*.

2.4. Medicinal species

More than 500 medicinal species were listed from the underneath vegetations of the forests and village groves. Many of those were used by villagers and tribal communities for human and animal treatments (Khan, 1991). But those valuable species were reported to be disappearing rapidly (FAO, 1984). Khan (1997) observed some medicinal species as

endangered, which were *Sagittaria platyphylla*, *Zingiber spectabile*, etc. It was also reported that some important medicinal plants were threatened in the wild state due to the destructions of their habitats and over collection. Those were: *Rauwolfia serpentina*, *Terminalia chebula*, *T. belerica*, *T. arjuna* and *Holarrhena antidysenterica*.

2.5. Bamboo species

Bangladesh has 30 bamboo species of which seven occur in the hill ecosystems. Forest bamboos occurred in extensive areas. The important forest bamboos are muli (*Melocanna bacifera*), mitinaga (*Bambusa tulda*), ora (*Dendrocalamus longispathus*) and dulu (*Neohouzeana dullooa*). The species peach (*Dendrocalamus hamiltonii*), lata (*Melocalamus compactiflours*) and dulu (*Neohouzeana dullooa*) were regarded as threatened ones in the hill forests (Banik, 1994).

2.6. Wood species

Alam (1988) recorded about 790 woody taxa belonging to 95 families from the hill forests of Sylhet of which nearly 400 were trees. Among the families enumerated, Leguminosae ranked top of the list having 95 woody taxa; Euphorbiaceae and Rubiaceae occupied the second and the third positions having 60 and 57 woody taxa, respectively. Moraceae, Lauraceae, Verbenaceae and Myrtaceae were symbolized by 32, 32, 31

and 27 woody taxa, in that order. Most of the members of Annonaceae and Apocynaceae were woody climbers. About 25 families were noted by single woody taxa. Approximately nine species of bamboos of six genera and five species of rattans of two genera occurred in the Sylhet forests.

2.7. Palm and rattan species

There 12 species of palms occurred in their natural habitats in the realm. The wild palms were being decimated at alarming rates resulting in losses of those valuable species (Khan, 1997). There were at least nine species of rattans growing wild in the forests. All the rattans species were also under threat of various degrees due to destructions of their habitats. Note that rattans were commercially important and had immense ethno botanical values (Alam, 1990).

2.8. Tree and timber species

Information about endangered tree and timber species are limited and scanty. It has been known that some important timber and woody tree species of both wild and semi-domesticated were endangered in parts of their distribution ranges where the species had been reduced to below the minimum viable population level due to fragmentation of habitats into patches and introduction of quick growing exotic timber species. The endangered tree species were *Lophopetalum fimbriatum*, *Bischofia javanica*, *Aphanomixis polystachya*, *Swietonia floriobunda*, Urian- Deshi

gab= ~~Diospyros~~ ~~Peregrina~~, Sonaba = (*Cassia fistula*), Mohua = (*Madhuca longifolia*), Tilgaha (*Lagestroemia parviflora*) and *Hymenodictyon excelsum* (Haque *et al.*, 1997).

2.9. Village tree diversity

Village forests covered an area of only 0.27 million hectares while the state owned forests roofed 2.25 million hectares. Village forests, mostly privately owned were more productive than the public forest and supplied about 85% of timber requirements of the nation. Both indigenous and exotic trees were the major components of those forests. Those were represented by 183 species belonging to 39 genera under 48 families. Floristic elements of those floras consisted mostly of native African and New World taxa. Nearly 50 species were exotic and many of those were naturalized. Exotic species are still being introduced. Most of the village trees had multiple uses. About 40 were fruits and others were timbers, firewood, fodder, tannins and medicinally important. Other than species diversity, genetic variations also occurred there. Homestead tree production systems in villages were the mode of species and genetic conservations for a good number of trees (Alam *et al.*, 1996).

2.10. Legume diversity

A preliminary account of legume diversity in the republic was prepared based on the literature survey and herbarium collection. A total of 98 genera and 332 sub generic taxa, both wild and cultivated, were recorded

under the sub-families Caesalpinioideae (20, 60), Mimosoideae (14, 39) and Papilionoideae (64, 233). Much of the relevant information on potential legumes including crops or exploitation of local ones was lost in countless reports, which were not readily available at the developing country level. Despite a growing sense of urgency, attempts to document the distribution of legume floras were relatively slow to face the increasing demand for information by national planners concerning topics like mitigation of destruction of biodiversity. Appreciating the urgency of the situation, the International Legume Database and Information Service (ILDIS) was established as a pioneer step, coordinated by the University of Southampton and the Royal Botanic Garden, Kew, the U.K., and the Missouri Botanical Garden, St. Lewis, Missouri, the U.S.A., and the National Botanical Research Institute (NBRI), Lucknow, India, which was the Regional Inquiry Centre of South Asia (RICOSA) of ILDIS and was developing a computerized database of legumes of South Asia covering eight countries, viz. Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka in collaboration with the Royal Botanic Garden, Kew, the U. K. (Khan *et al.*, 1996).

2.11. Tree diversity in the Ramu reserved forest of Cox's Bazar

Diversity and distribution patterns of tree species of that Forest were studied by count plot method to analyze the stand composition. A total of 58 tree species were recorded from the forest of which 77 belonging to 30

families were identified. Leguminosae and Moraceae ranked tops with seven species followed by Verbenaceae and Euphorbiaceae each with six species. The Important Value Index (IVI) of each species was calculated to characterize the composition of vegetation. *Bursera serrata* showed the highest IVI followed by *Artocarpus chama*, *Pterospermum acerifolium*, *Hopea odorata*, *Glochidion multiloculare* and *Vitex pedunculairs*. Considering the species richness- stocking, abundance and uniform distribution of many important species like *Artocarpus chama*, *Bursera serrata*, *Dipterocarpus alatus*, *D. turbinatus*, *Engelhardtia spicata* and *Hopea odorata*, that forest was declared protected (Hossain, *et. al.*, 1997).

2.12. Flora of the Rajshahi University (R.U.) campus

From a floristic study of the RU Campus, it was found that the total number of species were 135, of which 31 were trees, 19 were shrubs, 52 were herbs, 8 were climbers, 22 were grasses and 3 were pteridophytes. Among the plant species, 62.96% belonged to the general life from i.e. herb. Eventually, most of the fallow lands were covered with those. Trees and shrubs were 22.96 and 14.07% of the total number of species, respectively (Chowdhury, 1991).

2.13. Tree possessions of the Bangladesh Academy for Rural Development (B.A.R.D.) campus

Chowdhury (1996) surveyed the tree resources of the BARD Campus where he noted that timber yielding species constituted the highest number (46.2), and medicinal and spices plants formed the lowest ones

(1.1%). Twenty one species of varied timber values were available there. Fruit yielding species and fruit plus timber yielding species occupied the second (14.6) and the third (17.9%) positions, correspondingly. There were plenty of fruit trees in the premise. The highest number of fruit trees found was mostly of the Palmae family followed by guava.

2.14. Plant multiplicities of the Botanical Garden of the Bangladesh Agricultural University (B.A.U.)

A study was carried out to assess the diversity of the plant genetic resources and to develop a computerized database on the *ex situ* plant holding of that Garden for improved information management systems (Khandaker, 1999). The study revealed that there were in total 296 species under 225 genera and 86 families. The floras further showed a heterogeneous assemblage of one pteridophyte, six gymnosperms and 289 angiosperms. A total of 140 species of 180 genera and 70 families were documented under the dicots, and 54 species, 43 genera and 12 families under the monocots. Numerically the dicots dominated over the monocots in the ratio of 1: 9: 5 in the species level, 1: 5: 5: in the generic level and 1: 5 in the family level. In dicots, Leguminoae was the largest family (21 genera with 34 species) followed by Rubiaceae (9 genera and 10 species) and Apocynaceae (8 genera and 8 species), while 43 families were presented by single genus, and 37 families by single species in each. In monocots, Palmae was the largest family (14 genera and 16 species)

followed by Liliaceae (7 genera and 7 species) and Gramineae (6 genera and 14 Species). Two families were symbolized by single genus in each case and one family by a single species only (Khandaker, 1999). But Rahman (2007) furnished recent data about the plant possessions of this unique garden as 1,228 plant specimens covering 727 genera of 215 families. The Author also cited 5 notable successes of the garden.

2.15. Plant species diversity of the Singra forest, Dinajpur

A study was carried out to assess the plant genetic resources of the forest. The study revealed a total of 105 species under 90 genera and 45 families. The floras showed heterogeneous assemblage of three pterodophytes (3 genera of one family), 4 monocots (4 genera from a single family) and 98 dicots (83 genera on behalf of 43 families). Out of all, 17 timber species (including 15 genera from 10 families), 14 fruit species (13 genera coming from 10 families), 54 medicinal species (47 genera of 32 families), 8 ornamental species (8 genera covering 5 families), 6 fodder species (6 genera of 5 families), one rattan species (one genus from one family), 4 ficus species (one genus from a single family) and one fibre species (one genus representing one family) were recorded. Of all the species, 10 were found abundant while 10, 53, 29 and 3 were recorded as frequent, occasional, rare and introduced, respectively. Leguminosae (Caesalpinioideae, Papilionoideae and Mimosoideae) was the dominated one having 18 species under 12 genera followed by Euphorbiaceae and Moraceae having 7 species in each under 7 and 2 genera, respectively. A total of 58 species were trees, 25

shrubs 14 herbs and 8 climbers. A record on the plant genetic resources had also been developed with the taxonomic ways of resources. Huge number of plant species were found as rare and threatened. So, some suggestions were made to enhance the conservation of endemic, rare and threatened wild plant genetic resources and to safeguard the plant diversity there (Islam, 2004).

2.16. Plant species assortments of the Sal forest

Sal (*Shorea robusta*, Dipterocarpaceae) is a vital timber species. It had the widest distribution among the Dipterocarps. Sal forest were scattered in the comparatively drier central and northern areas of the state, mostly occurring in the Dhaka and Rajshahi divisions. The major forests lied in the districts of Gazipur, Mymensingh and Tangail. Small patches of natural sal forest also occurred at Saltilla of Sylhet and Mainamoti of Comilla districts. There were also sal plantations in Dhaka, Dinajpur and Sylhet districts (Das, 1976). In addition, there were some smaller patches of forest areas in the Comilla, Rangpur, Dinajpur and Thakurgaon districts. Forests of Dinajpur-Thakurgaon districts were situated at Singra, Nawabgonj, Dharmapur and Madhypara (Alam, 1995).

Champion *et al.* (1965) classified the sal forests under the tropical moist deciduous type. Most of the sal forests were of this type except a few patches along the foot hills of Garo, which were semi evergreen type. Sal

forests originally covered most of the lowlands and floodplains in the central and western parts of the country. Those forests were drastically reduced in areas and now exist only in a number of widely scattered and degraded patches. Officially, the sal forest occupied nearly 120,000 ha, but the area under tree covered only 10% (Winterbottom *et al.*, 1989). Two distinct subtypes of the natural sal forests were recognized: pure and mixed. The mixed subtype was dominated by sal in the canopy, and included many other associated species such as *Terminalia bellerica*, *Albizia procera* and *Lagerstroemia flosresinae*. A detailed list of the flora of the Barind Tract in sal forest type incorporated 271 species covering 41 tree species (Zuberi, 1992)

Sal was dominant of those forests and usually formed 75 to 25% of the upper canopy but might be absent locally over fairly large patches (Ismail and Mia, 1973). Its associates were other deciduous species and varied in different localities. *Adina cordifolia*, *Albizia procera*, *Bombax ceiba*, *Bullea monosperma*, *Lagerstroem iaparuiiflora*, *Dillenia pentagyna* were common members with sal in Madhupur, Singra and Rajendrapur areas. There was a fairly defined lower stratum of deciduous trees, such as *Careya arborea*, *Bauhinia* spp. and *Holarrhena pubescence*. Climbers were *Entada rheedii*, *Spatholobus roxburghii*, species of *Smilax*, *Dioscorea* and other members of Vitaceae. Shrubby *Syzygium nervosum*,

Glochidion spp. and *Flacourtia* spp. were also found along the edge of the forests. Among mistletoes, *Macrosolen cochinchimensis* was frequent. Amongst the palms only rattan (*Calamus viminalis* var. *fasciculatus*) was found beside the dry outskirts of Madhupur and Rajendrapur areas. Vegetations of Runcitia and Gazni areas were little different from those of Madhupur and other areas. Except sal, more ordinary species of the upper canopy in those areas were *Adina cordifolia*, *Protium serratum*, *Schima wallichii*, *Oroxylum indicum*, *Stereospennum personatum*, *Dalbergia sericea*, *Garuga pinnata* etc. The vegetation of the forests on the foothills of Garo Hill was of mixed type. There sal in the upper canopy was mixed with *Artocarpus chmpa*, *Aphanamixis polystachya* and other evergreen species (Alam, 1995).

