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DECLARATION

I, S.M. Serazul Islam, declare that this thesis is the result of my own works and that it has not yet been submitted or accepted for a degree in any other university.

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DEDICATED

TO

MY BELOVED PARENTS

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S.M. Serazul Islam

ABSTRACT

Bangladesh is a small, over populated country in the world. Its population is increasing day by day but on the other hand, land as well as forest cover are not increasing. The joint families are converted into a nuclear family, so the land also divided. As a result, people fell down the unwanted plant species for house construction and others. So many important plant species as well as animal species are extinct day by day. To assess the homegarden plant diversity and their conservation status, I was studied one of the upazilla (Dighalia) of Khulna district. Assessment was done by means of transect sampling method. A total number of 180 species belonging to 74 families were found in Dighalia Upazilla, Khulna, of which 75 species were recorded tree species (42%), 28 shrub species (16%), 53 herb species (29%) and 24 climber species (13%). A total 4201 individuals (65 per home garden and 1152 per ha) were counted from 3.65 ha total sampled area. Out of 180 species, 10 tree species, 9 herb species and 3 climber species are endangered species (according to theEncyclopedia of Flora and Fauna of Bangladesh). Most dominated tree species were Coconut (*Cocos nucifera*L.), betel nut (*Areca catechu* L.), Mahagony (*Swietenia mahagoni* L. Jacq.), Mango (*Mangifera indica* L.), Most dominated shrub species were Guava (*Psidium guajava* L.), Patabahar (*Codiaeum variegatum* (L.), Dumur (*Ficus hispida*L.f.), Most dominated herb and climber species were Banana (Musa paradisiacal L), Giant Taro (*Alocasiamacrorrhizos* (L.) G.Don), Blue Taro (*Xanthosoma violaceum* Schott) and Greater Yam (Dioscorea alata L.), Bottle Gourd (Lagenaria siceraria (Molina) Standl), Indian Spinach (Basella alba L).Again among the recorded 180species, 47 species were Medicinal plants species, 41 Fruits species, 17 Timber species, 26 Vegetable species, 9 Fuel wood Species, 41 Ornamental species, 3 Spices species, 3 Dyes species and 20 other uses species. Diversity and abundance of fruit and medicinal species found higher in all Home Gardens.TheShanon-winner index for diversity of trees (4.41) was higher than shrubs (3.27) and climber (3.74) but lower than herbs (4.49). Species RichnessIndex of trees (22.14) was higher than shrubs (9.12), herbs (18.62) and climbers (9.76).The Evenness Index was 0.71, 0.68, 0.78 and 0.82 for tree, shrub, herb and climber respectively. Average plant species per Homegardens are 23 in which 15 are tree species, 3 shrub species and 3 herb and 2 climber species.Tree Species always dominated over other plant species.

Table of Contents

List of Tables

List of Figures

List of Acronyms

HG	Home Garden
CBD	Convention on Biological Diversity
EFFB	Encyclopedia of Flora and Fauna of Bangladesh
DBH	Diameter at Breast Height
FAO	Food and Agriculture Organization
GPS	Global Positioning System
NGO	Nongovernmental Organization
USDA	United States Department of Agriculture
APAN	Asia Pacific Agro forestry Network
NAWG	National Agro forestry Working Group
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
QGIS	Quantum Geographic Information System
ASL	Average Sea Level
Sq.km	Square kilometer

INTRODUCTION

1.1Background of the Study

Homegardens are one of the most elaborate systems of the indigenous agro forestry, found most often in tropical and sub-tropical areas where subsistence land use systems predominate (FAO, 1986). Homegarden can be defined as the land surrounding a house, on which a mixture of annual and perennial plants is grown together with/without animals largely managed by the household members for own use or commercial purposes.

The variety of life on Earth, its biological diversity is commonly referred to as biodiversity. The number of species of plants, animals, and microorganisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse Earth. Appropriate conservation and sustainable development strategies attempt to recognize this as being integral to any approach. Almost all cultures have in some way or form recognized the importance that nature, and its biological diversity has had upon them and the need to maintain it (Global issues, 2017).

Homegarden enriches our biodiversity and also increases our forest cover. It provides an extra income to the villagers. Homegarden also provides fuel wood, fruits, vegetables, fodders for animal and timber for furniture making, home construction. Some plants have some medicinal value also. Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play.For example, a larger number of plant species means a greater variety of crops; greater species diversity ensures natural sustainability for all life forms; and healthy ecosystems can better withstand and recover from a variety of disasters (Global issues, 2017).

Homegardens are often ignored by scientist and development agents as an important part of traditional farming systems largely because of their small size and apparent insignificance (Bunderson *et al.*, 1990). They are often looked at as an example of primitive, underdeveloped agriculture compare to modern high-yielding technological agrosystems (Michon *et al.* 1983). Many studies have reported the existence of Homegardens in various regions of the world, but very few studies have adequately analyzed the structure, species composition, and diversity and conservation status of the Homegardens (Millat-e-Mustafa *et al.*, 1996)

The joint family converted in to nuclear family. So the area of Homegardens also divided and the pressure of over population, people cut the unwanted tree for build house or other uses. So plant diversity as well as animal diversity also decreased.The southwest part of Bangladesh is enriched in biodiversity. Dighalia upazilla is one of the upazilla in this part. Many fruit, timber, medicinal, vegetable and other plant species are planted in this area. Many species which are not found in natural forest are grown here. So, Homegardens play roles in conservation of this species. I have to assess the plant diversity and also look forward to find out those species which conserved in Dighalia upazilla. For those reason. I have done my research project on Dighalia upazilla, Khulna.

1.2 Objectives of Project Thesis

- To find out the plant species diversity in Dighaliaupazilla
- To find out Threat and Conservation Status of plant species (According to Encyclopedia of Flora and Fauna of Bangladesh).

LITERATURE REVIEW

2.1 Concept of Homegarden

From ecological and conservation point of view, assessment of biodiversity of any habitat or locality has been regarded as one of the vital issue for careful preservation, promotion and management of the variety of life-forms. Increased human population and associated development activities in the last few decades has resulted directly and indirectly in depletion of the natural vegetation which in turn increase the pressure on the homestead forest specially in the developing countries to meet various needs of the human beings. In this circumstances correct inventory and assessment of biodiversity in different habitats is necessary for evolving a long term strategy for conserving the endangered species and improvement of the existing species.

Bangladesh is situated at the complex interface of the Himalayan and the Southeast Asian Bio-geographic regions, and historically was well endowed with very diverse complements of terrestrial and aquatic flora and fauna. It has 15.4 million homesteads occupying 0.3 million hectares of land and are providing major requirement of food, fruit, vegetables, timber and food crops were found in the homesteads(Alam and Masum, 2005). Homegardens are usually the small plots of land surrounding the house. It also known as compound farms, homestead and mixed gardens. Homestead is an operational unit in which a number of crops including trees are grown with livestock, poultry and fish production mainly for the purpose of satisfying the farmer's basic needs. It is the most prospective form of production site along with the seat/shelter of the family. Homestead fulfill basic needs of the people such as food, shelter, cash etc and high species diversity of the homestead help to reduce the environmental deterioration commonly associated with monoculture production system. Moreover, they have been producing sustained yields for a century in a most resources efficient way. Homegardens are important agro ecosystems and are a source of substance and cash resources. That commonly exhibits a layered vertical structure of trees, shrubs and ground cover plants which recreate some of the features of nutrient recycling, soil protection and effective use of space below and above the soil surface. They also act as a repository and testing site for uncommon species and varieties of plants (Padoch and Jong 1991) and can be used to spread farm work, output and income more evenly throughout the year (Ninez, 1984). Homegardens are a source of edible, medicinal and other useful plant. The Homegardens of Southeast

Asia provide the most vivid illustration of the importance of plants in providing needs for the family. Within perhaps 50 m of each dwelling can be found bananas, coconuts, betel nuts, mangoes, many vegetable, palms, bamboo calm and even fuel wood and timbers trees. In Indonesia, no less than 37 fruit tree species have been found growing in just one Homegarden (Godbole, 1998). Study on homestead forest was carried out in different regions of Bangladesh. Alam and Mohiuddin, Alam et al. Das, Hassan and Mazumdar, Khan and Alam,Siddiqi and Khan studied the floristic composition (mainly trees) in the homestead of Bangladesh. Ahmad, Bashar, Choudhury and Sattar, Islam, studied Homestead agroforestry. Homestead plantation and traditional uses was studied by Alam *et al* , Miah *et al*., Momin *et al.* and Millat-e Mustafa *et al* .. From the conservation point of view, homestead forest can be considered as the ex-situ conservation sites for the wide range of plant diversity. The ecological merits of Homegarden are related to conservation of soil, water, nutrients and bio-diversity. Therefore, this study will be a baseline information for the policy makers to understand the species richness, species and composition, structure, soil conservation methods, fruit species conservation, household food security, and socio-economic importance of homestead forest as well as to formulate biodiversity conservation planning highlighting homestead forest of Bangladesh for sustainable production and maintenance of biodiversity (Alam and Masum, 2005).

2.2 Composition and characteristics of Homegarden

Although no quantitative information regarding species composition in the Homegardens is available in the literature the studies of Barrau (1961) in the Pacific, McConnel and Dharmapala (1973) in Sri Lanka, Sommers (1978) in Philippines, Michon *et al.* (1983) in java, Boonkind *et al.* (1984) in Thailand have acknowledged the predominance of fruit and food producing species in the Homegardens of the respective countries. Similar observations were also made by Isla and Ahmad (1987), Khaleque (1987), Akhtar *et al.* (1989), Alam *et al.* (1990), Khan *et al.* (1990), Dasgupta *et al.* (1990), Islam *et al.* (1990), Kar *et al.* (1990), Miah *et al.* (1990) and Momin *et al.* (1990) at different agro-ecological zones of Bangladesh. Number of authors also expressed the opposite view for the horizontal arrangement of plants in tropical Homegardens. Fernandes and Nair (1986) claim that the pacific Homegardens present a more clearly defined spatial arrangement of plants following the orientation and relief characteristics of the watershed and each species perfectly occupies the available space in the Homegardens. According to Nair and Krishnankutty (1984), a certain general pattern in arrangement of plants seems to exist in

the Homegardens of Kerala. However, Christanty*et al.* (1986), Ahmad *et al.* (1980), Sommers (1978) and Wickramasinghe (1992) mention that the spatial arrangement of plants in a Homegardens is always determined by various factors such as light, water and fertility requirements, security and crop protection, health, aesthetic and efficiency of space utilization.

In Homegarden, vertical stratification of vegetation has been long recognized as one of its characteristic features, though the variation of height within any one stratum has led to some arguments as to the distinctness of the various strata recognized by various authors, Barrau (1961), Michon (1983), Altieri and Farrell (1984), Fernandes *et al.* (1984),Okafor and Fernandes (1987),Oduaol and Aluma (1990) from various geographical regions give schematic presentation of vertical structure and observe that the canopies of most Homegardens consist of 2-5 layers. Fernandes and Nair (1986) provide a useful general summary of layers:

- <1 m; Vegetables, medicinal plants, tubers, roots
- 1-3 m; Food plants e.g. cassava, banana, papaya, yams
- 3-5 m; Sapling of fruit/timber trees all growing taller
- 5-10 m; Fruit/timber trees, some growing taller
- >10 m; Fruit/timber trees

They stress that these layers are dynamic and there is constant recruitment from one layer to another

2.3 Functions of Homegardens

- Cultivation of useful plants: annuals/perennials (mainly Herb) as well trees and shrubs
- Provision of products for household use and cash income
- Testing site for introduced crops such as introduced banana varieties, apple, grape vine etc to check their sustainability for large scale cultivation
- Resting area for livestock such as cows, goats, chickens, ducks, pigeons etc(supplementary activities)
- Provision of fuel wood and timbers tree
- Place for growing and cultivating vegetable crops such as beans, gourds, sweet potato, taro etc

- Provision of specific dietary considerations for different tribes.

2.4 Roles of Homegarden

Homegardens plats many important roles in different sectors of day to day life, such as;

2.4.1 Role of Homegardens in domestication of wild species

It is observed in KonyakHomegardens that forest trees such as *Aquillaria agallocha* some varieties of bamboo, and fruit trees are successfully domesticated and cultivated. Multipurpose forest trees are cultivated in the Homegardens of Kara (Nair and Krishnankutty, 1984).

2.4.2 Role of Homegardens in the economy

Homegardens are used widely to supplement outputs from other agro ecosystems, such as Jhum and terraced fields, by providing a variety of other subsistence and commercial crops. Certain products are specially cultivated in KonyakHomegardens as they are in great demand for the local market of Mon town. Recently local communities have started managing their Homegardens in response to the need of buyers. It is necessary to assess the changing pattern of Homegardens and its effect on the household economy.