2.17. Plant species variability of the hill forests

The hill forests consisted of moist tropical evergreen and semi-evergreen forests, which were extended from northeast to southeast of the country. Over 100 evergreen and deciduous species were identified. The forests were generally uneven aged and multistoried. Single species stand did not occur and the occurrence of a given species was often limited to a few trees per hectare. Six general subtypes were defined (De Milde *et al.*, 1985; Choudhury, 1990).

2.18. Tree diversity in the Sundarbans and other forests

The mangrove forest ecosystems originally covered a vast area of coastal Bangladesh. This coastal forest was restricted to approximately 5,77,000 ha (of which 1,82,000 ha in water) in the Sundarbans. Although greatly reduced from their former extent, the present days Bangladesh Sundarbans are part of the largest remaining expanse of mangrove forest in the world. Those accounted for at least half of the remaining areas of the natural forest of Bangladesh. Three forest zones or sub types were recognized in the Sundarbans tidal mangrove forests; freshwater, moderately saline and saltwater zones. Sundri (*Heritiera fomes*) was the typical species of the freshwater tidal forest type; gewa (*Excoecaria agallocha*) of the moderately saline form; and goran (*Ceriops decandra*) of the saltwater zone (Das and Siddiqui, 1985; Chaffey *et al.*, 1985; Hussain *et al.*, 1994). Besides, the forests also comprised of golpatta (*Nypa fruticans*), baen (*Avicennia officinalis*), keora (*Sonneratia apetala*), passur (*Xylocarpus mekongensis*), kakra (*Bruguiera gymnorhiza*), asila (*Sonneratia caseolaris*), singra (*Cynometra ramiflora*), tiger fern (*Acrostichum aureum*) and hintal (*Phoenix paludosa*). There were about 65 species in the Sundarbans (Chaffey *et al.*, 1985).

The Sundarbans- the natural mangrove forests, cover an area of 5,77,000 ha. It is the largest single tract of mangrove forest in the world. Sundri and gewa were the two most extensive tree species and they are the members of the Sterculiaceae and Euphorbiaceae families, respectively. The members of the family Rhizophoraceae did not dominate the tree vegetation of the Sundarbans. The forests were very rich in biodiversity and supported approximately 334 plant and many wild animal species too (Rahman *et al.*, 2000).

The Sundarban mangrove forests of Bangladesh were very rich in biodiversity and provide economic, social and ecological benefits to the nation. This important ecosystem started losing biodiversity due to over-exploitation and habitat destruction. So, the Government of Bangladesh and UNESCO emphasized the value of conservation of biodiversity in the Sundarbans (Sattar and Faizuddin, 1998).

Prain (1903) reported about 334 species of spennatophytes and pteridophytes in the Sundarbans and surrounding areas, but there was a change in the composition in the ecosystem since then. Sixty six climbers, herbs, shrubs and trees were reported to be available currently in the Sundarbans (Chaffey *et al.*, 1985). Trees and shrubs dominated the ecosystem. Sundri, gewa, goran and keora occurred abundantly. Other species were khalshi (*Aegiceras comiculatum*), amoor (*Amoora cucullata*), kirpa (*Lumnitzera racemosa*), golpata, dhundul (*Xylocarpus granatum*) etc.

The Chakaria Sundarbans were under severe biotic interferences in the recent decades. So, a study was carried to assess the present status, past conditions, process of destructions and to examine the feasibility of reforestation. The remnants of most of the vital species were available. The species composition was almost similar to that of the Khulna Sundarbans. But it differed in the abundance of *Dalbergia spinosa* and profusion of *Aegielitis rotundifolia*. The forests in the past supported a number of species (Siddiqi *et al.*, 1994).

Those forests were on sandy sea beaches and restricted to small areas in the coastal region. Those occurred between the sea and the forest on the high land or adjoin the tidal forests. Jhau (*Casuarina equisetifolia*) was the dominant species. The understory was hardy grasses and plants sometimes in association with cactus. Besides, there were newly accreted lands along the coastal areas and in the form of offshore islands. It was an early successional stage of mangrove forest following deposition of silts and sands washed down by the rivers. Keora was the pioneer tree following a succession of grasses (Anon, 2002).

The phytodiversity of the understorey of the Dulahazaru garjan forest (one of the most vital garjan forests of Bangladesh) was studied by Chowdhury *et al.* (2000) from Sep. 1994 to Jul. 1995, using the random quadrat method. Some 85 understory species belonging to

43 families were noted and classified into different groups: 2 fern species in 2 families, 15 monocot species in 8 families, 65 dicot species in 33 families but three species were unidentified. The utmost understory species were in the Leguminosae (Fabaceae) and Euphorbiaceae (dicots), and in the Gramineae (Poaceae) and Commelinaceae (monocots). The life forms were distributed as follows: epiphytes 1.18, megaphanerophytes 18.82, microphanerophytes 29.4, nanophanerophytes 20.00, therophytes 1.18, hemicryptophytes 7.06, chamaephytes 15.29, hydrophytes 4.71, and geophytes 2.35%. They also classified the understory species into different types, e.g. trees (18), shrubs (23), under shrubs (6), herbs (14), climbers (17), grasses (3), sedges (2) and ferns (2 species). A checklist included all the species giving botanical and common names, families, plant types, life forms, and Importance Value Index (IVI). The results suggested that garjan and associated understory species were degraded mainly by leaf-litter fall and wood collection, soil erosion, grazing, burning, unplanned logging etc., which could bring alarming changes to the whole garjan forest ecosystem and the existing gene pool.

2.19. Tree resources of homestead and cropland agro forestry

Miah *et al.* (2006) studied the tree species diversities of the understory crops in the homestead and cropland Agroforestry of 100 farmers of two upazilas viz. Sadar and Ghoraghat of Dinajpur. The most customary

species was litchi (35.15) but the least one was tamarind (0.18); while the same in the crop field was eucalyptus (25.00) and lemon (0.04), respectively. In total, 66 tree species were found in the farm of which fruit, timber, medicinal and others were 28, 21, 13 and 4, correspondingly. Among the trees, the most established one was litchi (35.15) went behind by mango (20.92), jackfruit (8.00), sissoo (5.89) and eucalyptus (4.47). The highest number of species (28) regardless of fruit species was found in the large farm categories whereas the lowest number of species (6) was found in the landless farm type.

2.20. An account of the exotic flora of Bangladesh

Hossain and Pasha (2004) listed 299 species of exotic plants (trees, shrubs, herbs and lianas) grown in Bangladesh. They concluded that most of its economic plants are exotic. The South Americans topped the list (50) followed by African (12), Asian (10%) and Australian (trace). They also noted that at least 6% of her present flora is exotic.

2.21. Plant genetic resources in the SARC countries

Hasanuzzaman *et al.* (2003) compiled the names, uses and other related information of the plant genetic resources of five SAARC countries viz. Bangladesh, India, Nepal, Pakistan and Sri Lanka in a very lucrative publication of SAIC, Dhaka.

CHAPTER 3

MATERIALS AND METHODS

The materials and methods exploited in conducting this survey work are presented here under diverse captions including a brief portrayal of the working site, soil and climates.

3.1. Description of the study area

The H.S.T.U. campus ($15^{\circ} 38' \text{N}$, $88^{\circ} 41' \text{E}$) stretches along east-west and is longer than the north-south line. 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. The location of the said campus, the survey site in the Dinajpur Sadar Upazila, is given in the Fig 1.

3.2. Methods of survey vis-à-vis collection of data

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 = Hall area
Zone E = Botanical Garden	Zone F = Campus of the VAS Faculty*

(VAS Faculty* = Veterinary and Animal Science Faculty)

In each block, species wise plants were counted physically. The floras were listed using a standard format (Table 1).

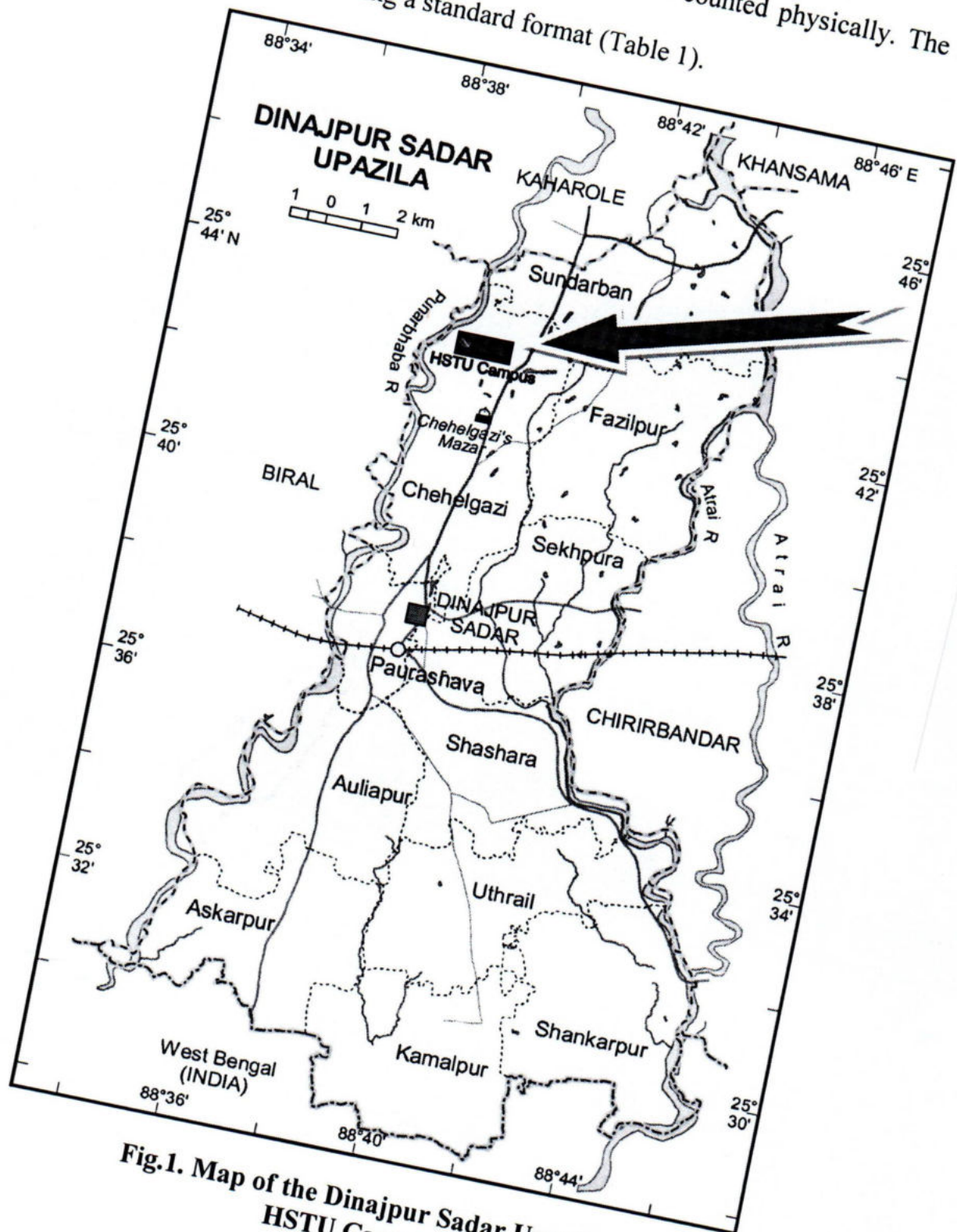


Fig.1. Map of the Dinajpur Sadar Upazila showing HSTU Campus- the study area

Table 1. The standard format used for the collection of data of
the plant possessions of H.S.T.U. campus

Broad Category: Gymnosperm/Angiosperm (Monocot/Dicot)

Basic group as per use: Fruit/Plantation/Medicinal/Spices/ Ornamental/
Timber and forest plants

Sheet no.:

Sl. no.	Fam. name	Sci. name	Eng. name	Local name	Growth habit	Total no. of plants	% of plants (broad category)	% of plants (basic group)	% of total plants
1									
2									
3									
4									
5									
6									
n									

The natural system of classification derived by George Bentham (1800-1884) and Joseph Dalton Hooker (1817-1911), popularly known as 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. Some standard publications were exploited for the detections of the species, i. e. (1) Cultivated Plants of the World by Don Ellison; (2) Manuals of Cultivated Plants Most Commonly Grown in the Continental

United States and Canada by Liberty Hyde Bailey (3) Manuals of Cultivated Trees and Shrubs Hardy in North America Exclusive of the Subtropical and Warmer regions by Alfred Rehder; and (4) Fuler Chash (in Bengali) by M. M. Rashid. 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.

3.3. Time of survey

The study was carried out during March, 2009.