2.4.3 Role of Homegardens in local diet

The staple food of shifting cultivators of the tropics is mainly rice. Meat is the main source of protein. However, large amounts of leafy vegetable, nuts, tubers, rhizomes and fruits are frequently used in the diets of local communities. In KonyakHomegardens, 154 plant products used in the local diet have been recorded and have immense importance for the health of the Konyak. It is necessary to assess the role of Homegardens products in the local diet. The plants grown become a resting and breeding ground for many edible insects. The impact of this small scale supplementary agro ecosystem on diversity and availability of insects should be documented.

2.4.4 Cultural significance of Homegardens

Rico-Gray et al. (1990) have pointed out that Mayan Homegardens, mainly those of the villages closer to Merida and other cities, tend to have more ornamental plants and commercial varieties of fruit trees at the expense of home traditional elements of Homegardens. This changing pattern of Homegardens and the effect of modern

development are interesting aspect of present cultivation practices. Such an assessment will be helpful for understanding the cultural significance of Homegardens.

2.4.5 Role of women for maintaining Homegardens

There is a clear share of tasks between women and men for the management of Homegardens (e.g. Ahmed et al., 1980, Hossain et al., 1988). According to stoler (1978), Homegarden cultivation occupies only 8 percent of the total working time for men and an insignificant amount of time for women, but Ahmed et al. (1980) found that most women spent 9.4 percent of their productive activities for the working in the Homegarden while men spent only 2.3 % of their productive activities in west java. Hossainet al. (1988) reported that in Bangladesh, women are mostly involved in pre and post-harvest work of vegetable production while men play key role in timber and fruit tree growing activities.

Women are aware of the use of plants and means of maintaining them. In many traditional societies it is only the women who have accumulated traditional knowledge about the food and other household products that plant can supply. Women are engaged in cooking and know the requirements for it. They have developed the skills to cultivate and maintain important plant species supplying these needs. Konyak women, for example, could name 29 plant products from Homegardens while men could name 12 such products only. Women are better judges at selecting species to be cultivated in Homegardens in response to the needs and demands of local markets. In most local markets surveyed in north-eastern India, the vendors are mainly women (Godbole, 1998).

2.4.6 Gender role in decision making regarding Homegarden management

Decisions regarding Homegarden management are usually are taken together by family members although for vegetable gardening, decisions are always taken by women. Though women are restricted to only a few management activities, they are more knowledgeable regarding plant interactions and management activities. In interviews men often confirmed their answers by asking the women (Millat-e-Mustafa, et al., 1997).

2.4.7 Farmers' awareness about functional aspects of Homegardens

Seven functions of Homegardens are recognized by farmers and five (subsistence food, income, improved soil, shade and shelter) are reported by all farmers. Micro-climate amelioration as an important function is recognized by farmers of the Dryland and the

plain regions. Aesthetic beauty as a function is recognized in the Deltaic and plain regions (Millat-e-Mustafa, et al., 1997).

2.4.8 Roles of Homegardens in maintaining Biodiversity

Homegardens play a significant role in maintaining biodiversity. The selection of plants grown is dependent on specific community needs, e.g., certain very hot chili varieties with high capsaicin content are only cultivated in Lotha and Konyak Naga Homegardens. Some leafy vegetables are grown in both Homegardens and *Jhum* fields, but others are grown only in Homegardens (Millat-e-Mustafa, et al., 1997).

2.5 Homegarden practices in Bangladesh

Generally, Homegardens are rectangular in shape. They are usually built on mounds to raise dwellings above the water level during annual flood (Leuschner and Khaleque, 1987). The extra earth for raising these mounds is generally obtained by digging ponds within the Homegarden. The Homegardens is usually fenced by trees or shrubs. A typical Homegardens serves several houses of related families in a luster, and has space for vegetable gardens and yard for threshing ground and communal activities, cattle shed, ponds, trees, shrubs and bamboo (Khaleque, 1987). The most frequently used plants are generally grown in the back yard, at the pond side and around the cow shed areas for the provision of fruit/food, fuel wood, timber and fodder both for domestic use as well as for cash.

To characterize the traditional Homegardens of Bangladesh, a systematic vegetation survey of the Homegardens and an exploratory survey of the farmers' indigenous knowledge on the management of the system were carried out over a period of 10 months from July 1992 to April 1993. The studies were carried out in villages representing each of the four physiographic regions of Bangladesh: Deltaic, Dryland, Hilly and plain regions. (Millat-e-Mustafa, et al., 1997).

Marked variation in species richness and diversity are found in the Homegardens of different regions. The highest numbers of species are recorded in the Homegardens of the Deltaic (67) and Plain (56) regions. Corresponding totals are 54 for the Hilly regions and 46 for the Dryland regions respectively. Species diversity is also highest in the Deltaic region (Shannon's diversity index H' =3.33) followed by the Plain (H' =2.83), Hilly (H' =2.38) and Dryland (H' =1.72) regions respectively (Millat-e-Mustafa, et al., 1997).

In the deltaic region, the agricultural land remains under water for most of the year. Here, farmers have developed a homestead based subsistence system where they raise nurseries of valuable species. The geographic isolation of the region is a likely cause for people to grow such a diversity of plant species because of the need to be self-sufficient with locally available resources. At the other extreme, in the Dryland region, adverse environmental conditions (such as low rainfall, intense heat and low soil fertility) restrict the variety of species that are rewarding to grow. The Dryland region is, as a result, the poorest in terms of species richness and diversity (Millat-e-Mustafa, et al., 1997).

Musa and *Mangifera indica* are present in every Homegarden in every region. Another 23 species are present in at least one Homegarden in each region. The relative importance values of the 15 common species given in Table 1 are used to rank the species in different regions as shown in table 2 (Millat-e-Mustafa, et al., 1997).

Food and fruit producing species and *Musa spp*is the dominant species in the three regions except hilly region. In the hilly region the most dominant species is *Areca catechu. Albizia spp.* is the dominant timber species in the plain region while it is *Samanea saman* in other regions (Millat-e-Mustafa, et al., 1997).

The growing of food plants in the Homegardens is primarily with home consumption in mind. Multiple uses and commercial values determine species dominance in the Homegardens. Thus food and fruit producing species predominate. *Musa spp.* and *Mangifera indica* are recorded from all 80 Homegardens surveyed. Early fruiting behavior, a function of famine food during food shortages, ease of growing and managing, availability of vegetative prop gules, Multiple uses and high income from sales of fruit have made Musa spp. one of the most common component in the Homegardens of Bangladesh. Similarly, *Mangifera indica* is regarded as a multipurpose tree species by farmers and its wood can burn green which is seen as an especially valuable characteristic (Millat-e-Mustafa, et al., 1997).

With few exceptions species dominance varies with region. As a cashier Musa spp. is dominant in the Deltaic, Dryland and Plain regions. *Mangifera indica* is an important cash crop in the Dryland region. Due to their higher quality there, mangoes from Dryland region are in high demand throughout the country. The commercial value of mango thus makes it the second most important Homegarden species in the region in financial terms. Similarly *Areca* nut produced in the hilly region is high in demand throughout the country

due to its more tranquilizing property. Farmers maintain this species in the Homegardens as a commercial crop and it is dominant in this region. *Samanea saman* is maintained as an insurance crop in Homegardens in the deltaic region to meet unforeseen expenses such as a marriage ceremony, building new house and buying drought animals. A 12-15 years old tree is sold up to TK 15000.00 (US$ 375.00) (Millat-e-Mustafa, et al., 1997).

Southern Bangladesh is a low, flat and fertile deltaic plain predominated by calcareous to monocalcareous alluvium soils (BBS 2004). From April 2005 to January 2006-Khulna, Bagerhat, Satkhira, Jessore, Chuadanga and Faridpur districts. In Khulna district, 320 species were found and 277, 321, 277, 237 and 326 species were found in Bagerhat, Satkhira, Jessore, Chuadanga and Faridpur respectively. A total of 419 plant species in 109 families were recorded from southwestern Bangladesh Homegardens. The mean of 293 species per region was represented by 106 trees, 50 shrubs, 97 herbs and 40 woody and nonwoody climbers. There were more native species than exotic species across all six regions. Of the 419 species, 146 were trees, 67 shrubs, 150 herbs and 56 woody and nonwoody climbers. Trees and herbs predominated across all six regions. Six species, *Schleichera oleosa* (Kosum), *Mangifera sylvatica* (forest mango), *Auvolfia serpentine* (snake root), *Andrographis paniculata* (creat), *Amomum aromaticum* (Bengal cardamom), and *Calamus guruba* (rattan) appear on the IUCN Red List with a mean of fourspecies (range: 3–5) per region. All recorded red listed species were planted except for *M. sylvatica*. Approximately half of the ten most important trees and climbers were native, but exotic shrubs and herbs, particularly *Citrus limon* and *Musa* spp. dominated the shrub and herb synapse, respectively (Table 3). All species recorded from the Homegardens were useful for nine different purposes (Table 3).Most species were used for food (36% of all species) followed by medicine (27%), fuel wood (22%), ornamental (19%), timber (11%), and fodder (8%). Forty-five percent of all species were multipurpose. Eighty percent of the ten most important tree (90%), herb (70%), and climber (80%) species were multipurpose (Kabir & Webb 2008).

Another Field investigation was carried out in Sandwip upazila (the offshore island) over a period of three months (June-August, 2003). A total of 142 plant species under 61 families. It was found that the family leguminosae ranks top of the list and it represented by 18 species. Cucurbitaceae (10 spp), Palmae (5 spp), Rutaceae (5 spp), Anacardiaceae (5 spp) and Moraceae (5 spp) are the major families available in the surveyed area. Out of 142 species, 76 species were recorded as tree species, 25 shrub species and 41 herb

species. Rain tree (*Samanea saman*), Betel nut (*Areca catechu*), Coconut (*Cocos nucifera*), Mango (*Mangifera indica*) and Mahagoni (*Swietenia mahagoni*) were the top five tree species, whereas shrub species Papaya (*Carica papaya*) and herb species Banana (Musa species) were found most predominant species in the homegardens. Some of the traditional species like Katbadam (*Terminalia catappa*), Bangab (*Diospyros montana*), Borta (*Artocarpus heterophyllus*) were found to be very rare species in the homegardens.Data obtained from Species Diversity Index (3.40) show higher value than Index of Dominance (0.066) which represents less dominancy of the tree species with more diversity. The calculated value of Species Richness Index and Species Evenness Index was 20.65 and 1.81 respectively which represent the more richness of tree species (corroborated with the previous findings) and more evenly the total number of individuals is distributed among all possible tree species. Again among the recorded 142 species, 34species were fruit producing species (23%), 24 timber species (17%), 21 fuel wood species (15%), 15 medicinal plants (11%), 11 ornamental species (8%), 32 vegetable species (22%) and 5 spices (4%) . The study revealed that fruit trees dominated over timber trees in the Homegardens. The farmers concentrate on fruit species because of their subsistence and cash need (Alam & Masum 2005).

2.6 Management of Homegardens

The management of the traditional Homegardens systems has evolved as a response to many factors, cultural, economic and environmental as well as personal preferences (Southern, 1994). Since farmers leave in intimate contact with their Homegarden production systems, it is reasonable to assume that they have detailed knowledge of the components that they manage in their Homegardens and the interactions between them and the local environment. Farmers' indigenous knowledge is often characterized as highly specific and context-bound, with knowledge emerging simply from localized, practical experience (Scoones and Thompson, 1994). Local communities in many areas benefits from generation's experience of the management of complex land use systems that take advantage of the benefits of stability and sustainability associated with complexity. They continuously conduct their own trails, particularly adopt and adapt technologies to their specific circumstances and spread innovations through their networks (Cornwall *et al.*, 1994). Their experimentation is quicker and more able to accommodate changing circumstance and diversity than those of research scientists.

Both seeds and vegetative methods are used to propagate plants in the Homegardens. Indeed fruit trees may spring up whenever people eat fruits and leave the seeds behind. The farmers' also scatter the seeds or nuts in suitable places. Sometimes bats, squirrels, birds also help in dispersal. Seedling of valuable species also used to propagate the whenever available. Some authors (for example, Fernandes et al., 1984 in Chagga Homegardens) report that the farmers also encourage naturally coming seedling of valuable species to grow.

The management of Homegardens requires low labour input as have been reported by several authors from different countries, e.g. half hour to two hours daily in 500 sq. m Homegardens of Philippines (Sommers, 1978). Similar range is reported in Indonesia (Haryadi, 1975, cited in Christanty, 1985); 50min per day in a 200 sq. m Homegardens in Lima (Ninez, 1985); 35-45 days of family labour per year during the year of Homegardens establishment and 17-22 days during subsequent years in Mexico (Buylla Roces *et al.*, 1989)

2.7 Constraints of present management system

Six constraints of the present management systems are identified. These are: lack of planting material, lack of technical support, natural calamities, and conflict with neighbours of which the first three are reported by all farmers. Lack of land and lack of money as constraints are reported by all marginal and small farmers Conflicts with neighbours are recognized, of which as a constraint is also reported from every region and larger farmers recognize this constraint more than the smaller one.

MATERIALS AND METHODS

3.1 Study Area

3.1.1 Location

Field investigations were carried out in Dighalia Upazilla at August 2016. Dighalia Upazilla is situated at the southwestern part of Bangladesh. Dighalia upazilla of Khulna district lies in between 22°50' and 22°59' north latitudes and in between 89°33' and 89°40' east longitudes. It lies north of Ovoynagar upazilla of Jessore and Kalia upazilla of Narail, east of Terokhada and Rupsha upazilla of Khulna, west of Dumuria upazilla of Khulna and south of river Bairab and Khulna Metropolitan Area. The deltaic landscape of this region is a primarily low (<10 m above asl), flat and fertile plain (BBS, 2012). It comprises an area of 86.52 sq. km. There are about 1, 63,265 people lives here. Population density in the upazilla is 1,048 persons/sq. km. Medium family size of six.

Studied Homegarden Location in Dighalia

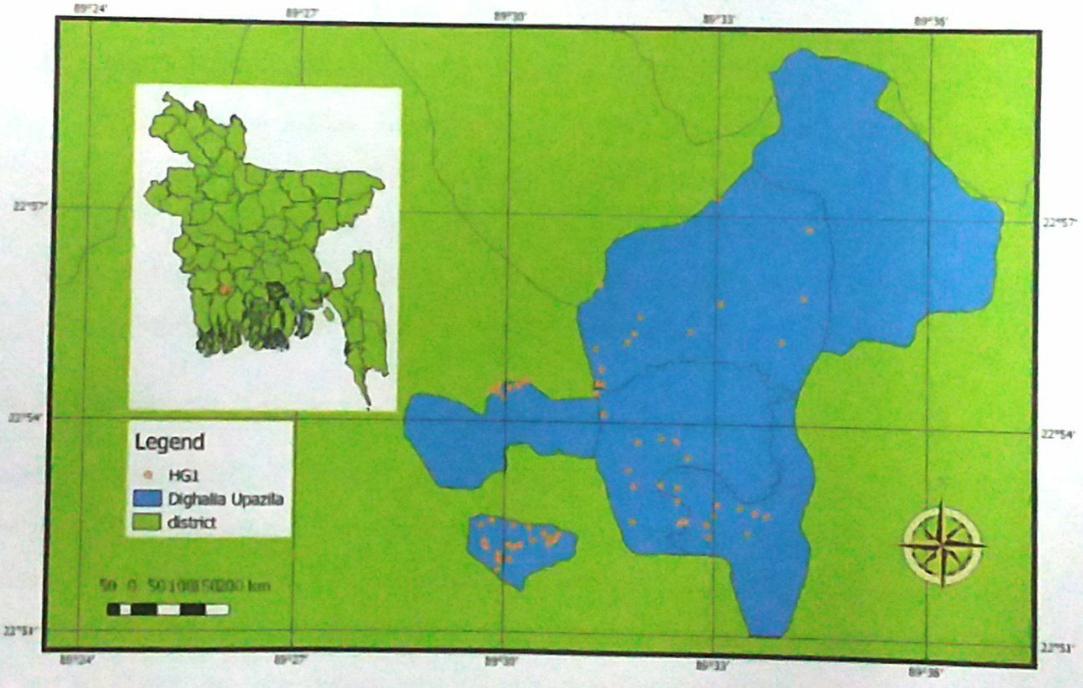

Fig 3.1: Digital Map of Dighalia Upazilla

Agriculture and fishing are main occupation for the most of people. There is about 13,545 hectors land. Dighalia has 6 Unions, 30 Mauzas/Mahallas, and 41 villages. It has 33,209 households. Those unions are Dighalia, Senhati, Barakpur, Gazirhat, Aaronghata, and Jugipole. The Upazilla headquarters is in Dighalia union (Wikipedia, 2017).

3.1.2 Climate Condition

Dighalia Upazilla enjoys generally a tropical to subtropical monsoon climate. While there are six season (changes every two months) in a year, three namely summer (March to May), monsoon or rainy (June to October) and winter (November to February) are prominent. These three seasons are characteristic of Khulna region. Winds are mostly from the north and northwest in the winter, blowing gently at 1 to 3 km/h in northern and central areas and 3 to 6 km/h near the cost. From March to May, violent thunderstorms produce winds up to 60 km/h. During the intense storms of the early summer and late monsoon season, southerly winds of more than 160km/h cause waves to crest as high as 6 meters in the Bay of Bengal, which bring disastrous to coastal areas of this region.

3.1.2.1Temperature

Dighalia Upazilla has an annual average temperature of 26°C. January is the coolest month and April is the hottest month in this region where monthly means varying between 12.4°C in January and 34.6°C in April. The climate of Dighalia is quite pleasant with not usually much fluctuation in temperature in winter and humid during summer. As the winter season progresses into pre-monsoon summer season, temperature starts rising up. In some places temperature reaches up to 40°C or more during the summer.

3.1.2.2 Rainfall

Annual average rainfall of Dighalia upazilla of Khulna is 1986 mm ranging from 1400 to 2600 mm. Approximately 87% of the annual average rainfall occurs between May to October. The monsoons result from the contrasts between low and high air pressure areas that result from differential heating of land and water. During the hot months of April and May hot air raises over the Indian subcontinent, creating low-pressure areas into which rush cooler, moisture-bearing winds from the Indian Ocean. This is the southwest monsoon, commencing in June and usually lasting through September.

3.1.2.3 Humidity

The annual average relative humidity of the region is 73%. March is the least humid month (62%). The relative humidity is 84% during monsoon (June to September) because of heavy rainfall but in summer season humidity becomes low (BBS, 2012).

3.1.2.4 Hydrology

Three main rivers have enclosed this upazilla such as Bairab, Mojudkhali, Citra and Atrai (BBS, 2012). Because of this reason, seasonal flooding near the river is a prominent characteristic in this region. Most of the area belongs to above river flood level where small area like coastal part of this region usually subjected to flood deeply. Some level terrace areas are also subjected to shallow rain water flooding.

3.1.3 Geology and Soil

Geologically, the Bengal basin is one of the more active tectonic regions in the world. Dighalia upazilla of Khulna district has been formed by sediments deposited by the Ganges-Brahmaputra-Meghna river system. These sediments are thought to be as thick as 1000 feet. Soils in the delta have some localized variation, both aerially and stratighaphically but consist primarily of fine sands, silts, silts sands and clayey silts. Remnants of swamp and forest appear in the form of peat layers in Khulna District. Excavation in this District show wood, trees or other vegetation at depths up to 100 feet below ground surface provides evidence of large scale subsidence, caused by compaction of recent sediments and possibly by structural down warping (BBS, 2012).

3.2 Sample Design and Data Collection

A botanical survey was conducted in 65 Homegardens by transect sampling method in 5 unions of Dighalia upazilla except Gazirhat union because of some transportation difficulty. Here all species (thee, shrub, herb and climber) were recorded by the local name that was later confirmed from the Encyclopedia of Flora and Fauna of Bangladesh and the accepted scientific name was confirmed by the website (www.theplantlist.org). All species number were counted and recorded but only diameter of trees was measured and recorded. The locations of each Homegardens were recorded by a global positioning system (GPS).

3.3 Data Analysis

To analyze the data gathering from 65 HG in Dighalia Upazilla, the following parameters were considered. At first each species from 65 Hg was classified into family, Life form (tree, shrub, herb and climber), origin (indigenous or exotic), local users and conservation status and Threat to the Species according to Encyclopedia of Flora and Fauna of Bangladesh, (2008).

Density, Relative Density, Frequency, and Relative Frequency of tree, shrub, herb and climber were calculated. Dominance and Relative Dominance of tree was also calculated from diameter at breast height, then calculated trees basal area. Finally tree's Importance Value Index (IVI) was calculated by the sum of Relative Density, Relative Frequency and Relative Dominance. The calculation formulas for different parameters are given below:-

1. $\text{Density} = \frac{Number\ of\ a\ Species}{Total\ Area\ Sampled}$

2. $\text{Frequency} = \frac{Area\ of\ HG\ in\ which\ a\ Species\ occurs}{Total\ Area\ Sampled}$

3. $\text{Dominance} = \frac{Total\ Basal\ Area\ of\ a\ Species}{Total\ Area\ Sampled}$

4. $\text{Relative Density} = \frac{Density\ of\ a\ Species}{Total\ Density\ of\ all\ Species} * 100$

5. $\text{Relative Frequency} = \frac{Frequency\ of\ a\ Species}{Total\ Frequency\ of\ all\ Species} * 100$

6. $\text{Relative Dominance} = \frac{\text{Dominance of a Species}}{Total\ \text{Dominance of all Species}} * 100$

7. Importance Value Index = Relative Density + Relative Frequency + Relative Dominance

The Shanon-winner index for diversity (Pielou, 1966), Diversity index, Species Richness index (Margalef, 1958) and Species Evenness index (Pielou, 1966) also calculated. The following calculation procedures are:-

1. The Shanon-winner index for diversity, $H = -\sum_{k=0}^{n} Pi * log2Pi$

Where, H = Index of Species Diversity

Pi = No. of Individual of one Species/Total No. of Individuals in the Samples

2. Diversity Index, D = S/N

Where, D = Diversity Index,

S = Total Number of Species,

N = Total Number of Individuals.

3. Species Richness Index, R = (S-1)/log N

Where, R = Species Richness Index,

S = Total Number of Species,

N = Total Number of Individuals of all the Species.

4. Species Evenness Index, E = H/log2S

Where, E = Species Evenness Index,

H = Shanon-Winner Index of Diversity

S = Total No. of Species.

RESULTS AND DISCUSSION

4.1 Results

4.1.1 Species diversity and structure

The sample area was 3.65 ha from a total 65 Homegardens in Dighalia upazilla. The average Homegardens area was 0.056 ha. It varies from size 0.008 to 0.20 ha according to the HG categories. There was about 180 plant species within 74 Families. A total of 110 indigenous species and 70 exotic species were found. Out of 180 species, 75 were tree species, 28 shrub species, 53 herb species and 24 climber species (Table 4.1).

Table 4.1: Plant species composition and structure of the Homegardens of Dighalia Upazilla, Khulna, Bangladesh.

No of HG Surveyed	Total HG Area Surveyed (Ha.)	Average Hg Area (Ha.)	HG Area Range (Ha)	Total No of Species Found
65	3.65	0.056	0.008-0.20	180

Components	No of Species	No of Species per HG	No of Individuals	No of Individuals per HG	No of Individuals per Ha.
Tree	75	15	2437	38	669
Shrub	28	3	916	14	251
Herb	53	3	621	10	170
Climber	24	2	227	4	62

The mean number of species per Homegardens was 23 in which 15 tree species, 3 shrub species, 3 herb species and 2 climber species. The number of species per Homegardens varies from 4 to 46. About 75 % Homegardens have 11 to 30 plant species. Tree species always dominated over other plant species in all Homegardens (Fig 4.1).

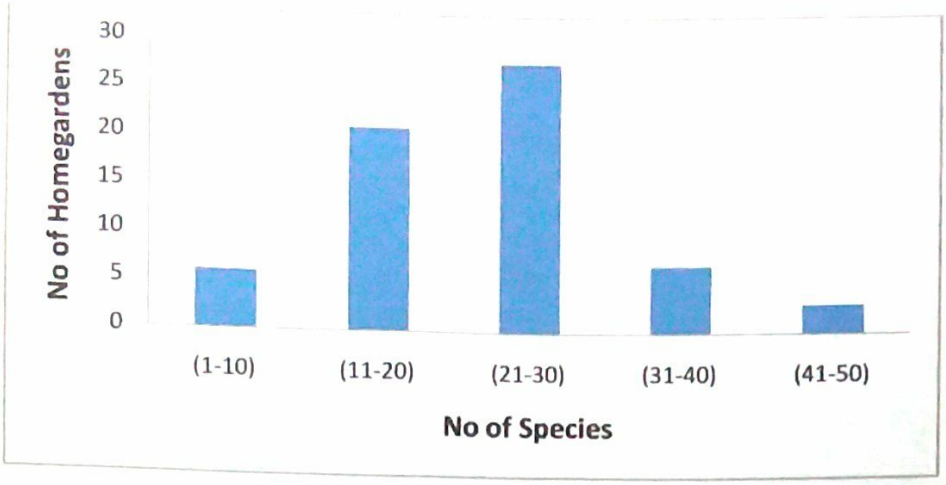

Fig 4.1: Frequency Distribution of Plant Species per Homegarden

4.1.2 Family Composition

A total number of 74 families were encountered the study area (Appendix 1).Tree species have more families followed by herb, shrub and climber species (Fig 4.2).