3.4. Methods of presentation of data

The related information viz. local names, scientific names, families, growth habits (herb, shrub, tree, vine, liana) and major uses (bases of groupings) of each species were taken into account. Plants were initially divided in to two broad categories, e.g. gymnosperms and angiosperms. Lastly, those were again grouped into 6 types according to their major utilities: fruit, spices and aromatic, plantation, medicinal, ornamental, and timber and forest species. The entitlement of those species were calculated, summarized and finally, offered in different tables alphabetically (both family and species) and discussed in the episode 'Results and Discussions'. Moreover, the tables were set in such a way so that those suit easy to access and finally, become users' friendly.



3. 5. Limitations of the study

There were 6 shortfalls of the survey work, which were as follows:

1. Only few species remained unidentified. So, those were not used in the calculation. The vernacular names of those were gunail (leafy tree spice- 1), pan bilash (leafy tree spice- 1), shalti (timber- 2), jaman phal (yellow fleshed 1 seeded fruit- 2 plant specimens) etc.
2. Grasses and weed species were excluded from the study.
3. All annual herbaceous species were ignored as those fluctuate greatly in number of species as well as in number of plants from year to year according to their husbandry.
4. The numbers of plants of perennial herbaceous species also differ greatly from season to season as per their cultivation. So, the numbers of those plants were not considered for computations. Rather, those were included here as single specimens in each case just to demonstrate their mere presence in this vicinity.
5. Like perennial herbaceous species, quick growing fruits (Banana, pineapple, papaya, etc.) were included here as single specimens in each case just to confirm their presence in this environment.
6. A few herbaceous species might remain overlooked unconsciously.

CHAPTER 4

RESULTS AND DISCUSSIONS

The findings of this survey work are accessible in this episode under different captions. Moreover, in some cases, necessary propositions are provided to conserve endemic, rare and endangered plant resources. In addition, various suggestions are also noted for better management of the plant possessions of the campus. Finally, several vital hints are forwarded for plantation programs to be taken by the university in the coming days.

4.1. Total number of plants as well as plant species

Plants are inestimable natural resources having no substitutes at all. There are a few species in the extinction record in Bangladesh to date. But the genetic erosion of a large number of taxa has undoubtedly been taken place and continues rapidly as more wild habitats are degraded, squeezed or lost. So, the conservation of the indigenous floras is a burning task for any territory. Hence, *ex situ* plantations of those resources are globally well accepted including this green republic having important roles to play particularly in the conservation of rare and endangered plant species.

Under such vulnerable circumstances, the green campus of this university was very proud to be a generous host of in total 5,134 plants representing 382 species, 270 genera and 84 families (Table 2).

Table 2. Plant species at H.S.T.U. campus according to the broad categories as appraised during March, 2009

Broad group	Families		Genera		Species		Plants	
	Total (nos.)	% of total families	Total (nos.)	% of total genera	Total (nos.)	% of total species	Total (nos.)	% of total plants
Gymno.	4	4.77	6	2.22	13	3.40	347	6.75
Monocots	14	16.66	64	23.70	84	21.99	666	12.97
Dicots	66	78.57	200	74.34	285	74.61	4,121	80.28
<i>Angio.</i>	80	95.23	264	97.76	369	96.60	4,787	93.25
Total	84	100.00	270	100.00	382	100.00	5,134	100.00

Gymno. = Gymnosperms

Angio. = Angiosperms

It is vital to note that these figures are quite reasonable compared to those premises of the old institutes like B.A.U, R.U. and B.A.R.D. as weighed those sites in the gigantic episode 'Review of Literature' of this Dissertation. Nonetheless, in addition to H.S.T.U. Authority, credits for such plant richness at the campus also go to the Agricultural Extension Training Institute (A.E.T.I.), Dinajpur, and Hajee Mohammad Danesh Agricultural College (H.M.D.A.C.), Dinajpur- the 2 abolished institutes from which H.S.T.U. emerged on 8 March, 2002. Nevertheless, it would not be an exaggeration to highlight that the floras of this university site are congregated having neither help of any donor agencies nor through exchange programs with any organizations.

4.2. Panorama of gymnosperms and angiosperms

The whole plant kingdom is of 2 broad categories: gymnosperms and angiosperms. And the campus was joyful to be a hospitable arena of both

the types. Nevertheless, the numbers of gymnosperms were 4, 6, 13 and 347 while those of angiosperms were 80, 264, 369 and 4,787 for the family, genera, species and plant levels, respectively (Table 2). So, it seemed that plants of those 2 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. Hasan (1995) noted that globally the number of gymnosperm species is about 700. Moreover, the same author also claimed that of those, only 3 genera: *Cycas*, *Podocarpus* and *Gnetum* grew naturally in the Chittagong Hill Tracts and Sylhet regions. He further cited that there were about 20 species of *Cycas*. Of those, only 2 viz. *C. circinalis* and *C. revoluta* were widespread in various gardens of Bangladesh. At this campus those 2 and other 6 species were available including *Jamia angustifolia* (Tables 6 and 10). Furthermore, both male and female plants of those Cycases exist here. So, the scenario of dioecious *Cycas* spp. was quite sensible at this showground. Oppositely, angiosperms have 300 families, 12,000 genera and 2,86,000 species in the globe (Hossain *et al.*, 2004). Hence, more plant species of those were accessible almost anywhere in this unique planet if temperature and rainfall were favourable to grow those species.

4.3. Mirror of monocot and dicot species

In this premise, monocot families (Tables 2, and 4), genera and species were few (14, 64 and 84, correspondingly) than its opponent dicots (66,

200 and 285, correspondingly). In the nature, monocot orders, genera and species are also few (34, 1,495 and 18,516, in the same way) than those of dicots (163, 6,030 and 78,215, in that order) as noted by Hasan (1995).

4.4. Scenario of aquatic species

There were ponds in the Campus. But distinguished aquatic species like Makhna (*Euryale ferox*, Onagraceae), water chestnut (*Trapa natans/bispinosa*, Nymphaeaceae), lotus (*Nelumbium speciosum*, Nymphaeaceae), and even the national flower of the republic (water lily: *Nymphaea nouchali*, Nymphaeaceae)- all these were absent in this campus. Hence, at least those noteworthy species must be sheltered with necessary priorities. In addition, some bog species may also be fitted e.g. hogla (*Typha elephantine*, Typhaceae), Mirta (*Schumannianthus dichotoma*, Marantaceae), Chad mala (*Nymphoidae cristatum*, Gentianaceae) etc.

Table 3. Fruit resources of H.S.T.U. campus
as recorded on March, 2009

Taxa level	Gymnosperms	Monocots	Dicots	Angiosperms
Family	-	3	28	31
Genera	-	5	44	49
Species	-	8	68	76
Plant	-	282	1,856	2,138

Table 4. *Number of* species and plants of H.S.T.U. campus as assessed during March, 2009

Sl. nos.	Family names	Category wise number of species (and plant nos.)					Total species (no.)	% of total species	Total plants (nos.)	% of total plants	
		Frts.	Ornm.	Spic.	Plan.	Medi					Timb.
		A) Gymnosperms									
1	Araucariaceae	-	2(11)	-	-	-	2	0.52	11	0.22	
2	Casuarianaceae	-	1(5)	-	-	-	1	0.26	5	0.09	
3	Cupressaceae	-	2(316)	-	-	-	2	0.52	316	6.16	
4	Cycadaceae	-	8(15)	-	-	-	8	2.08	15	0.29	
4	Sub total gymno.		13(347)	-	-	-	13	3.39	347	6.76	
		B) Monocot									
1	Acoraceae	-	-	1(1)	-	-	1	0.26	1	0.01	
2	Amaryllidaceae	-	7(7)	-	-	-	7	1.82	7	0.14	
3	Araceae	-	9(9)	-	-	-	9	2.23	9	0.18	
4	Bromeliaceae	1(1)	3(3)	-	-	-	4	1.04	4	0.08	
5	Cannaceae	-	1(1)	-	-	-	1	0.26	1	0.01	
6	Commelinaceae	-	2(2)	-	-	-	2	0.52	2	0.02	
7	Cyperaceae	-	1(1)	-	-	-	1	0.26	1	0.01	
8	Gramineae/Poaceae	-	2(2)	1(1)	4(4)	-	7	1.82	7	0.14	
9	Liliaceae	-	11(14)	-	-	2(2)	13	3.39	16	0.32	
10	Marantaceae	-	8(8)	-	-	-	8	2.08	8	0.15	
11	Musaceae	3(3)	4(4)	-	-	-	7	1.82	7	0.14	
12	Palmae/Arecaceae	4(278)	8(23)	-	2(292)	-	19	4.96	598	11.64	
13	Pandanaceae	-	1(1)	1(1)	-	-	2	0.52	2	0.02	
14	Zingiberaceae	-	1(1)	2(2)	-	-	3	0.78	3	0.05	
14	Sub total monocot	8(282)	58(76)	5(5)	6(296)	2(2)	84	21.93	666	12.97	

Table 4. *Number of species and plants of H.S.T.U. campusCONTINUED*

Sl. nos.	Family names	Category wise number of species (and plant nos.)					Total species (no.)	% of total species	Total plants (nos.)	% of total plants
		Frts.	Ornm.	Spic.	Plan.	Medi				
C) Dicot										
1	Acanthaceae	-	7(8)	-	-	2(2)	9	2.34	10	0.19
2	Amaranthaceae	-	1(1)	-	-	-	1	0.26	1	0.01
3	Anacardiaceae	4(363)	-	-	-	1(1)	6	0.78	366	7.10
4	Annonaceae	3(27)	3(312)	-	-	-	6	0.78	339	6.70
5	Apiaceae	-	-	-	-	1(1)	1	0.26	1	0.01
6	Apocynaceae	1(10)	12(41)	-	-	3(9)	16	4.17	60	1.16
7	Araliaceae	-	1(1)	-	-	-	1	0.26	1	0.01
8	Asclepiadaceae	-	-	-	-	1(1)	1	0.26	1	0.01
9	Averrhoaceae	2(17)	-	-	-	-	2	0.52	17	1.17
10	Bignoniaceae	-	9(19)	-	-	1(1)	10	2.61	20	0.39
11	Bixaceae	-	-	1(3)	-	-	1	0.26	3	0.06
12	Bombaceae	1(1)	1(2)	-	-	-	3	0.78	4	0.08
13	Cactaceae	1(1)	3(3)	-	-	-	4	1.04	4	0.08
14	Caprifoliaceae	-	2(5)	-	-	-	2	0.52	5	0.10
15	Caricaceae	1(1)	-	-	-	-	1	0.26	1	0.01
16	Chenopodiaceae	-	1(1)	-	-	-	1	0.26	1	0.01
17	Combretaceae	1(6)	1(2)	-	-	3(62)	5	1.30	70	1.46
18	Compositae	-	1(1)	-	-	1(1)	2	0.52	2	0.03
19	Convolvulaceae	-	1(1)	-	-	-	1	0.26	1	0.01
20	Crassulaceae	-	-	-	-	1(1)	1	0.26	1	0.01
21	Dilleniaceae	1(7)	-	-	-	-	1	0.26	7	0.17
22	Dipterocarpaceae	-	-	-	-	-	1	0.26	6	0.14
23	Ebenaceae	1(3)	-	-	-	-	1	0.26	3	0.12
24	Elaeocarpaceae	1(31)	-	-	-	-	1	0.26	31	0.60

Table 4. . *Number of species and plants of H.S.T.U. campus CONTINUED*

Sl. nos.	Family names	Category wise number of species (and plant nos.)						Total species (no.)	% of total species	Total plants (nos.)	% of total plants
		Frts.	Ornm.	Spic.	Plan.	Medi	Timb.				
25	Ericaceae	-	1(3)	-	-	-	-	1	0.26	3	0.06
26	Euphorbiaceae	2(14)	11(47)	-	1(3)	2(36)	-	16	2.61	100	1.94
27	Flacourtiaceae	2(6)	-	-	-	-	-	2	0.52	6	0.11
28	Guttiferae	3(4)	1(3)	-	-	-	-	4	1.04	7	0.14
29	Labiatae	-	1(1)	3(3)	-	1(1)	-	5	1.30	5	0.10
30	Lauraceae	1(1)	-	3(3)	-	1(1)	-	5	1.30	5	0.10
31	Lecythiadaeae	-	1(3)	-	-	-	-	1	0.26	3	0.06
32	Leguminosae	2(18)	21(174)	-	-	-	9(92)	32	8.35	284	5.53
33	Logianaceae	-	-	-	-	1(1)	-	1	0.26	1	0.01
34	Lythraceae	-	1(8)	-	-	1(5)	1(13)	3	0.78	26	0.50
35	Magnoliaceae	-	3(10)	-	-	-	-	3	0.78	10	0.19
36	Malvaceae	-	6(31)	-	-	-	-	6	1.56	31	1.95
37	Malpighiaceae	-	2(4)	-	-	-	-	4	0.78	2	0.03
38	Melastomaceae	-	2(5)	-	-	-	-	2	0.52	5	0.10
39	Meliaceae	-	-	-	-	1(251)	4(719)	5	1.30	970	18.90
40	Moraceae	3(414)	6(23)	-	-	1(2)	4(22)	14	3.65	461	8.98
41	Moringaceae	-	-	-	-	1(4)	-	1	0.26	4	0.04
42	Myrtaceae	7(249)	5(30)	2(2)	-	-	1(101)	15	3.90	382	7.44
43	Nyctiginaceae	-	1(7)	-	-	1(1)	-	2	0.52	8	0.15
44	Oleaceae	-	6(28)	-	-	-	-	6	1.56	28	0.55
45	Orchidaceae	-	1(1)	-	-	-	-	1	0.26	1	0.01
46	Passifloraceae	1(1)	-	-	-	-	-	1	0.26	1	0.01
47	Piperaceae	-	-	3(9)	1(1)	-	-	4	1.04	10	0.19
48	Plumbaginaceae	-	1(1)	-	-	-	-	1	0.26	1	0.01
49	Poligonaceae	-	2(2)	-	-	-	-	2	0.52	2	0.03