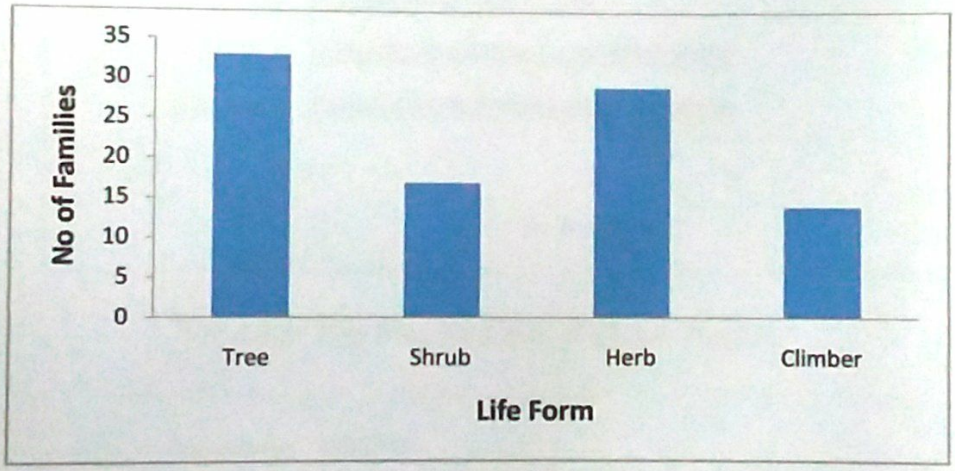

Fig 4.2: Family dominance of 65 Homegardens in Dighalia Upazilla, Khulna

For tree species, Leguminosae family is the most dominated family followed by Palmae, Moraceae, Meliaceae, Euphorbiaceae, and Annonaceae (Fig 4.3.1). For Shrub Species, Lythraceae and Malvaceae are most dominated family than others (Fig 4.3.2). For Herb Species, Araceae is the most found family than others (Fig 4.3.3). For Climber Species, Cucurbitaceae is the most dominant family (Fig 4.3.4).

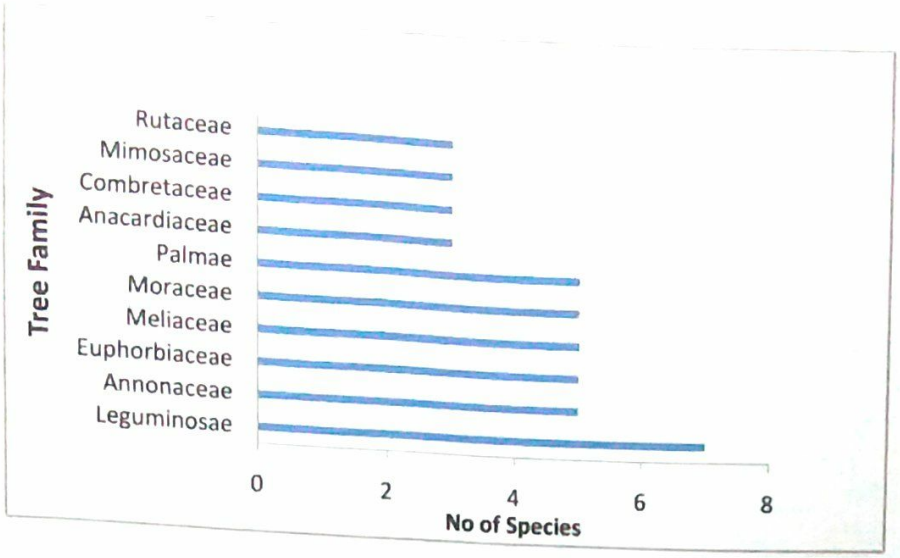

Fig 4.3.1: Top Ten Families of Tree Species

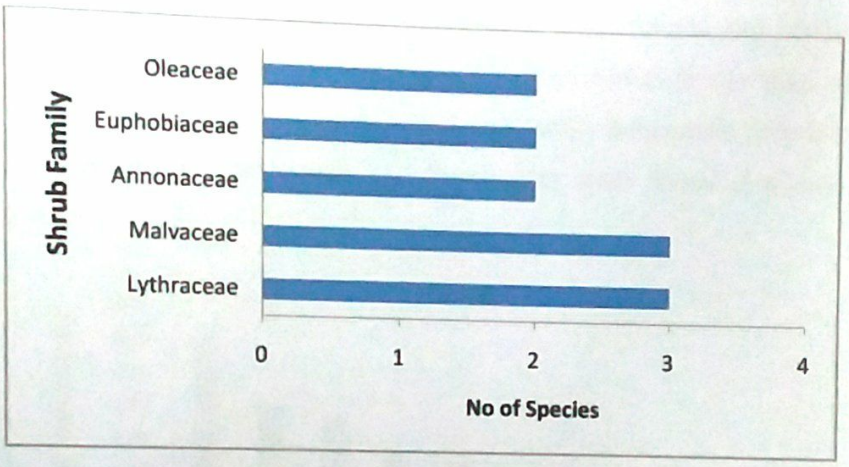

Fig 4.3.2: Top Five Families of Shrub Species

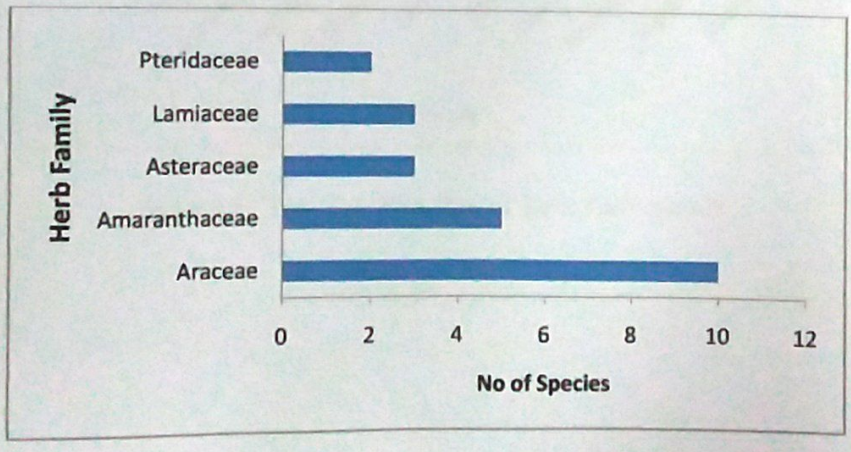

Fig 4.3.3: Top Five Families of Herb Species

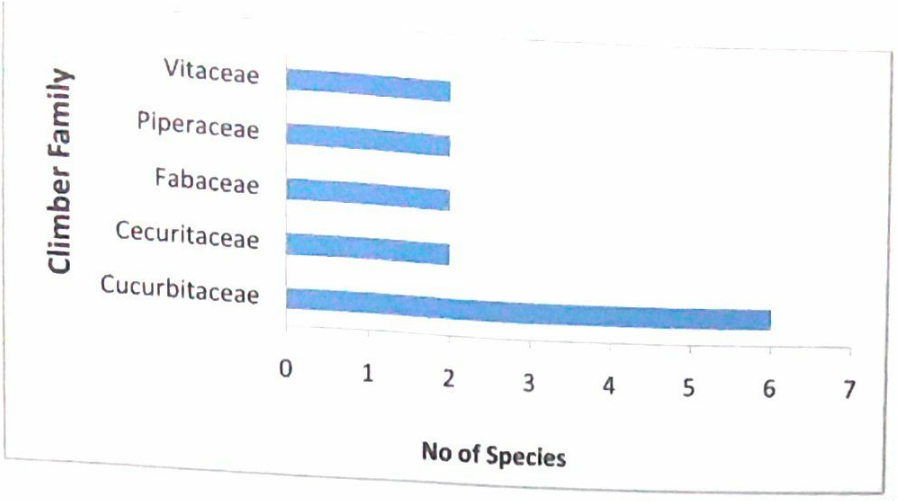

Fig 4.3.4: Top Five Families of Climber Species

On the basis of number of individual plants of each family, Palmaewas the most dominant tree family followed by Anacardiaceae, Annonaceae, Leguminosae and Meliaceae (Fig 4.4.1). Euphobiaceaeand Myrtaceae weremore dominant Shrub family than others (Fig 4.4.2). Musaceae, Araceaewere the more found herb family than others herb families (Fig 4.4.3). Dioscoreaceae, Cucurbitaceae and Basellaceae were found dominate Climber family (Fig 4.4.4)

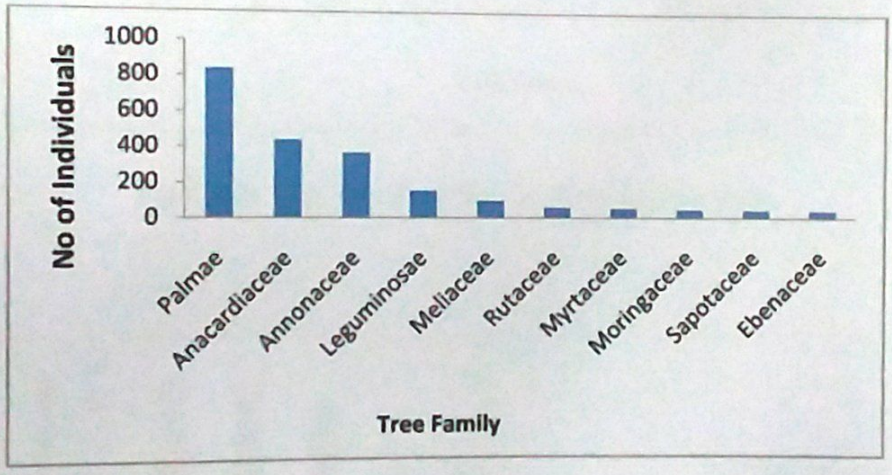

Fig 4.4.1: Top Ten Families of Tree Individuals

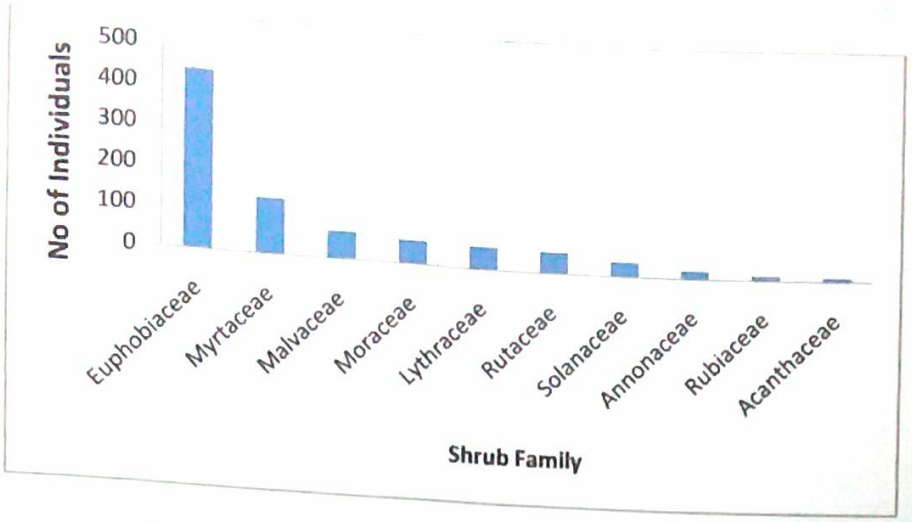

Fig 4.4.2: Top Ten Families of Shrub Individuals

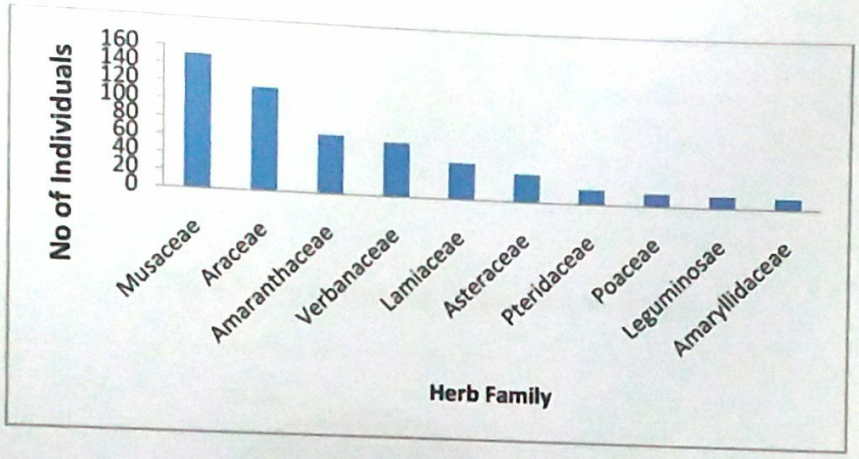

Fig 4.4.3: Top Ten Families of Herb Individuals

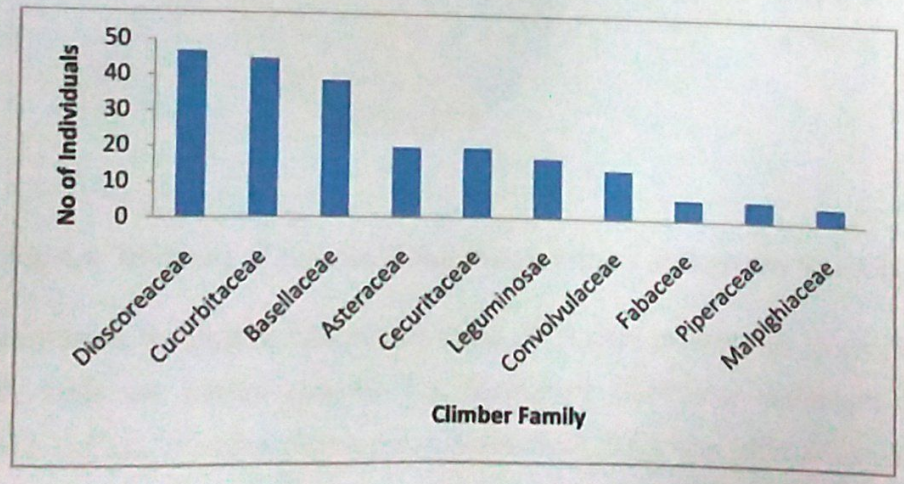

Fig 4.4.4: Top Ten Families of Climber Individuals

4.1.3 Floristic Composition

A total number of 180 species belonging to 74 families were found in Dighalia Upazilla, Khulna. There are about 110 species of Indigenous and 70 species are Exotic (Fig 4.5). Out of 180 species, tree, shrub, herb and climber species were 75, 28, 53 and 24 respectively (Fig 4.6).

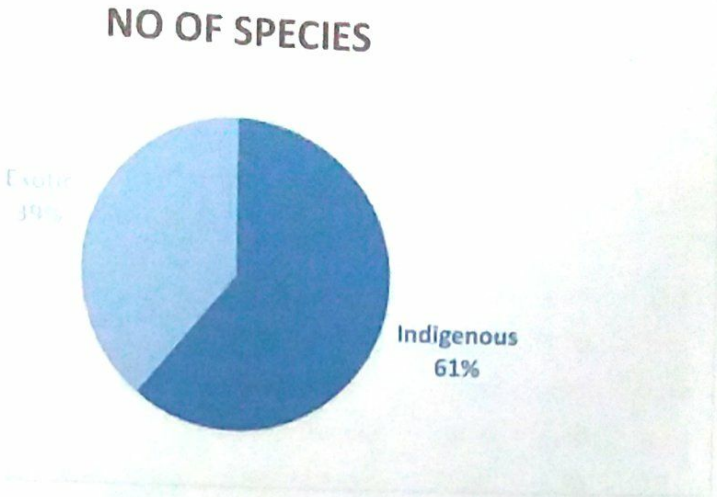

Fig 4.5: No of Species According to Origin

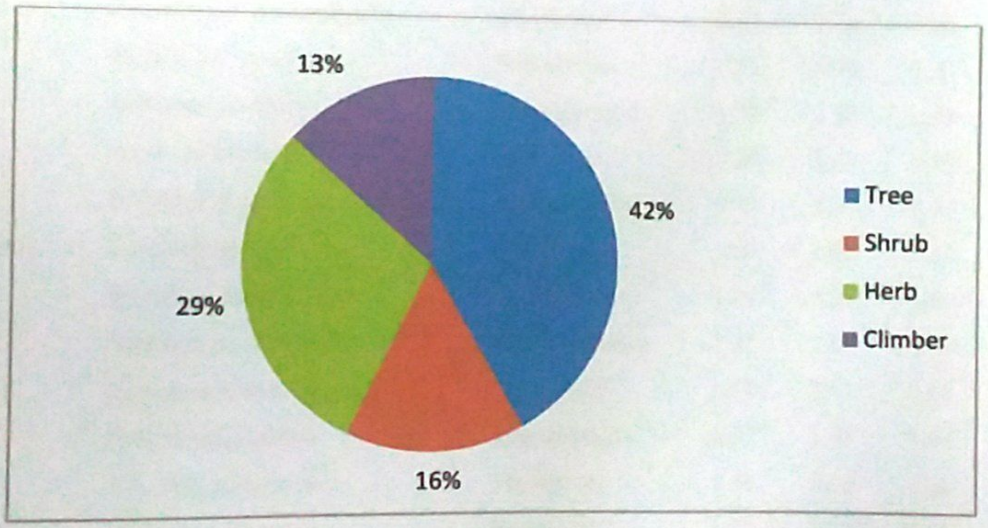

Fig 4.6: Diversity of Species in the Homegardens of Dighalia Upazilla

In 75 tree species, the highest Importance Value (IVI) were recorded by Coconut (*Cocos nucifera*), betel nut (*Areca catechu* L.), Mahagony (*Swietenia mahagoni*), Mango (*Mangifera indica*), Woodier (*Lannea coromandelica*), Rain tree (*Albizia saman*), Date tree (*Phoenix sylvestris*), Jack fruit (*Artocarpus heterophyllus*), Saodilla (*Manikara zapota*) and Drumstick tree (*Moringa oleifera*). Out of 28 shrub species, Guava (*Psidium*

guajava), Patabahar (*Codiaeum variegatum*), Dumur (*Ficus hispida*), Morich (*Capsicum frutescens*), Mehedi (*Lawsonia inermis*) were dominated. The most dominated herb species were Banana (*Musa paradisiacal*), Giant Taro (*Alocasia macrorrhizos*), Blue Taro (*Xanthosoma violaceum*), Apang (*Achyranthes aspera*) and Bamboo (*Dendrocalamus longispathus*).And the predominant climber species was Greater Yam (*Dioscorea alata*), Bottle Gourd (*Lagenaria siceraria*), Indian Spinach (*Basellaalba*), Pumpkin (*Cucurbita moschata*) and Heartleaf Hemp vine (*Mikania cordata*).

Table 4.2: The twenty most important species and ten most species of shrubs, herbs and climbers in Homegardens of Dighalia upazilla, Khulna.

Local Name	Scientific Name	Family Name	R.D.	R.F.	R.Do.	IVI
Trees						
Narikel	*Cocos nucifera*	Palmae	14.28	5.79	43.33	63.42
Supari	*Areca catechu*	Palmae	16.29	5.78	7.76	29.84
Mahagoni	*Swietenia mahagoni*	Annonaceae	12.47	4.95	7.84	25.27
Aam	*Mangifera indica*	Anacardiaceae	10.22	5.49	6.14	21.86
Kocha	*Lannea coromandelica*	Anacardiaceae	7.14	4.70	2.91	14.75
Rain Tree	*Albizia saman*	Leguminosae	3.08	4.39	6.26	13.74
Khejur	*Phoenix sylvestris*	Palmae	3.32	3.16	4.88	11.37
Kanthal	*Artocarpus heterophyllus*	Myrtaceae	2.17	3.46	1.61	7.25
Sofeda	*Manikara zapota*	Sapotaceae	1.81	3.79	1.41	7.01
Sajna	*Moringa oleifera*	Moringaceae	1.97	2.53	1.99	6.49
Nim	*Azadirachta indica*	Meliaceae	2.09	3.47	0.72	6.28
Boroi	*Ziziphus mauritiana*	Rhamnaceae	1.47	3.51	0.86	5.85
Batabi Lebu	*Citrus grandis*	Rutaceae	1.06	2.91	1.57	5.55
Jam	*Syzygium cumini*	Annonaceae	1.27	3.21	1.02	5.49
Jiapoti	*Putranjiva roxburaghii*	Euphorbiaceae	1.31	2.89	0.67	4.88
Jamrul	*Syzygium samarangense*	Myrtaceae	1.11	2.53	0.69	4.34
Tetul	*Tamarindus indica*	Leguminosae	0.67	1.91	1.64	4.25
Debdaru	*Polyalthia longifolia*	Meliaceae	1.43	1.34	1.20	3.98
Gab	*Diospyros discolor*	Ebenaceae	1.72	1.75	0.46	3.93
Pepe	*Carica papaya*	Casicaceae	1.23	2.02	0.61	3.86
Shrubs						
Piyara	*Psidium guajava*	Myrtaceae	14.08	17.47		
Patabahar	*Codiaeum variegatum*	Euphorbiaceae	34.06	11.85		
Dumur	*Ficus hispida*	Moraceae	6.44	11.28		
Mehedi	*Lawsonia inermis*	Lythraceae	2.40	6.65		
Morich	*Capsicum frutescens*	Solanaceae	2.94	6.55		
Kagoji Lebu	*Citrus aurantiifolia*	Rutaceae	2.07	5.79		

Hamjum	*Polyalthia suberosa*	Annonaceae	2.07	5.31
Kamini Ful	*Murraya paniculata*	Rutaceae	3.82	4.90
Joba	*Hibiscus rosa-sinensis*	Malvaceae	7.21	4.58
Berachita	*Pedilanthus tithymaloides*	Euphorbiaceae	13.97	3.83
Herbs				
Kola	*Musa paradisiaca*	Musaceae	24.31	16.89
Man Kochu	*Alocasia macrorrhizos*	Araceae	7.89	9.19
Apang	*Achyranthes aspera*	Amaranthaceae	2.09	6.83
Bas	*Dendrocalamus longispathus*	Poaceae	1.77	6.67
Jolpan Kochu	*Xanthosoma violaceum*	Araceae	4.83	5.88
Morog Ful	*Celosia argentea*	Amaranthaceae	3.06	3.85
Chutra	*Laporteacuneata*	Urticaceae	1.12	3.19
Tulshi	*Ocimum sanctum*	Lamiaceae	4.02	3.03
Gada Ful	*Tagetes erecta*	Asteraceae	4.83	2.72
Vati	*Clerodendrum viscosum*	Verbanaceae	9.98	2.51
Climbers				
Mati Alu	*Dioscorea alata*	Dioscoreaceae	20.70	18.59
Poi-shak	*Basella alba*	Basellaceae	17.18	14.81
Lau	*Lagenaria siceraria*	Cucurbitaceae	5.72	10.61
Misti Kumra	*Cucurbita moschata*	Cecuritaceae	6.16	9.82
Jarmani Lota	*Mikania cordata*	Asteraceae	8.81	9.36
Sheem	*Lablab purpureus*	Leguminosae	7.48	5.86
Kakrol	*Momordica dioica*	Cucurbitaceae	5.28	4.33
Papoli	*Piper sylvaticum*	Piperaceae	2.20	3.86
Tela Kucha	*Coccinia grandis*	Cucurbitaceae	3.08	3.78
Bet	*Calamus tenuis*	Arecaceae	1.32	3.42

Here, R.D. = Relative Density; R.F. = Relative Frequency; R.Do. = Relative Dominance; IVI = Importance Value Index of the Plant species found in 65 Homegardens of Dighalia upazilla, Khulna

In 75 tree species, the least Importance Values (IVI) were recorded by Venna (*Ricinus communis*), Chandokora, Horitoki (*Terminalia chebula*), and Ora (*Sonneratia caseolaris*). Out 28 Shrub species, the least important species were Kathal Ful (*Artabotrys odoratissimus*), Pholsa (*Grewia asiatica*), and Ghetu Ful (*Clerodendrum infortunatum*). Dahlia Ful (*Dahlia pinnata*), Peperomia (*Peperomia Pellucida*) and Patahorkuchi (*Bryophyllum pinnatum*) were the less important Herb Species and Goros (*Tinospora*

crispa), Lajjabati (*Mimosa pudica*) and Harjora lota (*Cissus quadrangularis*) were the less dominated climber species in Dighalia Upazilla, Khulna.

Table 4.3: The ten least important species of trees and five least species of shrubs, herbs and climbers in Homegardens of Dighalia upazilla, Khulna.