Table 4 *Number of* plant species and plants of H.S.T.U. campus CONTINUED

Sl. nos.	Family names	Category wise number of species (and plant nos.)						Total species (no.)	% of total species	Total plants (nos.)	% of total plants
		Frts.	Ornm.	Spic.	Plan.	Medi	Timb.				
50	Punicaceae	1(6)	-	-	-	-	-	1	0.26	6	0.12
51	Rhamnaceae	2(25)	-	-	-	-	-	2	0.52	25	0.48
52	Rosaceae	5(14)	2(32)	-	-	-	-	7	1.82	46	0.89
53	Rubiaceae	-	8(59)	-	1(4)	-	2(14)	11	2.87	77	1.50
54	Rutaceae	11(154)	2(9)	1(5)	-	-	-	14	3.66	168	3.27
55	Santalaceae	-	-	-	-	1(1)	-	1	0.26	1	0.01
56	Sapindaceae	2(169)	-	-	-	1(1)	-	3	0.78	170	3.31
57	Sapotaceae	3(11)	2(61)	-	-	-	-	5	1.30	72	1.40
58	Saxifragaceae	-	1(1)	-	-	-	-	1	0.26	1	0.01
59	Scrophulariaceae	-	1(1)	-	-	-	-	1	0.26	1	0.01
60	Smiliaceae	-	-	-	-	1(1)	-	1	0.26	1	0.01
61	Solanaceae	-	3(10)	-	-	-	-	3	0.78	10	0.19
62	Sterculiaceae	3(14)	1(1)	-	-	1(3)	-	5	1.30	18	0.35
63	Tiliaceae	2(6)	-	-	-	-	-	2	0.52	6	0.11
64	Theaceae	-	1(2)	-	1(161)	-	-	2	0.52	163	3.17
65	Verbenaceae	-	8(14)	-	-	1(1)	2(28)	11	2.87	43	0.85
66	Vitaceae	1(1)	-	-	-	1(1)	-	2	0.52	2	0.03
66	Sub total dicot	68(1574)	144(967)	13(25)	4(169)	30(389)	26(998)	285	74.41	4,122	80.29
84	Grand total	76(1856)	215(1388)	18(30)	10(465)	32(391)	31(1003)	382	100.00	5,134	100.00

Frts. = Fruits, Ornm. = Ornamentals, Spic. = Spices, Plan. = Plantation species, Medi. = Medicinal, Timb. = Timber and forest species

Table 5. E. *Fruit plant* species of H. S. T. U. campus as recorded during March, 2009

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
Monocot							
1. Family : Bromeliaceae							
1	<i>Ananas comosus (sativus)</i>	Pineapple	Anarash	Herb	1	0.05	0.01
2. Family : Musaceae							
2	<i>Musa acuminata</i>	Banana	Seeded kala	Herb	1	0.05	0.01
3	<i>M. cavendishi</i>	Table banana	Kala	Herb	1	0.05	0.01
4	<i>M. sapientum</i>	Table banana	Kala	Herb	1	0.05	0.01
3. Family : Palmae/Palmaceae							
5	<i>Borassus flabellifer</i>	Palmyra palm	Tal	Tree	2	0.10	0.02
6	<i>Cocos nucifera</i>	Cocoanut	Narikel	Tree	270	14.56	5.6
7	<i>Phoenix dactylifera</i>	Arabian date palm	Arobio khajur	Tree	4	0.22	0.08
8	<i>P. sylvestris</i>	Local date palm	Deshi khajur	Tree	2	0.10	0.02
8			Sub total	monocot	282	15.26	5.49
B) Dicot							
1. Family : Anacardiaceae							
1	<i>Anacardium occidentale</i>	Cashew nut	Kaju badam	Tree	2	0.10	0.02
2	<i>Mangifera indica</i>	Mango	Aam	Tree	355	19.10	6.91
3	<i>Spondias dulcis (cythera)</i>	Golden apple	Bilati amra	Tree	3	0.16	0.06
4	<i>S. mangifera</i>	Hog plum	Deshi amra	Tree	3	0.16	0.06
2. Family : Annonaceae							
5	<i>Annona muricata</i>	Sour sop	Tok ata	Tree	2	0.10	0.03
6	<i>A. reticulata</i>	Bullock's heart	Ata	Tree	21	1.13	0.48
7	<i>A. squamosa</i>	Custard apple	Sarifa	Tree	4	0.22	0.08
3. Family : Apocynaceae							
8	<i>Carissa carandas</i>	Caranda	Karamcha	Shrub	10	0.53	0.19

Table 5 *Fruit plant* species of H. S. T. U. campus as recorded durin CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		4. Family : Averrhoaceae	Oxalidaceae				
9	<i>Averrhoa blimbi</i>	Bilimbi	Bilimbi	Tree	5	0.27	0.1
10	<i>A. carambola</i>	Star fruit / carambola	Kamranga	Tree	12	1.20	0.23
		5. Family :	Bombacaceae				
11	<i>Adansonia digitata</i>	Baobab	Baobab	Tree	1	0.50	0.01
		6. Family :	Cactaceae				
12	<i>Opuntia dillenii</i>	Prickly pear	Fonimonsha	Herb	1	0.05	0.01
		7. Family :	Caricaceae				
13	<i>Carica papaya</i>	Papaya	Panpaya	Tree	1	0.05	0.01
		8. Family :	Combretaceae				
14	<i>Terminalia catappa</i>	Kath badam	Kath badam	Tree	6	0.32	0.11
		9. Family :	Dilleniaceae				
15	<i>Dillenia indica</i>	Indian dillenia	Chalta	Tree	7	0.38	0.14
		10. Family :	Ebenaceae				
16	<i>Diospyros discolor</i>	Velvet apple	Bilati gab	Tree	3	0.16	0.06
		11. Family :	Elaeocarpaceae				
17	<i>Elaeocarpus floribundus</i>	Indian olive	Jalpai	Tree	31	1.67	1.95
		12. Family :	Euphorbiaceae				
18	<i>Baccaurea sapida</i>	Burmese grape	Lotkon	Tree	10	0.50	0.20
19	<i>Phyllanthus acidica/distichus</i>	Star gooseberry	Arboroi	Tree	4	0.20	0.08
		13. Family :	Flacourtiaceae				
20	<i>Flacourtia indica</i>	Matdagascar plum	Boichi	Tree	3	0.16	0.03
21	<i>F. jangomas</i>	Flacourtia	Paniala	Tree	3	0.16	0.03

Table 5. *Fruit plant species of H. S. T. U. campus as recorded durin ...* CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
			14. Family : Guttiferae				
22	<i>Garcinia cowa</i>	Cowa	Kauphol	Tree	2	0.10	0.03
23	<i>G. pedunculata</i>	Toikar	Toikar	Tree	1	0.05	0.01
24	<i>G. xanthochymus</i>	Egg fruit	Dephal	Tree	1	0.05	0.01
			15. Family : Lauraceae				
25	<i>Persea americana</i>	Avocado	Avocado	Tree	1	0.05	0.01
			16. Family : Leguminosae				
26	<i>igna dulkis</i>	igna	Jelapi fhol	Tree	6	0.32	0.12
27	<i>Tamarindus indicus</i>	Tamarind	Tetul	Tree	12	1.67	0.23
			17. Family : Moraceae				
28	<i>Artocarpus heterophyllus</i>	Jackfruit	Kanthal	Tree	408	21.95	7.95
29	<i>A. lakoocha</i>	Monkey jack	Dewa	Tree	3	0.16	0.03
30	<i>Morus alba</i>	Mulberry	Tut	Tree	3	0.16	0.03
			18. Family : Myrtaceae				
31	<i>Psidium friedrichsthalianum</i>	Chinese guava	China guava	Tree	1	0.05	0.01
32	<i>P. guajava</i>	Guava	Payara	Tree	159	8.55	3.10
33	<i>Syzygium cuminii</i>	Black berry	Jam	Tree	39	2.10	0.79
34	<i>S. jambos</i>	Rose apple	Golap Jam	Tree	36	2.04	0.70
35	<i>S. samarangense</i>	Wax jambu	Jamrul	Tree	10	0.38	0.19
36	<i>S. uniflora</i>	Surinam cherry	Cherry	Shrub	2	0.10	0.03
37	<i>S. sp.</i>	Cherry	Cherry	Shrub	2	0.10	0.03
			19. Family : Passifloraceae				
38	<i>Passiflora edulis</i>	Passion fruit	Passion fFruit	Vine	1	0.05	0.01
			20. Family : Punicaceae				
39	<i>Punica granatum</i>	Pomegranate	Dalim	Tree	6	0.32	0.12

Table 5. *Fruit plant* species of H. S. T. U. campus as recorded during CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		21. Family : Rhamnaceae					
40	<i>Zizyphus jujube</i>	Chinese ber	Kul boroi	Tree	5	0.27	0.1
41	<i>Z. mauritiana</i>	Indian ber	Deshi kul	Tree	20	1.07	0.39
		22. Family : Rosaceae					
42	<i>Fragaria ananassa</i>	Strawberry	Strawberry	Herb	1	0.05	0.01
43	<i>Malus sylvestris</i>	Apple	Apple	Tree	2	0.10	0.03
44	<i>Prunus communis</i>	Bokhra plum	Alu bokhra	Tree	1	0.05	0.01
45	<i>P. persica</i>	Peach	Peach	Tree	5	0.27	0.1
46	<i>Pyrus khasiana</i>	Pear	Naspati	Tree	5	0.27	0.1
		23. Family : Rutaceae					
47	<i>Aegle marmelos</i>	Bel	Bael	Tree	19	1.04	0.38
48	<i>Citrus aurantifolia</i>	Lime	Kagoji lebu	Shrub	33	1.0	0.65
49	<i>C. grandis</i>	Shaddock/Pomello	Batabi lebu	Tree	15	0.08	0.29
50	<i>C. jambhiri</i>	Rough lemon	Jamir	Shrub	2	0.10	0.03
51	<i>C. limon</i>	Lemon	Elachi lebu	Shrub	43	2.32	0.84
52	<i>C. reticulata</i>	Mandarin	Tok kamla	Tree	22	1.18	0.43
53	<i>C. sinensis</i>	Sweet orange	Misti kamla	Tree	1	0.05	0.01
54	<i>C. sp.</i>		Sharbati lebu	Shrub	2	0.10	0.03
55	<i>C. sp.</i>		Ada jamir	Shrub	2	0.10	0.03
56	<i>Feronia limonia</i>	Wood apple	Koth bel	Tree	12	0.65	0.23
57	<i>Poncirus trifoliata</i>	Trifoliate orange	Tripati lebu	Shrub	3	0.16	0.05
		24. Family : Sapindaceae					
58	<i>Litchi chinensis</i>	Litchi	Litchi	Tree	167	8.98	3.25
59	<i>Nephelium longana</i>	Longan	Ansh phol	Tree	2	0.10	0.03

Table 5. *Fruit plant* species of H. S. T. U. campus as recorded during CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
			25. Family : Sapotaceae				
60	<i>Chrysophyllum cainito</i>	Star apple	Star apple	Tree	2	0.10	0.03
61	<i>Manilkara achras</i>	Sapota	Sopheda	Tree	6	0.32	0.11
62	<i>Mimusops hexandra</i>	Khirney	Kher khejur	Tree	3	0.16	0.05
			26. Family : Sterculiaceae				
63	<i>Sterculia alata</i>	Kashmiri nut	Buddho narikel	Tree	3	0.16	0.05
64	<i>S. diversifolia</i>	Nut	Kath badam	Tree	6	0.32	0.11
65	<i>S. foetida</i>	Wild nut	Bonno badam	Tree	5	0.27	0.10
			27. Family : Tiliaceae				
66	<i>Grewia asiatica</i>	Phalsa	Phalsa	Tree	4	0.22	0.07
67	<i>Muntingia calabura</i>	Chinese cherry	China cherry	Tree	2	0.10	0.02
			28. Family : Vitaceae				
68	<i>Vitis vinifera</i>	Grape	Angur	Liana	1	0.05	0.01
68			28	Dicot	1574	84.80	30.65
76			31	Fruit	1856	100	36.14
			Sub total				
			Grand total				

4.5. Treasury of the fruit species

Fruits are special bounties of the nature and the agro-climate of the realm is blessed for many of those endowments. It was astonishingly appraised that, the fruit-world of the campus was glorified with much diversity (Tables 3, 4 and 5) as the site was quite congenial of having fruit plants of 31 families (3 monocots+28 dicots), 49 genera (5 monocots + 44 dicots) and 76 species (8 monocots+68 dicots). In addition, there were 2,138 fruit plants (282 monocots+1,856 dicots). The figures were also eye catching than those of the B.A.U., R.U. and B.A.R.D. campuses.