Local Name	Scientific Name	Family	R.D.	R.F.	R.Do.	IVI
Trees						
Sonalu	*Cassia fistula*	Caseslpinieae	0.08	0.12	0.02	0.23
Arjun	*Terminalia arjuna*	Combretaceae	0.08	0.12	0.01	0.20
Oil-palm	*Elaeis guineensis*	Arecaceae	0.04	0.07	0.05	0.17
Catiyan	*Alstonia scholaris*	Apocynaceae	0.04	0.12	0.01	0.17
Jarul	*Lagerstroemia speciosa*	Lythraceae	0.04	0.11	0.01	0.15
Uri Jam	*Syzygium fruticosum*	Annonaceae	0.04	0.09	0.01	0.15
Ora\Shoila	*Sonneratia caseolaris*	Lythraceae	0.04	0.09	0.01	0.14
Horitoki	*Terminalia chebula*	Combretaceae	0.04	0.09	0.01	0.13
Chandokora	Not Identified	Not Identified	0.04	0.03	0.02	0.09
Redi/ venna	*Ricinus communis*	Euphorbiaceae	0.04	0.03	0.01	0.08
Shrubs						
Hasna-hena	*Cestrum nocturnum*	Solanaceae	1.09	0.43		
Karabi	*Thevetiaperuviana*	Apocynaceae	0.22	0.34		
Ghetu Ful	*Clerodendrum infortunatum*	Lamiaceae	0.11	0.34		
Pholsa	*Grewia asiatica*	Malvaceae	0.11	0.34		
Kathal Ful	*Artabotrys odoratissimus*	Annonaceae	0.21	0.28		
Herbs						
Thankuni	*Centella asiatica*	Apiaceae	0.16	0.29		
Pathabahar Kochu	*Caladium bicolor*	Araceae	0.16	0.20		
Patahorkuchi	*Bryophyllum pinnatum*	Crassulaceae	0.16	0.14		
Peperomia	*Peperomia pellucida*	Piperaceae	0.16	0.14		
Dahlia Ful	*Dahlia pinnata*	Asteraceae	0.16	0.12		
Climbers						
Goros	*Tinospora crispa*	Menispermaceae	0.44	0.78		
Harjora lota	*Cissus quadrangularis*	Vitaceae	0.44	0.78		
Shornolota	*Cuscuta reflexa*	Cuscutaceae	0.44	0.78		
Lajjabati	*Mimosa pudica*	Fabaceae	2.20	0.62		
Jhinga	*Luffa acutangula*	Cucurbitaceae	0.88	0.52		

The complete floristic is Appended.

TheShanon-winner index for diversity of trees (4.41) was higher than shrubs (3.27) and climber (3.74) but lower than herbs (4.49). Species Richness Index of trees (22.14) was higher than shrubs (9.12), herbs (18.62) and climbers (9.76). So most of the cases, tree species were dominated than others Plant species.

Table 4.4: Diversity Index of Plant Species

Components	Shanon-winner Diversity Index, H	Diversity Index, D	Species Richness Index, R	Species Evenness Index, E
Tree	4.41	0.03	22.14	0.71
Shrub	3.27	0.03	9.12	0.68
Herb	4.49	0.09	18.62	0.78
Climber	3.74	0.11	9.76	0.82

4.1.4 Local Uses of Plant Species

Again among the recorded 180species, Medicinal plant species (47) found than others. Fruit species (41) and ornamental species (41) also found in high level. But timber species (17) was not found so high. Other uses species such as fodder, fuel wood, spices, dyes and vegetables species also found in the HG of Dighalia upazilla.

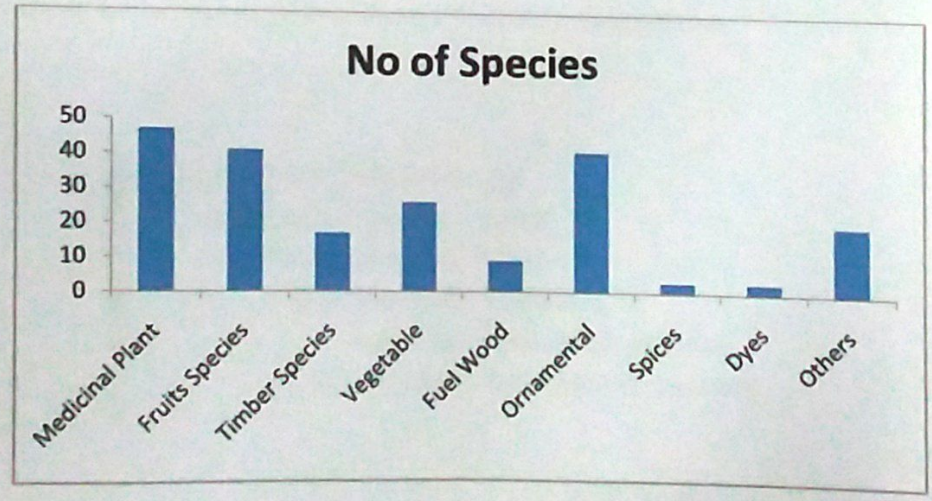

Fig 4.7: Local Uses of Plant Species in Dighalia Upazilla

4.1.5 Threats of Plant Species and Conservation Status According to Encyclopedia of Flora and Fauna in Bangladesh (EFFB):

Out of 180 plant species, most of the species were found under No Threat and No Major Threat. Some species were found no apparent threat, habitat loss, over-exploitation, deforestation, less plantation and increased felling, indiscriminate harvesting and no major threat but some native varieties are disappearing for introducing new varieties.

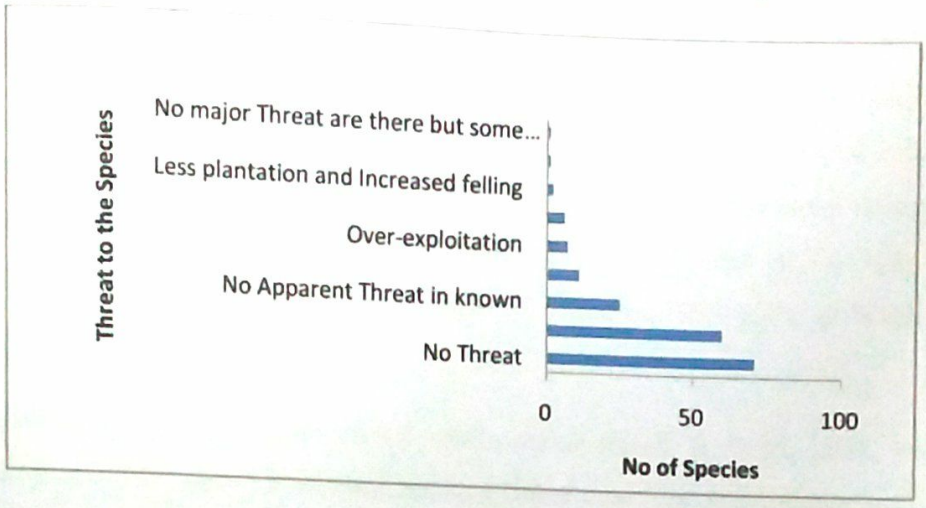

Fig 4.8: Threats of Plant Species in Dighalia upazilla, Khulna

Out of 180 Species, Most of species were found in least concern (153). Some plant species were found in vulnerable, near threatened, and seem to be rare. Others found in not evaluated, conservation dependent and gradually disappearing.

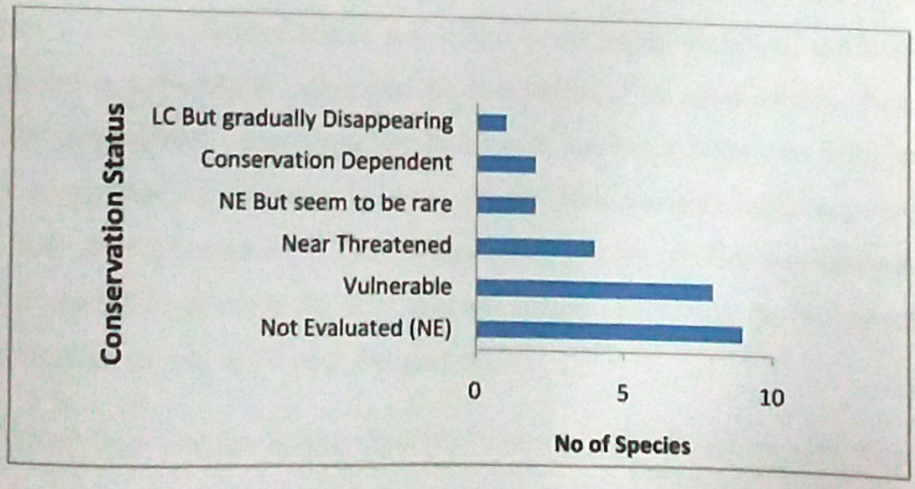

Fig 4.9: Conservation Status of Plant Species in Dighalia upazilla, Khulna

4.2 Discussion

In Bangladesh prospects, primary forests are the richest reservoir of plant diversity as well as biodiversity. But Primary forest cover is very low respect to the need and it's time to concern about it. Homegarden cover lots of area and in such prospectus, it is a good way to conserve of plant diversity and increase the forest cover as well. Agroforestry systems, such as mixed shape coffee production (Perfecto et al. 1996) or Indonesian agroforests (Thiollat, 1995); can contain significant level of both plant animal biodiversity (Grifith 2000, Montagnini 2006). In Bangladesh and worldwide many article were published about homestead agroforestry. Compared to other published across the world and Tropical and subtropical Asia, Homegardens in southwestern Bangladesh exhibited high species richness. Globally (Karyono 1981, Padoch & De Jung 1991, Soemarwoto & Conway 1992, House & Ochoa 1998, Jensen 1993, Kabir & Webb 2008) shows higher species diversity.

In Bangladesh perspective, Compared to those article (Kabir & Webb 2008, Millat-e-Mustafa, et al. 1997, Alam & Masum 2005), I found more species richness in Dighalia upazilla, Khulna. The number of plant species (excluding vegetable species) in this study area higher (75 spp) than those found in homesteads of Tangail (52 spp), Ishurdi (34 spp), Jessore (28 spp), Patuakhali (20 spp) and Rangpur (21 spp) district respectively (Alam & Masum 2005). Millat-e Mustafa found 92 perennial plant species in one study conducted in different part of the country. Alam & Masum found 142 species in Sandwip upazilla (the offshore island). Various Macro and Micro environment factors of the homestead, need and choice of the family influenced the distribution of the plant species. That is why the species composition varied from one location to another location and from one farm category to another. In Dighalia upazilla, all the Homegardens contained many tree species than other plant species. The average plant species per Homegarden was 23 in which 15 were tree species. So tree species always dominated in Homegardens of Dighalia upazilla as well as all over Bangladesh.

Data obtained from Shanon-Winner Species Diversity Index (4.41) for tree show higher value than shrubs and climbers which represents more diversity of tree species than others plant species. The calculated value of Species Richness Index and Species Evenness Index was 22.14 and 0.71 respectively which represent the more species richness of tree and more evenly the total number of individuals is distributed among all possible tree

species. Species Richness Index and Species Evenness Index for shrub, herb and climber were 9.12 and 0.68; 18.62 and 0.82; and 9.76 and 0.78 respectively. So we can see that all the plant species in Dighalia upazilla showed more species richness and more evenly the total number of individuals is distributed among all possible plant species.

The study revealed that medicinal plants and fruit trees dominated over timber trees in the Homegardens of Dighalia upazilla, Khulna (fig 4.6). The farmers concentrate on medicinal and fruits species because of their subsistence and cash need. Coconut (Cocos nucifera), Betel nut (*Areca catechu*), Guava (*Psidium guajava*), Banana (*Musa spp.*), Papaya (*Carica papaya*), Taro (Alocasia spp.), Date palm (Phoenix sylvestris), Mango (*Mangifera indica*), Nim (*Azarirakh indica*) was cultivated in more than 65% of the homestead. Next to fruit species, people concentrate on timber species, for future investment. Mahagoni (*Swietenia mahagoni*), Rain tree (*Albizia saman*), Koroi (*Albizia procera*) were found common in most homesteads. Poor families prefer those species, which give quick and regular cash returns, required little space and would not cast heavy shade that might cause conflict with neighbors. While larger farmers thought of fruits for long term benefit, they didn't take care the neighbor's inconvenience from shade.

Tree species, Ulotkambal (*Abroma augusta*) and Ashphal (*Dimocarpus longan*) are near threatened. Gonori (*Cinnamomun cecicidaphne*) and Amra (*Spondias pinnata*) are seemed to be rare and gradually disappearing (Fig 4.7 & 4.8). Some species like Horitoki (*Terminalia chebula*) and Arjun (*Terminalia arjuna*) are also Vulnerable. For herb species, Sadaful (*Tabernaemontana corymbosa*) is seemed to be rare. Most of species of Araceae family are Vulnerable such as Gatkol (*Typhonium roxburaghii*), Guri Kochu (*Colocasia affinis*), Dudmann Kochu (*Colocasia oresbia*), and Pani Kochu (*Colocasia lihengiae*). For climber species, Harjora lota (*Cissus quadrangularis*) is Vulnerable; Goros (*Tinospora crispa*) is near Threatened and Papoli (*Piper sylvaticum*) is Conservation Dependent. No shrub species not found in red list. All the red listed species are indigenous. Most of the plant species have good medicinal value. Gonori is used for furniture and boat making. Climber species Papoli's fruit is used for carminative and appetizer. Another climber species Harjora lota is used for the treatment of bone fracture, menstrual disorder and scurvy. All the information is collected from The Encyclopedia of Flora of Fauna of Bangladesh. So all of those red listed species are very important and people are not concern about to conserve those species.

The challenge of en situ conservation of plants in Homegardens can be tackled on three fronts. First, Homegardens need to be made aware of the status and rarity of the species they may have on their property; such awareness could result in localized efforts to conserve rare native species by promoting more widespread use. Awareness building campaigns, publications and educational programs are methods to increase public support for using native species in Homegardens (Trewhella et al., 2005). To conserve those species as well as our biodiversity, encourage people to plant those species more and more. Second, Government and NGOs do lot of thing to conserve those species. They supply indigenous species seedling to the farmers in regular basis and NGOs people motivate them to plant those species and say about its importance. Finally, the abundance and frequency of those species is very low because germination of those species is not viable. So artificial regeneration is necessary. Intervention methods such as hand pollination could be crucial in maintaining genetic diversity and regeneration potential of those species. To conserve our plant biodiversity as well as biodiversity; deforestation. habitat loss, over-exploitation, indiscriminate felling etc should be controlled. So to conserve our biodiversity, local people, Government and NGOs collaboration is very much important.

RECOMMENDATION AND CONCLUSION

Biodiversity ensures the sustainable utilization of life support systems on earth by playing their role in various ways and thus conserving the global environment. So for maintaining a favorable environmental system for the mankind, man should take step to conserve biodiversity. Although there are two productions system existed in Bangladesh but the underlying problem is quite different. Large production unit, encroachments, lack of labors and staff, illicit felling, budget allocation, mono-plantation etc are the major problems for the management of Govt. forest land. Thus the forestry production system is much more unprotected than the homestead production system. Since the production unit of homestead is small and people live there, it is better protected from the problems that are acute in the forestry sector. It was reported that people exterminated many tree species from the forest and many were threatened by some manmade causes. At the same time it was observed that social attitude towards the homestead forestry was more or less positive. In 1994 threatened species in Bangladesh were 60 but in 1999 it has increased 176 as the government forests are not so much promising for a long time. The homesteaded forestry or Homegardens can play the vital role in Biodiversity Conservation where there is people's long time love and felling towards nature from time immemorial. It was observed from the study that Govt. and NGOs initiatives to provide quality planting materials and technical supports to the farmers are imperative to sustain and improve the productivity of the Homegardens of the study area. It is necessary to take special attitude toward the conservation and proper management of Homegarden Biodiversity in Bangladesh.

I used the book "Encyclopedia of Flora and Fauna in Bangladesh" for finding out the red listed plant species. It was the first limitation in my research project. To find out the red listed species, IUCN red list was the best way but the updated version of IUCN red list for plant species is not published yet and the previous on was not updated enough. One union of this upazilla was eliminated because of some transportation problem; this was second limitation of this study. So those kinds of limitation should be overcome in future for further research in this area.

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Appendix 1

Homegardens Biodiversity Assessment

Upazilla	Dighalia	Latitude	
Union		Longitude	
Ward		HG No	
Village		HG Area	

Tree Information

Local name	DBH	P/N	N/E	Local Uses

Shrub Information

Herb Information

Local name	No of Individual	Local Uses	Local name	No of Individual	Local Uses

Climber Information

Local Name	No of Individual	Local Uses	Local Name	No of Individual	Local Uses

Appendix-2

Sl No	Tree Species	Scientific Name	Family	Origin	Native country	Local Use	Other local name	English Name	Threats to The species	Conservation Status	R D	R F	R Do	IVI
1	Aam	*Mangifera indica L.*	Anacardiaceae	I	Tropical Asia & Assam Myanmar Region	Fruit	No	Mango	NMT but some native varieties are fast disappearing because of introducing of new varieties	LC	10 22	5 50	6 14	21 86
2	Akashmoni	*Acacia auriculiformisBenth.*	Leguminosae	E	Australia	Timber	Sonajhuri	Ear-pod Wattle, Darwin Black Wattle	NT	LC	0 82	0 10	0 09	1 00
3	Amloki	*Phyllanthus emblica L.*	Euphobiaceae	I	Cambodia, Hong Kong, India,Laos	Medicine	Amla, Ambolati, Awla	EmblicMyrobalan, Indian Gooseberry	NT	LC	0 12	0 24	0 01	0 37
4	Amra	*Spondias pinnata (L. f.) Kurz*	Anacardiaceae	I	India & Myanmar	fruit	DeshiAmra, Pial, Thoura	Hog Plum	NAT	LC But gradually Disappearing	0 66	1 24	0 46	2 36
5	Arjun	*Terminalia arjuna (Roxb. ex DC.) Wight &Arn.*	Combretaceae	I	India, Sri Lanka, Malay Peninsula	Medicinal	Arjuna, Kahu	The ArjunaMyrobalan, White Murdah	Overexploitation for medicinal uses	Vulnerable	0 08	0 12	0 01	0 21
6	Ashphal	*Dimocarpus longan Lour*	Sapindaceae	I	Southwestern India	Fruit and medicine	Kathlichu	Eyeball Tree, Dragon's Eye, Buldock	Deforestation and fire wood collection	Near Threatened	0 25	0 70	0 14	1 08
7	Ashwath	*Ficus religiosa L.*	Moraceae	I	China, India, Srilanka, Pakistan	Medicinal value	Panbot, Ashwathwa	Peepal Tree, The Pipal, Bo-Tree	NST	LC	0 16	0 22	0 02	0 40
8	Ata	*Annona reticulata L.*	Annonaceae	E	Tropical America	Fruit	Nona, Nona ata	Bullock's Heart	NMT	LC	0 74	2 34	0 23	3 30
9	BarmaShimul	*Ceiba pentandra (L.) Gaertn.*	Bombacaceae	I	Tropical America, Africa & Asia	Fuel wood	No	Kapok Tree	NT	LC	0 21	0 15	0 17	0 52
10	Batabi Lebu	*Citrus grandis Merr.*	Rutaceae	I	Southeast Asia	Fruit	Jambura	Pummelo, Shaddock,Bitter Orange	NMT	LC	1 07	2 91	1 58	5 55
11	Bel	*Aegle marmelos (L.) Corrêa*	Rutaceae	I	India	Fruit	no	BaelFruit,Bengal Quince	NAT	LC	0 90	2 04	0 29	3 23
12	Bolla	*Hibiscus tiliaceus L.*	Malvaceae	E	Coastal tropical, sub-tropical area	Medicinal value and Resin	No	Sea hibiscus, Mahoe	NAT	LC	0 08	0 19	0 00	0 27
13	Boroi	*Ziziphus mauritiana Lam*	Rhamnaceae	I	Middle East &Subcontinents	Fruit	Kul	Indian Jujubi, Indian Plum	NT	LC	1 48	3 51	0 86	5 85
14	Bot	*Ficus benghalensis L.*	Moraceae	I	Bangladesh	Religious ceremonies	Bot Gachh	BanyanTree	NT	LC	0 08	0 39	0 12	0 59
15	Catryan	*Alstonia scholaris (L.) R. Br*	Apocynaceae	E	Borneo, Cambodia, China	Wood	Chhatim	Devil's tree	NT	NE	0 04	0 13	0 01	0 17

16	Chalta	*Dillenia indica L.*	Dilleniaceae	I	Tropical Asia	Fruit	No	Elephant apple	NT	LC	0 16	0 14	0 02	0 33
17	Chandokora	*Not Identified*	Not Identified	E	Not Identified	Timber, Fuel wood	Not Identified	Not Identified	Unknown	Unknown	0 04	0 03	0 02	0 09
18	Chinese fan or Fountain palm	*Livistonachinensis (Jacq) R Br ex Mart*	Arecaceae	E	Central Asia	Ornamental	NO	Chinese Fan Palm, China Palm	NMT	NE	0 04	0 27	0 04	0 36
19	Chambal	*Albizia richardiana (Voigt) King &Prain*	Mimosaceae	E	Madagascar	Timber and fuel wood	Raj Koroi, GaganSiris	No	NT	LC	0 21	0 67	0 22	1 09
20	Debdaru	*Polyalthia longifolia (Sonn.) Thwaites*	Meliaceae	I	India, Sri lanka	Timber		Mast Tree	NMT	LC	1 44	1 35	1 20	3 99
21	Dewa	*Artocarpus lacucha Buch.-Ham.*	Moraceae	I	India, Myanmar, Malaysia	Fruit and timber	Dewphal, Bon Khanthal	Monkey Jack	NT	LC	0 25	0 69	0 38	1 32
22	Gab	*Diospyros discolor Willd.*	Ebenaceae	E	Philippines	Fruit	Beelati Gab	Mabolo, Valvet Apple	NMT	LC	1 72	1 75	0 46	3 94
23	Ghora Nim	*Melia azedarach L.*	Araceae	I	India, Pakistan, Nepal,Srilanka	Medicinal value	Poa, Poma, Mahanim	Barbados Lilac, Pride of China	NMT	LC	0 12	0 45	0 14	0 72
24	Gonori	*Cinnamomun cecicidaphne Meiss.*	Lauraceae	I	Bhutan, India, Nepal And Sikkim	Furniture & Boat Building	Gonory	No	Habitat Destraction	NE But seem to be rare	0 04	0 27	0 00	0 31
25	Harol/Arhar	*Cajanus cajanifolius (Haines) Maesen*	Fabaceae	I	Tropical Africa, India, Pakistan, New Guinea	Food crop	Arual	Pigeon Pea, Cajanus Pea, Red Gram	NAT	LC	0 08	0 13	0 04	0 25
26	Horitoki	*Terminalia chebula Retz.*	Combretaceae	I	India, Malaysia, Thailand	Medicine	GolHaritoki	Black Myrobalan, ChebulicMyrobalan	Under severe threat of exploitation	Vulnerable	0 04	0 09	0 00	0 13
27	IpilIpil	*Leucaena leucocephala (Lam.) de Wit*	Leguminosae	E	Tropical America	Timber	No	Horse Tamarind, Wild Tamarind	NT	LC	1 07	1 56	0 37	3 00
28	Jalpai	*Elaeocarpus serratus L.*	Elaocarpaceae	I	India, Bhutan, Myanmar	Fruit and medicinal values	Belphoi	Indian Olive,Olive, Rugged Oil-fruit	NMT	LC	0 16	0 56	0 13	0 86
29	Jam	*Syzygium cumini L.*	Annonaceae	I	India and Srilanka	Fruit	Kala Jam	Black Berry, Java Palm, Black Palm	NT	LC	1 27	3 20	1 02	5 50
30	Jamrul	*Syzygium samarangense (Blume) Merr & L.M.Perry*	Myrtaceae	E	Andaman's, Nicobars and Malacca	Fruit	no	Wax Jambu, Java apple	NMT	LC	1 11	2 54	0 70	4 34
31	Jarul	*Lagerstroemia speciosa (L.) Pers.*	Lythraceae	E	India, Indonesia, Myanmar	Ornamental	KantaJarul, PannyaJarul	Pride of India, Queen Flower	NT	IC	0 04	0 11	0 00	0 16