Furthermore, there were some awe-inspiring fruit species, e.g. baobab, sour sop, plum, Chinese cherry, prickly pear etc. It is important to note that baobab is a deciduous dicot species, which is illustrious globally for its topmost girth. This surprising species was introduced personally from the African country Guiana 4 years back. Oppositely, herbaceous plants with small red/yellow fruits of prickly pear are enjoyable in arid areas.

Again, in terms of monocots (Tables 3, 4 and 5), the campus was a sanctuary of fruits of 3 families, 5 genera, 8 species and 282 plants. The fruit plants of the Musaceae and Bromeliaceae families were herbaceous while those of Palmae were branchless tall trees. Again, coconut trees were 270 in number, which is a skyscraper value judged against the rest 3: palmyra palm, local date palm and Arabian date palm.

As far as dicot species were concerned (Table 5), the campus scoped to lodge fruits of 28 families, 44 genera, 68 species and 2,138 plants. Moreover, the species of the family Cactaceae is a herb, that of Passifloraceae is a vine, that of Vitaceae is a liana, those of Rutaceae are shrubs as well as trees while the rests are trees. So, all the 5 sorts of fruit plants were available here. 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).

In addition, fruits of some other plant species are also edible. But those are cited under different captions (medicinal, Table 7) as the key uses of those are merely therapeutic, e.g. aonla, horitoki, bahera, etc. In addition, fruits of some rattan species are edible, which was also present here. But those species are shown under timber and forest plants (Table 8). Moreover, from the Table 5, it is evident that several species namely baobab, grape, thoikor, passion fruit, pear, dephal, plum, cashew nut, sweet orange, avocado, Chinese guava were really symbolized by single plants and so, those must be increased in number. In a nutshell it can be said that the existing scenario was also noteworthy.

From the Table 5, it is further revealed that, only a few minor fruit species were planted here. But from *in situ* conservation point of view, it may be mentioned that more local fruit species should be assembled.

Furthermore, wild, underexploited and endemic fruit species and their wild relatives must be preserved to increase the species as well as genetic diversities. So, the authority may kindly look into the anthology of local, wild and underutilized fruit species as well as the genetic richness of the existing species in the future programs.

4. 6. Portrait of plantation crops

The campus had accommodated 7 plantation crops with 10 species from 6 families (Tables 6 and 7); of those 6 families, 2 were monocots while 4 were dicots. Again, out of those 10 species, 5 are trees while 4 were herbs and only 1 i.e. betel leaf was vine (Table 7). So, plantation crops with 4 types of growth habits were accessible here. In addition, betel nut had the maximum number of trees (283) followed by tea (161). The scenario of plantation crops was also quite reasonable. But cocoa (*Theobroma 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 B.A.U.; Dhaka University, etc.

Table 6. Abstract of the plantation crops of H.S.T.U. campus as revealed on March, 2009

Taxa level	Gymnosperms	Monocots	Dicots	Angiosperms	Total
Family	-	2	4	6	6
Genera	-	3	4	7	7
Species	-	6	4	10	10
Plant	-	296	169	465	465

Table 7. Details of the plantation crops available at H.S.T.U. campus during March, 2009

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of planta. plants	% of total plants
		A) Monocot					
		1. Family : Gramineae/Poaceae					
1	<i>Bambusa balcooa</i>	Bamboo	Buro bansh	Herb	1	0.22	0.01
2	<i>B. longispiculata</i>	Bamboo	Talla bansh	Herb	1	0.22	0.01
3	<i>B. strictus</i>	Bamboo	Lathi bansh	Herb	1	0.22	0.01
4	<i>B. tulda</i>	Bamboo	Makla bansh	Herb	1	0.22	0.01
		2. Family : Palmae					
5	<i>Areca catechu</i>	Betel palm	Supary	Tree	283	60.86	5.51
6	<i>Elaeis guineensis</i>	Oil palm	Oil pam	Tree	9	1.98	0.17
6		2	Sub total	monocot	296	63.66	5.76
		B) Dicot					
		1. Family : Euphorbiaceae					
1	<i>Hevea brasiliensis</i>	Rubber	Ruber	Tree	3	0.66	0.05
		2. Family : Piperaceae					
2	<i>Piper betel</i>	Betel leaf	Pan	Vine	1	0.22	0.01
		3. Family : Rubiaceae					
3	<i>Coffea arabica</i>	Coffee	Kofee	Tree	4	0.88	0.07
		4. Family : Theaceae					
4	<i>Thea sinensis</i>	Tea	Cha	Tree	161	34.62	3.13
4		4	Sub total	dicot	169	36.34	3.29
10		6	Grand total	dicot	465	100.00	9.06

4. 7. Reserve of spices and aromatic species

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 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 8 and 9). Moreover, herb, tree and vine- these 3 kinds of species were accessible. Note that globally shrubs are almost nil in the spice group. Again, 3 crops: choi, pepul and black pepper are vines. 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 are locally called (i) **pan bilash/pan bahar** (probably *Clausena heptaphylla*, Rutaceae, multiplid by seeds) and (ii) **gunail** (perhaps *Aegialitis rotundifolia*, propagated by root cuttings). It is important to note that both of those are trees and the leaves of each of those are used as spices. Again, leaves of pan bilash are usually used to add sweet flavor to betel leaf rolls. Oppositely, leaves of gunail are used to remove bad smell of slightly awful odoured fishes.

Table 8. Abstract of the plantation crops of H.S.T.U. campus as revealed on March, 2009

Taxa level	Gymnosperms	Monocots	Dicots	Angiosperms	Total
Family	-	4	6	10	10
Genera	-	4	8	12	12
Species	-	5	13	18	18
Plant	-	5	25	30	30

Table 9. Panorama of the perennial spice species recorded at H. S. T. U. campus in March, 2009

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of spic. plants	% of total plants
			A)				
		1. Family :	Monocot				
1	<i>Acorus calamas</i>	Sweet flag	Boj	Herb	1	3.33	0.01
		2. Family :	Gramineae				
2	<i>Cymbopogon citratus</i>	Lemon grass	Lebu gash	Herb	1	3.33	0.01
		3. Family :	Pandanaceae				
3	<i>Pandanus odoratus</i>	Pandanas	Polao pata	Herb	1	3.33	0.01
		4. Family :	Zingiberaceae				
4	<i>Elettaria</i> sp.		Bengal cardamon	Herb	1	3.33	0.01
5	<i>Elettaria</i> sp.		Wild cardamon	Herb	1	3.33	0.01
5			Sub total	monocot	5	16.66	0.10
			B)				
		1. Family :	Dicot				
			Bixaceae				
1	<i>Bixa orellana</i>	Annatto	Dai rong / bon halud	Tree	3	10.00	0.05
		2. Family :	Labiatae				
2	<i>Mentha arvensis</i>	Japanese mint	Pudina	Herb	1	3.33	0.01
3	<i>M. spicata</i>	Spearmint	Pudina	Herb	1	3.33	0.01
4	<i>Ocimum basilicum</i>	Basil	Tulshi	Herb	1	3.33	0.01

Table 9. Panorama of the perennial spice species recorded at H. S. T. U. campus in March, 2009... ..CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of spic. plants	% of total plants
		3. Family :	Lauraceae				
5	<i>Cinnamomum aromaticum</i>	Cassia China	Bonno daruchini	Tree	1	3.33	0.01
6	<i>C. talama</i>	Bay leaf	Tej pata	Tree	1	0.33	0.01
7	<i>C. zeylanicum</i>	Cinnamon	Daruchini	Tree	1	3.33	0.01
		4. Family :	Myrtaceae				
8	<i>Eugenia caryophyllus</i>	Clove	Lobongo	Tree	1	3.33	0.01
9	<i>Pimenta dioica</i>	Allspice/pimento	Hazari moshla	Tree	1	3.33	0.01
		5. Family :	Piperaceae				
10	<i>Piper cubea</i>		Choi	Vine	4	13.33	0.07
11	<i>P. longum</i>	Long pepper	Pepul	Vine	1	3.33	0.01
12	<i>P. nigrum</i>	Black (white) pepper	Gul marich	Vine	4	13.33	0.07
		6. Family :	Rutaceae				
13	<i>Murraya koenigii</i>	Curry leaf	Kari pata	Tree	5	16.66	0.10
13			Sub total	dicot	25	83.33	0.49
18			Grand total	spices	30	100	0.58

4. 8. Sketch of medicinal species

Table 10. Abstract of the medicinal plants of H.S.T.U. campus as revealed on March, 2009

Taxa level	Gymnosperms	Monocots	Dicots	Angiosperms
Family	-	1	24	25
Genera	-	2	28	30
Species	-	2	30	32
Plant	-	2	389	391

The whole world is a unique treasury of numerous medicinal plants. And the list is getting longer day by day as humans are acquiring more knowledge about pharmacology. Under the medicinal species, in total 391 plants were listed from 32 species, 30 genera and 25 families (Tables 10 and 11). It was also lucid from the Table 11 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. Nonetheless, 7 tree species noted by 1 plant in each case were also these extra ordinary plants. From the above results, it was further exposed that herbs, shrubs, trees, vines and lianas - all 5 forms of medicinal plants were found hosted in this arena. Moreover, other species are used medicinally. Several of those were also present here but cited under different groups in this section according to their major utilities.

Table 11. The portrait of the medicinal species available at H.S.T.U. campus during March, 2009

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of medici. plants	% of total plants
			A) Monocot				
			1. Family Liliaceae				
1	<i>Aloe vera</i>	Aloe	Ghrito kumari	Herb	1	0.25	0.01
2	<i>Asparagus officinalis</i>	Asparagus	Satamuli	Herb	1	0.25	0.01
2			Sub total	monocot	2	0.51	0.04
			B) Dicot				
			1. Family : Acanthaceae				0.01
1	<i>Adhatoda zeylanica</i>	Vasaka	Bashok	Herb	1	0.25	0.01
2	<i>Justicia gendarusa</i>	Justicia	Bishalla	Herb	1	0.25	0.01
3	<i>Buchanania lanjan</i>	Piyal	Anacardiaceae	Tree	1	0.25	0.01
4	<i>Centella asiatica</i>	Indian pennywort	Thankuni	Herb	1	0.25	0.01
5	<i>Alstonia scholaris</i>	Devils tree	Satim	Tree	2	0.50	0.04
6	<i>Holarrhena antidysentrica</i>	Kurchi	Kurchi	Tree	2	0.50	0.04
7	<i>Rauvolfia serpentina</i>	Snake root	Swarpogondha	Herb	5	1.23	0.10
8	<i>Calotropis procera</i>	Akanda	Asclepiadaceae	Herb	1	0.25	0.01
9	<i>Crescentia cujete</i>	Calabush	Bignoniaceae	Tree	1	0.25	0.01
10	<i>Terminalia arjuna</i>	Aurjun	Combretaceae	Tree	18	4.58	0.35
11	<i>T. belerica</i>	Bohera	Bohera	Tree	33	8.38	0.64
12	<i>T. chebula</i>	Hartoki	Hartoki	Tree	11	2.79	0.21

Table 11. The portrait of the medicinal species available at H.S.T.U. campus during March, 2009 CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of medici. plants	% of total plants
			8. Family : Compositae				
13	<i>Wedelia calendulacea</i>	Vingoraj	Vingoraj	Vine	1	0.25	0.01
			9. Family : Crassulaceae				
14	<i>Kalanchoe</i> sp.	Kalanchoe	Pathorkuchi	Herb	1	0.25	0.01
			10. Family : Euphorbiaceae				
15	<i>Phyllanthus emblica</i>	Aonla	Amloki	Tree	31	7.87	0.60
16	<i>Ricinus communis</i>	Castor	Verenda	Tree	5	1.27	0.10
			11. Family Labiatae				0.01
17	<i>Ocimum sanctum</i>	Ocimum	Tulshi	Herb	1	0.25	
			12. Family : Lauraceae				
18	<i>Cinnamomum camphora</i>	Camphor	Karpur	Tree	1	0.25	0.01
			13. Family Logianaceae				
19	<i>Strychnos nux-vomica</i>	Nux-vomica	Kuchila /Tita gab	Tree	1	0.25	0.01
			14. Family Lythraceae				
20	<i>Lawsonia inermis</i>	Henna	Mehdi	Tree	5	1.27	0.10
			15. Family : Meliaceae				
21	<i>Azadirachta indica</i>	Neem	Neem	Tree	251	63.54	4.90
			16. Family : Moraceae				
22	<i>Ficus glomerata</i>	Fig	Jagodumur	Tree	2	0.50	0.03
			17. Family : Moringaceae				
23	<i>Moringa oliefera</i>	Drumstick	Sajina	Tree	4	1.01	0.07
			18. Family : Nyctaginaceae				
24	<i>Boerhaavia diffusa</i>	Spreading hogweed	Sheto Punornova	Herb	1	3.45	0.01

Table 11. Medicinal species available at H.S.T.U. campus during March, 2009 CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of medici. plants	% of total plants
		19. Family : Santalaceae					
25	<i>Santalum album</i>	Santalum	Seto chandan	Tree	1	0.25	0.01
		20. Family Sapindaceae					
26	<i>Sapindus trifoliatus</i>	Ritha	Ritha	Tree	1	0.25	0.01
		21. Family Smiliaceae					
27	<i>Smilax roxburghiana</i>	Kumari lata	Kumari lata	Vine	1	0.25	0.01
		22. Family Sterculiaceae					
28	<i>Abroma augusta</i>	Ulatkambal	Ulatkambal	Tree	3	0.73	0.05
		23. Family Verbenaceae					
29	<i>Vitex negundo</i>	Nisinda	Nisinda	Tree	1	0.25	0.01
		24. Family Vitaceae					
30	<i>Vitis quadrangularis</i>	Harjora	Harjora	Vine	1	0.25	0.01
30		24	Sub total	dicot	389	99.49	7.58
32		25	Grand total	Medici.	391	100	7.61

4. 9. Portrayal of timber and forest species

Table 12. Abstract of the timber and medicinal plants of H.S.T.U.
campus as revealed on March, 2009

Taxa level	Gymnosperms	Monocots	Dicots	Angiosperms	Total
Family	-	1	10	11	11
Genera	-	2	21	23	23
Species	-	5	26	31	31
Plant	-	5	998	1003	1003

Timber and forest species are blessings for the whole mankind even if a man resides in the centre of a metropolitan city. A total of 1,003 timber and forest plants were listed under 31 species, 23 genera and 11 families (Tables 9 and 10). The Legnminosae 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, according to Banik (1996), 6 species of rattan were found in Bangladesh. On the other hand, the campus gathered 5 species of those. So, the rattan scenario was quite agreeable. Finally, it can be concluded that this section was not so rich. So, more diversified timber and forest species should be gathered in this green campus.

Table 13. Scenario of the timber and other forest species available at H.S.T.U. campus as assessed on March, 2009

Sl. nos.	Scientific names	English names	A) Monocot		Local (vernacular) names	Growth habits	Total no. of plants	% of timb. plants	% of total plants
			1. Family : Palmae						
1	<i>Calamus guruba</i>	Rattan			Jali bet	Herb	1	0.09	0.01
2	<i>C. latifolius</i>	Rattan			Bhutom bet	Her	1	0.09	0.01
3	<i>C. longisatus</i>	Rattan			Udam bet	Herb	1	0.09	0.01
4	<i>C. viminalis</i>	Ratrtan			Joyat bet	Herb	1	0.09	0.01
5	<i>Daemonorops denkinsianus</i>	Rattan			Golla bet	Herb	1	0.09	0.01
5			1		Sub total	monocot	5	0.49	0.10
			B) Dicot						
			1. Family : Anacardiaceae						
1	<i>Lannea coromandelica</i>	Lannea			Jiga	Tree	2	0.19	0.03
			2. Family : Bombaceae						
2	<i>Bombax (Ceiba) pentrandra</i>	Kapok			White shimul	Tree	1	0.09	0.01
			3. Family : Dipterocarpaceae						
3	<i>Dipterocarpus turbinatus</i>	Garjan			Garjan	Tree	6	0.59	0.11
			4. Family : Leguminosae						
4	<i>Acacia auriculiformis</i>	Acacia			Akashmoni	Tree	15	1.45	0.29
5	<i>Acacia sp.</i>	Acacia			Acacia hybrid	Tree	10	0.99	0.19
6	<i>A. mangium</i>	Mangium			Mangium	Tree	6	0.59	0.11
7	<i>Adenanthera pavonina</i>	Bead tree			Rakta chandan	Tree	1	0.09	0.01
8	<i>Albizzia chinensis</i>	Tarul			Tarul	Tree	2	0.18	0.03
9	<i>Cassia siamea</i>	Minjiri			Minjiri	Tree	2	0.19	0.03
10	<i>Dalbargia sissoo</i>	Sisso			Sisso	Tree	20	1.99	0.38
11	<i>Leucaena leucocephala</i>	Ipil ipil			Ipil ipil	Tree	28	2.79	0.54
12	<i>Samanea saman</i>	Rain tree			Rain tree	Tree	8	0.79	0.29

Table 13. Scenario of the timber and other forest species available at H.S.T.U. campus as assessed on March, 2009 CONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of timb. plants	% of total plants
13	<i>Lagerstroemia speciosa</i>	Queen of the forest	Lythraceae	Tree	13	1.29	0.25
14	<i>Melia azedarach</i>	Bead tree	Meliaceae	Tree	188	18.74	3.66
15	<i>Swietenia macrophylla</i>	Mehogoni	Mehogoni	Tree	490	48.85	9.54
16	<i>S. mehogoni</i>	Mehogoni	Mehogoni	Tree	6	0.59	0.11
17	<i>S. lomboo</i>	Lomboo	Lomboo	Tree	35	3.48	0.69
18	<i>Artocarpus chaplasha</i>	Chapalish	Moraceae	Tree	3	0.29	0.05
19	<i>Ficus bengalensis</i>	Banyan tree	Bot	Tree	7	0.69	0.13
20	<i>F. religiosa</i>	Peepul	Ashoth/Pakurr	Tree	8	0.79	0.15
21	<i>Streblus asper</i>	Shaora	Shaora	Tree	4	0.39	0.07
22	<i>Eucalyptus citriodora</i>	Eucalyptus	Myrtaceae	Tree	101	10.06	1.96
23	<i>Adena cordifolia</i>	Adena	Rubiaceae	Tree	2	0.19	0.03
24	<i>Anthocephalus chinensis</i>	Kadambo	Kadam	Tree	12	1.19	0.23
25	<i>Gmelina arborea</i>	Gamari	Verbenaceae	Tree	25	2.49	0.45
26	<i>Tectona grandis</i>	Teak	Shegun	Tree	3	0.29	0.05
26		10	Sub total	dicot	998	99.51	19.44
31		11	Grand total	timber	1003	100	19.53

Table 14. Abstract of the ornamental plants of H.S.T.U. campus
as revealed on March, 2009

Taxa level	Gymnosperms	Monocots	Dicots	Angiosperms	Total
Family	4	13	41	54	58
Genera	6	41	99	140	146
Species	13	58	144	202	215
Plant	347	76	966	1042	1389

4. 10. Exposal of ornamental plant species

Humans are the only creation having multidimensional aesthetic needs and the nature is quite kind to satisfy those requirements. A total of 1,389 ornamental plants were displaying beauties (Tables 14 and 15) in this congenial arena on behalf of 215 species, 146 genera and 58 families. Of those 215 species 71, 49, 68, 9 and 17 were trees, shrubs herbs, vines and lianas (Table 15). Again, Leguminosae had the largest number of species (21) and 13 genera covering 174 plants.

The highest number of plants listed are weeping fir (260) succeeded by Thuja (184). Note that these 2 species are planted as welcoming species by the 2 sides of different roads and paths of the campus.

Palms are one of the most spectacular ornamental plants and hence are called the princes of the plant kingdom (Rashid, 2003). And a total of 7 genera, 7 species and 45 palms were recorded at the university campus

(Table 15). Only lady palm and liquala palm are shrubs, others are branchless trees.

Here, gymnosperms, angiosperms, herbs, shrubs, trees, vines and lianas - all the 6 kinds of plants are present. But no aquatic species is available in this campus. Again, orchids, cacti and roses are very poor in number - only 2-3. Nonetheless, 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. But one thing is odd looking that it has ignored the aquatic species completely. So, some important species must be added to the list. In addition, cacti, orchids, ferns etc. must have the membership with adequate number and rooms in this green campus.

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discovered during March, 2009

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		A) Gymnosperm					
		1. Family : Araucariaceae					
1	<i>Araucaria columnaris</i>	Araucaria/Christmas tree	Araucaria	Tree	10	0.73	0.19
2	<i>A. cunninghamii</i>	Araucaria	Araucaria	Tree	1	0.07	0.01
		2. Family : Casuarinaceae					
3	<i>Casuariana equisetifolia</i>	Australian oak	Zhau	Tree	5	0.36	0.10
		3. Family : Cupressaceae					
4	<i>Juniperus prostrata</i>	Juniper	Junipere	Tree	2	0.14	0.03
5	<i>Thuja orientalis</i>	Thu	Thuja	Tree	314	22.78	6.11
		4. Family : Cycadaceae					
6	<i>Cycas circinalis</i>	Cycas	Cycas	Tree	5	0.36	0.10
7	<i>C. revoluta</i>	Cycas	Cycas	Tree	3	0.21	0.05
8	<i>C. sp.</i>	Cycas	Cycas	Tree	1	0.07	0.01
9	<i>C. sp.</i>	Cycas	Cycas	Tree	1	0.07	0.01
10	<i>C. sp.</i>	Cycas	Cycas	Tree	1	0.07	0.01
11	<i>C. sp.</i>	Cycas	Cycas	Tree	1	0.07	0.01
12	<i>C. sp.</i>	Cycas	Cycas	Tree	2	0.15	0.03
13	<i>Jamia angustifolia</i>	Jamia palm	Cycas	Tree	1		0.01
13		4	Sub total	Gymno.	347	25.30	6.76
		B) Monocot					
		1. Family : Amaryllidaceae					
1	<i>Amaryllis belladonna</i>	Barbadose lily	Barbadose lily	Herb	1	0.07	0.01
2	<i>Cooperia drummondii</i>	Prairy lily	Peeaj phul	Herb	1	0.07	0.01
3	<i>Crinum asiaticum</i>	Crinum	Sudorshan lily	Herb	1	0.07	0.01
4	<i>Eucharis amazonica</i>	Amazon lily	Amazon lily	Herb	1	0.07	0.01
5	<i>Haemanthus sp.</i>	Football lily	Football lily	Herb	1	0.07	0.01

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
6	<i>Hymenocallis</i> sp.	Spider lily	Makrasha lily	Herb	1	0.07	0.01
7	<i>Polyanthes tuberosa</i>	Tuberose	Rojonygandha	Herb	1	0.07	0.01
		2. Family	Araceae				
8	<i>Aglaonema commutatum</i>	Aglaonema	Aglaonema	Herb	1	0.07	0.01
9	<i>Anthurium</i> sp.	Anthurium	Anthurium	Herb	1	0.07	0.01
10	<i>Anthurium</i> sp.	Anthurium	Anthurium	Herb	1	0.07	0.01
11	<i>Anthurium</i> sp.	Anthurium	Anthurium	Herb	1	0.07	0.01
12	<i>Caladium bicolor</i>	Ornamental aroid	Bahari kachu	Herb	1	0.07	0.01
13	<i>Diffenbachia amoena</i>	Dumb cane	Boba bet	Herb	1	0.07	0.01
14	<i>Monstera deliciosa</i>	Swiss cheese plant	Monstera	Herb	1	0.07	0.01
15	<i>Philodendron</i> sp.	Philodendron	Money plant	Herb	1	0.07	0.01
16	<i>Syngonium podophyllum</i>	Syngonium	Goose foot plant	Vine	1	0.07	0.01
		3. Family	Bromeliaceae				
17	<i>Ananas comosus variegata</i>	Ornamental pineapple	Bahari anaras	Herb	1	0.07	0.01
18	<i>Billbergia nutans</i>	Bromilid	Bromilid	Herb	1	0.07	0.01
19	<i>Vriesia speciosa</i>	Flaming sword	Bromelid	Herb	1	0.07	0.01
		4. Family	Cannaceae				
20	<i>Canna indica</i>	Canna	Sarbojoya	Herb	1	0.07	0.01
		5. Family	Commelinaceae				
21	<i>Rhoeo discolor</i>	Boat lily	Boat lily	Herb	1	0.07	0.01
22	<i>Setcreasea purpurea</i>	Purple heart	Purple heart	Herb	1	0.07	0.01
		6. Family	Cyperaceae				
23	<i>Cyperus alternifolius</i>	Umbrella plant	Sata ghash	Herb	1	0.07	0.01
		7. Family	Gramineae				
24	<i>Arundinacea</i> sp.	Ornamental bamboo	Bahari bansh	Herb	1	0.07	0.01
25	<i>Bambusa nana</i>	Hedge bamboo	Hedge bansh	Herb	1	0.07	0.01

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		8. Family	Liliaceae				
26	<i>Agave americana</i>	Century plant	Sataiu gass	Herb	1	0.07	0.01
27	<i>A. sisalana</i>	Sisal	Sisal	Herb	1	0.07	0.01
28	<i>Asparagus plumosa</i>	Asparagus	Satomuli	Herb	1	0.07	0.01
29	<i>Aspidistra elatior</i>	Cast iron plant	Cast iron plant	Herb	1	0.07	0.01
30	<i>Chlorophytum elatum</i>	Chlorophytum	Chlorophytum	Herb	1	0.07	0.01
31	<i>Cordiline terminalis</i>	Cabbage palm	Agnishawar	Shrub	1	0.07	0.01
32	<i>Dracaena fragrans</i>	Dracaena	Dracaena	Shrub	1	0.07	0.01
33	<i>Furcraea gigantea</i>	Furcraea	Furcraea	Herb	1	0.07	0.01
34	<i>Nolina tuberculata</i>	Nolina	Nolini	Herb	1	0.07	0.01
35	<i>Sansevieria trifasciata</i>	Mother-in-law's tongue	Ghora chakro	Herb	1	0.07	0.01
36	<i>Yucca sp.</i>	Adam's needle	Adamer sooch	Shrub	4	0.29	0.07
		9. Family	Marantaceae				
37	<i>Calathia sp.</i>	Calathia	Calathia	Herb	1	0.07	0.01
38	<i>Calathia sp.</i>	Calathia	Calathia	Herb	1	0.07	0.01
39	<i>Calathia sp.</i>	Calathia	Calathia	Herb	1	0.07	0.01
40	<i>Calathia sp.</i>	Calathia	Calathia	Herb	1	0.07	0.01
41	<i>Maranta arundinacea</i>	Arrow root	Araroot	Herb	1	0.07	0.01
42	<i>Maranta sp.</i>	Maranta	Maranta	Herb	1	0.07	0.01
43	<i>Maranta sp.</i>	Maranta	Maranta	Herb	1	0.07	0.01
44	<i>Maranta sp.</i>	Maranta	Maranta	Herb	1	0.07	0.01
		10. Family	Musaceae				
45	<i>Heliconia metallica</i>	Canna	Kalaboti	Herb	1	0.07	0.01
46	<i>Musa ornate</i>	Ornamental banana	Bahari kola	Herb	1	0.07	0.01
47	<i>Ravenala madagascariensis</i>	Travelers' tree	Pantho padob	Tree	1	0.07	0.01
48	<i>Sirelitzia reginae</i>	Birds of paradise	Zannater pakhi	Herb	1	0.07	0.01

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		11. Family	Palmae /Arecaceae				
49	<i>Caryota urens</i>	Fishtail palm	Chaur	Tree	3	0.21	0.05
50	<i>Chrysalidocarpus lutescens</i>	Butterfly palm	Butterfly pam	Tree	3	0.21	0.05
51	<i>Licuala grandis</i>	Liquala palm	Liquala pam	Tree	1	0.07	0.01
52	<i>Livistona</i> sp.	China palm	China pam	Tree	4	0.29	0.07
53	<i>Phoenix roebelinii</i>	Pigmy palm	Dwarf pam	Tree	2	0.14	0.03
54	<i>Raphis excelsa</i>	Lady palm	Lady pam	Tree	3	0.21	0.05
55	<i>Raphis</i> sp.	Lady palm	Lady pam	Tree	2	0.14	0.03
56	<i>Roystonea regia</i>	Royal palm	Rajokio pam	Tree	5	0.36	0.10
		12. Family	Pandanaceae				
57	<i>Pandanus sanderi</i>	Screw pine	Keya	Herb	1	0.07	0.01
		13. Family	Zingiberaceae				
58	<i>Hedychium coronarium</i>	Ginger lily	Dolon champa	Herb	1	0.07	0.01
58		13	Sub total	Mono.	76	5.51	1.48
		C) Dicot					
		1. Family	Acanthaceae				
1	<i>Aphelandra squarrosa</i>	Zebra plant	Zebra plant	Herb	1	0.07	0.01
2	<i>Crossandra nilotica</i>	Crossanda	Crossanda	Herb	1	0.07	0.01
3	<i>Daedalacanthus nervosus</i>	Blue sag	Blue sag	Herb	1	0.07	0.01
4	<i>Hypoestes phyllostachya</i>	Hypoestes	Polka dot plant	Herb	1	0.07	0.01
5	<i>Pseudoranthemum atropurpureum</i>	Pseudoranthemum	Pseudoranthemum	Shrub	2	0.14	0.03
6	<i>Ruellia</i> sp.	Ruellia	Ruellia	Herb	1	0.07	0.01
7	<i>Thunbergia erecta</i>	Thunbergia	Nilghanta	Shrub	1	0.07	0.01
		2. Family :	Amaranthaceae				
8	<i>Aerva sanguinea</i>	Nuria	Nuria	Herb	1	0.07	0.01

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		3. Family :	Annonaceae				
9	<i>Ariabotrys odoratissimus</i>	Climbing ylang ylang	Kanthali chanpa	Liana	2	0.14	0.03
10	<i>Polyalthia longifolia</i>	Mast tree	Deshi debdaru	Tree	10	0.72	0.19
11	<i>P. longifolia</i> var. <i>pendula</i>	Weeping fir	Weeping debdaru	Tree	300	21.77	5.85
		4. Family	Apocynaceae				
12	<i>Adenium obesum</i>	Flamingo giant	Adenium	Shrub	1	0.07	0.01
13	<i>Aganospma caryophyllata</i>	Aganospma	Maloti lata	Liana	2	0.14	0.03
14	<i>Allamanda blanchetii</i>	Allamanda	Alokmanda	Liana	10	0.72	0.19
15	<i>A. cathartica</i>	Allamanda	Alokmanda	Liana	5	0.36	0.10
16	<i>A. neriifolia</i>	Allamanda	Alokmanda	Liana	3	0.21	0.05
17	<i>Nerium oleader</i>	Oleander	Korobi	Shrub	5	0.36	0.10
18	<i>Plumeria rubra</i>	Pagoda tree (Pink)	Golapy Kath golap	Tree	2	0.14	0.03
19	<i>P. obtusa</i>	Pagoda tree	Kath golap	Tree	1	0.07	0.01
20	<i>Tabernaemantana coronaria</i>	Wax plant	Tagor	Shrub	4	0.29	0.07
21	<i>Thevetia neriifolia</i>	Yellow oleander	Kolkey ful	Tree	6	0.43	0.11
22	<i>Vinca alba</i>	Vinca	Nayontara	Herb	1	0.07	0.01
23	<i>V. rosea</i>	Vinca	Nayontara	Herb	1	0.07	0.01
		5. Family	Araliaceae				
24	<i>Polyscias guilfoylei</i>	Aralia	Aralia	Shrub	1	0.07	0.01
		6. Family	Bignoniaceae				
25	<i>Adenocalymma alliaceum</i>	Garlic vine	Rosunia lota	Liana	2	0.14	0.03
26	<i>Campsis radicans</i>	Campsis	Komol lota	Liana	2	0.14	0.03
27	<i>Oroxylum indicum</i>	Oroxylum	Kanaidanga	Tree	4	0.29	0.07
28	<i>Pyrostegia venusta</i>	Golden shower	Konok lata	Liana	1	0.07	0.01
29	<i>Spathodea campanulata</i>	Tulip tree	African tulip	Tree	1	0.07	0.01
30	<i>Stercospermum kunthianem</i>	Stercospermum	Parul	Liana	2	0.14	0.03

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
31	<i>Tecoma capensis</i>	Tecoma	Tecoma	Shrub	2	0.14	0.03
32	<i>T. stans</i>	Yellow bell	Tecoma	Tree	3	0.21	0.05
33	<i>Tecoma</i> sp.	Tecoma	Tecoma	Shrub	2	0.14	0.03
			Bombaceae				
34	<i>Bombax ceiba</i>	Silk cotton tree	Shimul	Tree	2	0.14	0.03
			Cactaceae				
35	<i>Epiphyllum</i> sp.	Epiphytic cactus	Epiphytic cactus	Herb	1	0.07	0.01
36	<i>Pereskia grandiflora</i>	Rose cactus	Rose cactus	Vine	1	0.07	0.01
37	<i>Pereskia</i> sp.	Rose cactus	Rose cactus	Herb	1	0.07	0.01
			Caprifoliaceae				
38	<i>Lonicera japonica</i>	Honey suckle	Honey suckle	Vine	1	0.07	0.01
39	<i>Sambucus nigra</i>	Sambucus	Sambucas	Shrub	4	0.29	0.07
			Chenopodiaceae				
40	<i>Kochia scoparia</i>	Summer cypress	Kochia	Herb	1	0.07	0.01
			Combretaceae				
41	<i>Quisqualis indica</i>	Rangoon creeper	Brommo lota	Liana	2	0.14	0.03
			Compositae				
42	<i>Gerberajamesonii</i>	Gerbera	Gerbera	Herb	1	0.07	0.01
			Convolvulaceae				
43	<i>Ipomoea batatas</i>	Ipomoea	Ipomoea	Vine	1	0.07	0.01
			Ericaceae				
44	<i>Rhododendron hookery</i>	Rhododendron	Rhododendron	Shrub	3	0.21	0.05
			Euphorbiaceae				
45	<i>Acalypha hispida</i>	Cat's tail	Mukto jhuri	Shrub	2	0.14	0.03
46	<i>A. wilkesiana</i>	Copper leaf	Mukto jhuri	Shrub	4	0.29	0.07
47	<i>Breynia nívosa</i>	Mosaic bush	Mosaic bush	Shrub	1	0.07	0.01

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
48	<i>Codiaeum variegatum</i>	Croton	Pata bahar	Shrub	4	0.29	0.07
49	<i>Euphorbia cristata</i>	Milkbush	Dudh gass	Shrub	1	0.07	0.01
50	<i>E. lactea</i>	Euphorbia	Euphorbia	Herb	1	0.07	0.01
51	<i>E. pulcherrima</i>	Poinsettia	Poinsettia	Tree	20	1.45	0.38
52	<i>E. thiansis</i>	Blood leaf	Rakto pata	Tree	2	0.14	0.03
53	<i>E. tirucalis</i>	Milkbush	Dudh gass	Herb	4	0.29	0.07
54	<i>Jatropha panduræfolia</i>	Jayoti	Jayiti	Shrub	4	0.29	0.07
55	<i>J. podagrica</i>	Jatropha	Joyotri/Moyor kunthi	Shrub	4	0.29	0.07
			Guttiferae				
56	<i>Mesua ferrea</i>	Iron wood tree	Nageswar champa	Tree	3	0.21	0.05
			Labiatae				
57	<i>Coleus blumeri</i>	Coleus	Coleus	Herb	1	0.07	0.01
			Lecythidaceae				
58	<i>Couroupita guianensis</i>	Canon's ball tree	Nag lingom	Tree	3	0.21	0.05
			Leguminosae				
59	<i>Albizzia richardiana</i>	Royal siris	Raj Korai	Tree	96	6.96	1.86
60	<i>Bauhinia acuminata</i>	Camel's foot plant	Kanchan	Shrub	6	0.43	0.11
61	<i>B. tomentosa</i>	Camel's foot plant	Kanchan	Shrub	3	0.21	0.05
62	<i>B. purpurea</i>	Camel's foot tree	Deb kanchan	Tree	5	0.36	0.10
63	<i>Brownea coccinea</i>	Mountain rose	Brownia	Tree	2	0.14	0.03
64	<i>Butea monosperma</i>	Flame of the forest	Polash	Tree	5	0.36	0.10
65	<i>Calliandra emarginata</i>	Calliandra	Powder puff	Shrub	1	0.07	0.01
66	<i>C. hybrida</i>	Calliandra	Powder puff	Tree	3	0.21	0.05
67	<i>C. sp.</i>	Calliandra	Powder puff	Shrub	1	0.07	0.01
68	<i>Cassia alata</i>	Candle bush	Dad mordon	Shrub	2	0.14	0.03
69	<i>C. fistula</i>	Indian labuurnum	Sonalu	Tree	3	0.21	0.05

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
70	<i>C. siamea</i>	Yellow cassia	Halud cassia	Tree	2	0.14	0.03
71	<i>C. nodosa</i>	Pink cassia	May ful	Tree	3	0.21	0.05
72	<i>Caesalpinia pulcherrima</i>	Radhachura	Radhachura	Shrub	3	0.21	0.05
73	<i>Clitoria ternatea</i>	Clitoria	Oporazita	Vine	2	0.14	0.03
74	<i>Delonix regia</i>	Peacock flower	Krisnachura	Tree	25	1.81	0.48
75	<i>Erythrina indica varigata</i>	Variegated coral tree	Bahari mandar	Tree	2	0.14	0.03
76	<i>E. indica</i>	Coral tree	Madar	Tree	1	0.07	0.01
77	<i>Pettophorum inerme</i>	Yellow gold mohur	Holud krisnachura	Tree	1	0.07	0.01
78	<i>Saraka indica</i>	Ashoke	Ashok	Tree	6	0.43	0.11
79	<i>Sesbania grandiflora</i>	Swamp pea	Bokful	Tree	2	0.14	0.03
		20. Family	Lythraceae				
80	<i>Lagerstroemia indica</i>	Indian lilac	Furush	Tree	8	0.57	0.15
		21. Family	Magnoliaceae				
81	<i>Michelia champaca</i>	Champa	Swarna champa	Tree	6	0.43	0.11
82	<i>Magnolia grandiflora</i>	Magnolia	Udoy poddo	Tree	3	0.21	0.05
83	<i>M. pumila</i>	Magnolia	Johuri chanpa	Shrub	1	0.07	0.01
		22. Family	Malvaceae				
84	<i>Disanthus cercidifolius</i>	Mosaic plant	Disanthus	Tree	3	0.21	0.05
85	<i>Hibiscus mutabilis</i>	Changable rose	Sthol padma	Tree	2	0.14	0.03
86	<i>H. rosa-sinensis</i>	China rose	Joba	Shrub	12	0.86	0.23
87	<i>H. schizopetalus</i>	Coral hibiscus	Jhumko joba	Shrub	3	0.21	0.05
88	<i>H. syriacus</i>	Rose of sharon	Joba	Shrub	5	0.36	0.10
89	<i>Malvaviscus arboreus</i>	Scarlet cotton	Lanka joba	Shrub	6	0.43	0.11
		23. Family	Malpighiaceae				
90	<i>Malpighia coccigera</i>	Malpighia	Khaiful	Shrub	2	0.14	0.03
91	<i>Hiptage mandhablata</i>	Mandhablata	Mandhablata	Liana	2	0.14	0.03

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		24.Family	Melastomaceae				
92	<i>Memecylon tinctorium</i>	Anjon	Anjon	Tree	4	0.29	0.07
93	<i>Tibouchina urvilliana</i>	Spider flower	Tibouchina	Herb	1	0.07	0.01
		25.Family :	Moraceae				
94	<i>Ficus benjamina</i>	Ficus	Ficus	Tree	15	1.08	0.29
95	<i>F. deltoidea</i>	Ficus	Bot	Tree	1	0.07	0.01
96	<i>F. elastica</i>	Indian rubber	Bharotio rubber	Tree	3	0.21	0.05
97	<i>F. lyrata</i>	Ficus	Bina bot	Tree	2	0.14	0.03
98	<i>F. microcarpa</i>	Ficus	Ficus	Tree	1	0.07	0.01
99	<i>F. pumila</i>	Rooting fig	Lota bot	Vine	1	0.07	0.01
		26. Family :	Myrtaceae				
100	<i>Barringtonia acutangula</i>	Indian oak	Hijol	Tree	12	0.86	0.23
101	<i>Callistemon lanceolatus</i>	Bottle brush	Bottle brush (red)	Tree	8	0.57	0.15
102	<i>C. formosus</i>	Bottle brush	Bottle brush (white)	Tree	5	0.36	0.10
103	<i>C. viminalis</i>	Bottle brush	Bottle brush (yellow)	Tree	4	0.29	0.01
104	<i>Gustavia</i> sp.	Gustavia	Gustavia	Shrub	1	0.07	0.01
		27.Family :	Nyctaginaceae				
105	<i>Bougainvillea</i> sp.	Bougainvillea	Baganbilash	Liana	7	0.51	0.13
		28.Family :	Oleaceae				
106	<i>Jasminum angustifolium</i>	Mollika	Mollika	Shrub	3	0.21	0.05
107	<i>J. auriculatum</i>	Common jasmine	Juin	Liana	4	0.29	0.07
108	<i>J. grandillorum</i>	Spanish jasmine	Chameli	Liana	3	0.21	0.05
109	<i>J. pubescens</i>	Kundo	Kundo	Shrub	5	0.36	0.10
110	<i>J. sambac</i>	Arabian jasmine	Baliful	Shrub	5	0.36	0.10
111	<i>Nyctanthes arbor-tristis</i>	Night jasmine	Sefali	Tree	8	0.58	0.15

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		29. Family :	Orchidaceae				
112	<i>Bletilla hyacintha</i>	Ground orchid	Bhumij orchid	Herb	1	0.07	0.01
		30. Family :	Plumbaginaceae				
113	<i>Plumbago capensis</i>	Plumbago	Plumbago	Herb	1	0.07	0.01
		31. Family :	Polygonaceae				
114	<i>Antigonon leptopus</i>	Coral vine	Ananto lota	Vine	1	0.07	0.01
115	<i>Coccoloba platyclada</i>	Coccoloba	Coccoloba	Herb	1	0.07	0.01
		32. Family :	Rosaceae				
116	<i>Rosa gigantea</i>	Wild rose	Bonno golap	Shrub	20	1.42	0.38
117	<i>R. sinensis</i>	Rose	Golap	Shrub	12	0.86	0.23
		33. Family	Rubiaceae				
118	<i>Gardenia carinata</i>	Gardenia	Boro gangharaj	Tree	1	0.07	0.01
119	<i>G. jasminoides</i>	Gardenia	Gondhoraj	Shrub	12	0.86	0.23
120	<i>G. jardinei</i>	Gardenia	Gandharaj (Hing)	Shrub	1	0.07	0.01
121	<i>Ixora alba</i>	Ixora	Rongon	Shrub	4	0.29	0.07
122	<i>I. coccinea</i>	Ixora	Rongon	Shrub	16	1.16	0.31
123	<i>Mussaenda erythrophylla</i>	Mussaenda	Mussanda	Tree	20	1.42	0.38
124	<i>M. frondosa</i>	Mussaenda	Sada pata	Shrub	4	0.29	0.07
125	<i>Pentas lanceolata</i>	Egyptian star flower	Pentas	Herb	1	0.07	0.01
		34. Family	Rutaceae				
126	<i>Murraya exotica</i>	China box	Kaminy	Tree	6	0.43	0.11
127	<i>Ravenea spectabilis</i>	Ravenea	Ravenea	Shrub	3	0.21	0.05
		35. Family	Sapotaceae				
128	<i>Mimusops elengi</i>	Indian medlar	Bakul	Tree	58	4.20	1.12
129	<i>Madhuca latifolia</i>	Butter tree	Mahua	Tree	3	0.21	0.05

Table 15. The detail picture of the ornamental species available at H.S.T.U. campus as discoveredCONTINUED

Sl. nos.	Scientific names	English names	Local (vernacular) names	Growth habits	Total no. of plants	% of fruit plants	% of total plants
		36. Family :	Saxifloraceae				
130	<i>Hydringia hortensis</i>	Hydrangea	Hydrangea	Herb	1	0.07	0.01
		37. Family :	Scrophulariaceae				
131	<i>Russelia floribunda</i>	Fountain plant/Russelia	Zhorna plant	Herb	1	0.07	0.01
		38. Family	Solanaceae				
132	<i>Brunfelsia americana</i>	Brunfelsia	Brunfelsia	Shrub	3	0.21	0.05
133	<i>B. latifolia</i>	Brunfelsia	Brunfelsia	Shrub	2	0.21	0.03
134	<i>Cestrum nocturnum</i>	Lady of the night	Hasnahena	Shrub	2	0.36	0.03
		39. Family	Sterculiaceae				
135	<i>Pterospermum acerifolium</i>	Kanok champa	Kanok champa	Tree	1	0.07	0.01
		40. Family	Theaceae				
136	<i>Camellia japonica</i>	Camellia	Camellia	Tree	2	0.14	0.03
		41. Family	Verbenaceae				
137	<i>Clerodendron macrosiphon</i>	Clerodendron	Clerodendron	Vine	2	0.14	0.03
138	<i>C. infortunatum</i>	Clerodendron	Roctovat	Vine	2	0.14	0.03
139	<i>C. fragrance</i>	Clerodendron	Chandonbhat	Herb	2	0.14	0.03
140	<i>C. thomsoniae</i>	Bleeding heart	Bleeding heart	Vine	1	0.07	0.01
141	<i>Duranta repens</i>	Duranta	Duranta	Shrub	1	0.07	0.01
142	<i>Gmelina hystrix</i>	Gmelina	Bhadora	Liana	2	0.14	0.03
143	<i>Lantana camera</i>	Lantana	Kutus kanta	Shrub	4	0.29	0.07
144	<i>Petrea volubilis</i>	Purple wreath	Nilmoni lota	Liana	1	0.07	0.01
144			Sub total	dicot	966	69.57	18.83
215			Grand total	ornam.	1389	100	27.07

CHAPTER 5

SUMMARY AND RECOMMENDATIONS

A taxonomic survey work was conducted at H.S.T.U. campus with a view to make an inventory of its plant resources during March, 2009. The evaluation visibly highlights that there were in total 5,134 plant samples representing 382 species from 270 genera and 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 uppermost numbers among all the plants were: mehogani (531) followed by jackfruit (408), mango (355), thuja (314), weeping fir (300), betel nut (283), cocoanut (270), neem (251), ghora neem (188), litchi (167), tea (161) and guava (159). Campus also hosts some rare species, e.g. agor, allspice, anjan, African tulip, baobab, brownia, canon ball tree, camphor, kapok, ritha, thaikor, shatkorra, sour sop.

The green campus was substantially covered with various plant species. So, total plant richness was better than other institutes of Bangladesh. But

the site was considered as a plant conservatory arena. Thus, the total species collection should be further diversified, particularly the broad wild genetic pool, which are still available in the nature. Hence, suggestions are made to boost-up the protection of endemic, rare and threatened wild plant resources and to defend diversity of the domain.

The present study revealed some drawbacks of those programs relating to biodiversity and conservation of plant resources. The survey showed that some species had almost been included each year. Sadly, attempts were not made to include the native, rare and endangered wild and semi-domesticated genetic resources. Also, the plant materials sheltered were not documented. Finally, lacking of data management systems existed.

Recommendations

From the above findings these suggestions can be made:

1. Nameplates for all species should be provided.
2. Species with only one plant sample must be increased in number. In addition, propagation of rare, endangered and threatened species should be done for public uses.
3. Judicious replacements of plant species of inferior health are needed. Also, gap fillings should be done as per situations.

4. Control of parasitic flowering weeds on various dicot species e.g. mango, litchi, *Citrus* spp., should be done immediately.
5. Coconut and betel nuts are monocots lacking the very cambium layer. So, their pruning should be done with adequate care as is evident from injuries and holes on their trunks. Note that, any injury to those is irreparable for its life time.
6. Diversified plant species, particularly for the minor fruit, forest, medicinal, spice and aromatic, aquatic, cactus, orchid, fern and multi-purposes trees (MPTs) should be incorporated further.
7. Extra area should be allotted to develop a full-fledged plant conservatory cum field gene bank/germplasm centre for new species and also for those, which are few in numbers.
8. Research and extension works should be done as per needs.
9. More detailed survey work should be conducted for the appraisal of the plant genetic richness of the Campus.

10. Seminars, symposia, workshops, trainings etc. should be arranged for scientific developments as well as creation of public awareness about plant resources.
11. A detailed colored pictorial inventory of the plant resources available at the campus should be printed in a users' friendly manner for general use. That will be beneficial for this institution as well as other similar organizations.
12. A computer based data management system (Microsoft Access Software) should be developed for quick access of the plant resources. And that should be updated time to time as per needs.
13. Memorandum of understanding (MOU) may be signed with various local and foreign organizations to enrich and exchange plant samples, seeds, experiences, cooperation, and financial as well as other technical supports.
14. Steps are needed to set a landscape section/equivalent unit with required manpower and finance to look after the plant resources.
15. A network should be set with other Botanical Gardens of Bangladesh for nationwide better linkage.
16. Finally, the University may seek membership for GSPC (Global Strategy for Plant Conservation), BGCI (Botanical Garden Conservation International) etc. for up to date information etc.

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