32	Jiapoti	*Putranjiva roxburaghii Wall*	Euphobiaceae	I	West Himalayan To Sri Lanka	Treatment of biliousness , Burning Sensation and Elephantiasis	Jiapura	No	NT	LC	1 31	2 90	0 67	4 89
33	Jiban	*Trema orientalis (L.) Blume*	Ulmaceae	I	Tropical America, Sri Lanka	Fodder and feul wood	Jinal, Chikan, Banjiga	Indian Nettle Tree, Charcoal Tree	NAT	LC	0 49	1 34	0 09	1 92
34	Jog Dumur	*Ficus racemosa L.*	Moraceae	I	*India Myanmar*	Fruit	Gulang Dumur	No	Habitat loss	NE	0 53	1 37	0 12	2 02
35	Kadam	*Anthocephalus chinensis (Lam.) Hassk*	Annonaceae	I	Sri Lanka Nepal, India	Ornamental	Bul-kadam	No	NAT	LC	0 74	1 34	0 23	2 31
36	Kamranga	*Averrhoa carambola L.*	Averrhoaceae	I	Indian Sub Continent	Fruit	Kamranga	Star Fruit, Carambola	NT	LC	0 29	0 66	0 06	1 01
37	Kath Badam	*Terminilia catappa L.*	Combretaceae	E	Madagascar, along the coast of Tropical Asia	Fruit and timber	Deshibadam	Indian Almond, Tropical Almond	NT	LC	0 25	0 56	0 06	0 87
38	Khanthal	*Artocarpus heterophyllus Lam.*	Myrtaceae	I	India	Fruit and Timber	Kathal	Jack fruit, jack	NT	LC	2 18	3 46	1 61	7 25
39	Khejur	*Phoenix sylvestris (L.) Roxb*	Palmae	I	India and Pakistan	Fruit and Timber beam	Deshi Khejur	Wild Date Palm, Indian Oil Palm	NT	LC	3 32	3 16	4 89	11 37
40	KhoiaBabla	*Acacia farnesiana (L.) Willd.*	Mimosaceae	I	Tropical South America, Now Pan tropical	Fruits and Timber	Belatibabla, GuryaBabla	Sweet Acacia, Stinking Acacia	NAT	LC	0 08	0 26	0 05	0 40
41	Kocha	*Lannea coromandelica Merr.*	Anacardiaceae	I	Hotter Part Of India, Andaman Islands & Sri Lanka	House Construction	Jiga, Bhadi, Jial, Jialbhadi, Jigor	Wodier	NAT	LC	7 14	4 70	2 91	14 76
42	kocthbel	*Limonia acidissima Groff*	Rutaceae	I	South India And Sri Lanka	Fruit	NO	Wood Apple, Elephant apple and Monkey Fruit	NMT	LC	0 45	1 43	0 32	2 20
43	Koroi	*Albizia procera (Roxb.) Benth.*	Mimosaceae	I	India	Timber	Sil Koroi, Jat Koroi, Sada Koroi	White Siris	NT	LC	0 21	0 29	0 04	0 53
44	Krishnochura	*Delonix regia (Hook.) Raf*	Leguminosae	E	Madagascar	Ornamental	Golmohar	Flame Tree, Royal Poinciana	NT	LC	0 12	0 28	0 03	0 43
45	Lambu	*Khaya anthotheca (Welw.) C DC.*	Meliaceae	E		Timber	No	No	NT	LC	0 16	0 14	0 07	0 37

46	Latkan	*BaccaurearamifloraLour*	Phyllanthaceae	I	India, Pakistan, Sri lanka	Fruit	Bhubi	The burmese grape	NMT	LC	0 04	0 23	0 01	0 28
47	Lichu	*Litchi chinensis Sonn.*	Sapindaceae	E	South Est China, Indo-Chinese Peninsula	Fruit	No	Litchi	NMT	LC	0 37	1 34	0 24	1 95
48	Mahagoni	*Swietenia mahagoni (L.) Jacq.*	Annonaceae	E	West indies, Coasts of central America	Timber	no	Spanish Mahagoni, West Indian and Small Leaved Mahagoni	NMT	LC	12 48	4 96	7 84	25 28
49	Mandar Kocha	*Erythrina indica Lam.*	Leguminosae	I	India, Sri lanka	Ornamental	Mandar, Madar, Parijat	Indian Coral Tree	NT	LC	0 25	0 61	0 06	0 92
50	Matam	*Not Identified*	Not Identified	I	Not Identified	Not Identified	Fruit	Not Identified	Unknown	Unknown	0 12	0 33	0 01	0 46
51	Narikel	*Cocos nucifera L.*	Palmae	E	Pacific Islands, Coast of Panama	Fruit and Timber beam	Daab	Coconut palm	NAT	LC	14 29	5 80	43 34	63 42
52	Nim	*Azadirachta indica A.Juss.*	Meliaceae	E	Myanmar	Timber and medicine	Nimba	Margosa Tree, Indian Lalic	NT	LC	2 09	3 47	0 72	6 29
53	Noil	*Phyllanthusacidus L.*	Euphobiaceae	E	Brazil	Fruit and medicinal values	Amla, Harbari, Loda	Star Gooseberry, The Country Gooseberry	NMT	LC	0 21	0 58	0 10	0 89
54	Oil-palm	*Elaeisguineensis Jacq*	Arecaceae	E	West & Central Africa	Pump oil	No	Oil palm, African Oil Palm	NMT	NE	0 04	0 08	0 06	0 17
55	Ora\Shoila	*Sonneratiacaseolaris (L.) Engl.*	Lythraceae	I	Sri Lanka, Peninsular India	Fruit	Orali, Orcha	Crabapple Mangrove	NMT	NE	0 04	0 09	0 01	0.14
56	Pepe	*Carica papaya L.*	Casicaceae	E	Mexico& Costa Rica	Fruit	Pepe	Papaya	NAT	LC	1 23	2 02	0 61	3 87
57	Pitapora/Pitali	*Mallotus repandus (Willd.) Mull.Arg.*	Euphobiaceae	I	China, Hong Kong, India, Malaysia	Fuel wood	Gunti, Jante	No	NT	LC	0 25	0 33	0 18	0 76
58	Puta/toon	*Toona ciliata M.Roem.*	Meliaceae	I	Pakistan	Timber, pesticide	Toon, Peo, Piyatoon, Kuma,Prias	Indian Mahagony Toon,Australian Red Cedar, Cedar	NMT	LC	0 21	0 67	0 18	1 06
59	Rain Tree	*Albizia saman (Jacq.) Merr.*	Leguminosae	E	Central America	Timber	Belatisiris, Randi-koroi	Cow Tamarind, Monkey Pod,	NT	LC	3 08	4 39	6 27	13 75
60	Raj Koroi										0 08	0 08	0 03	0 18
61	Redi/ venna	*Ricinus communis L.*	Euphorbiaceae	E	Northeast Tropical Africa	Castor oil	Bherenda, Gab-bherenda	Castor, Castor Bean,	NMT	LC	0 04	0 04	0 01	0 09
62	Royena/Pitraj	*Aphanamixis polystachya Wall.*	Meliaceae	I	India, Pakistan, Nepal, Bhutan	Medicinal value, Timber	Royna,Pitti, Titra	Amoora	NMT	LC	0 12	0 39	0 01	0 52

63	Sajna	*Moringa oleifera Lam.*	Moringaceae	I	Indian Sub Continent	Fruit &fodder	Sojne	Ben oil Tree, DrumStick Tree	NT	LC	1 97	2 53	1 99	6 49
64	Shegun	*Tectona grandis L.f*	Lamiaceae	E	India, Myanmar	Furniture, Constructi on	Shegoon, Teak	The Teak Tree	NT	LC	0 12	0 22	0 02	0 36
65	Shimultula	*Bombax ceiba L.*	Bombacaceae	I	India, Myanmar, South China, Thailand	Cotton fuel wood	Simul, Tula Gachh	Red Silk Cotton Tree	NT	LC	0 25	0 88	0 16	1 28
66	Sissoo	*Dalbergiasissoo DC*	Leguminosae	I	India, Bhutan, Myanmar Pakistan Afghanistan	Timber	No	Sissoo, South Indian Red Wood	NMT	LC	0 25	0 50	0 28	1 03
67	Sofeda	*Manikara zapota (L.) P Royen*	Sapotaceae	E	West indies, Tropical America	Fruit	No	Sapodilla, Naseberry, Sapota	NT	LC	1 81	3 79	1 41	7 01
68	Sonalu	*Cassia fistula L.*	Caseslpinieae	I	Tropical Asia	Fuel wood	Sonali, Bandar Lathi	Golden Shower Tree, Purging cassia	NMT	LC	0 08	0 12	0 03	0 23
69	Sora	*Streblus asperLour*	Moraceae	I	Bhutan, Cambodia, China, India, Laos	Medicinal Value and Leaves for Wood & ivory polishing	Sheora, Harbi, Hekra, Harban	Siamese Rough Brush, Tooth Brush Tree	NT	LC	0 62	0 88	0 24	1 74
70	Supari	*Areca catechu L.*	Palmae	E	Malaysia	Fruit and Timber beam	Gua	Betel nut palm, Areca nut palm	NAT	LC	16 30	5 78	7 76	29 84
71	Tal	*Borassus flabellifer L.*	Palmae	I	India, Pakistan, Bangladesh	Fruit and Timber beam		Palmyra Palm, Toddy Palm	Less plantation and Increased felling	LC	0 49	1 77	0 71	2 97
72	TejPata	*Cinnamomun tamala (Buch - Ham) T.Nees&Eberm*	Lauraceae	I	Tropical & Subtropical Himalayan regions, Bhutan, India & Nepal	Cooking and medicene	Huara	Cassia Cinnamon, Cassia Lignea	Habitat Loss in the Wild	NE	0 12	0 24	0 02	0 38
73	Tetul	*Tamarindus indica L.*	Leguminosae	E	Tropical Africa	Wood ,fruit	Tentul, Amli,Ambli	Tamarind	NT	LC	0 70	1 91	1 65	4.25
74	Ulotkambal	*Abroma augusta (L.) L.f*	Stercullaceae	I	India, Warmer Parts of china	Medicine	Tambol	Devil's Cotton	Over-exploitation	Near Threatened	0 25	0 23	0 01	0 49
75	Uri Jam	*Not Identified*	Annonaceae	I	No	Fruit	No	No	NMT	LC	0 04	0 10	0 01	0 15
	Shrub Species	**Scientific Name**	**Family**	**Origin**	**Native country**	**Local Use**	**Other local name**	**English Name**	**Threats to The species**	**Conservation Status**	**R.D.**	**R.F.**	**R.Do.**	**IVI**
76	Bashak	*Justicia adhatoda L.*	Acanthaceae	I	India, Laos, Vietnam	Medicinal value	Vasak, Alok-bizak	White Draagon's Head	NMT	LC	1 09	1 64		

63	Sajna	*Moringa oleifera Lam.*	Moringaceae	I	Indian Sub Continent	Fruit &fodder	Sojne	Ben oil Tree, DrumStick Tree	NT	LC	1 97	2 53	1 99	6 49
64	Shegun	*Tectona grandis L.f*	Lamiaceae	E	India, Myanmar	Furniture, Constructi on	Shegoon, Teak	The Teak Tree	NT	LC	0 12	0 22	0 02	0 36
65	Shimultula	*Bombax ceiba L*	Bombacaceae	I	India, Myanmar, South China, Thailand	Cotton fuel wood	Simul, Tula Gachh	Red Silk Cotton Tree	NT	LC	0 25	0 88	0 16	1 28
66	Sissoo	*Dalbergiasissoo DC*	Leguminosae	I	India, Bhutan, Myanmar Pakistan Afghanistan	Timber	No	Sissoo, South Indian Red Wood	NMT	LC	0 25	0 50	0 28	1 03
67	Sofeda	*Manikara zapota (L.) P Royen*	Sapotaceae	E	West indies, Tropical America	Fruit	No	Sapodilla, Naseberry, Sapota	NT	LC	1 81	3 79	1 41	7 01
68	Sonalu	*Cassia fistula L.*	Caseslpinieae	I	Tropical Asia	Fuel wood	Sonali, Bandar Lathi	Golden Shower Tree, Purging cassia	NMT	LC	0 08	0 12	0 03	0 23
69	Sora	*Streblus asperLour*	Moraceae	I	Bhutan, Cambodia, China, India, Laos	Medicinal Value and Leaves for Wood & ivory polishing	Sheora, Harbi, Hekra, Harban	Siamese Rough Brush, Tooth Brush Tree	NT	LC	0 62	0 88	0 24	1 74
70	Supari	*Areca catechu L.*	Palmae	E	Malaysia	Fruit and Timber beam	Gua	Betel nut palm, Areca nut palm	NAT	LC	16 30	5 78	7 76	29 84
71	Tal	*Borassus flabellifer L.*	Palmae	I	India, Pakistan, Bangladesh	Fruit and Timber beam		Palmyra Palm, Toddy Palm	Less plantation and Increased felling	LC	0 49	1 77	0 71	2 97
72	TejPata	*Cinnamomum tamala (Buch.-Ham.) T.Nees&Eberm*	Lauraceae	I	Tropical & Subtropical Himalayan regions, Bhutan, India & Nepal	Cooking and medicene	Huara	Cassia Cinnamon, Cassia Lignea	Habitat Loss in the Wild	NE	0 12	0 24	0 02	0 38
73	Tetul	*Tamarindus indica L.*	Leguminosae	E	Tropical Africa	Wood ,fruit	Tentul, Amli,Ambli	Tamarind	NT	LC	0 70	1 91	1 65	4 25
74	Ulotkambal	*Abroma augusta (L.) L.f*	Stercullaceae	I	India, Warmer Parts of china	Medicine	Tambol	Devil's Cotton	Over-exploitation	Near Threatened	0 25	0 23	0 01	0 49
75	Uri Jam	*Not Identified*	Annonaceae	I	No	Fruit	No	No	NMT	LC	0 04	0 10	0 01	0 15
	Shrub Species	**Scientific Name**	**Family**	**Origin**	**Native country**	**Local Use**	**Other local name**	**English Name**	**Threats to The species**	**Conservation Status**	**R.D.**	**R.F.**	**R.Do.**	**IVI**
76	Bashak	*Justicia adhatoda L*	Acanthaceae	I	India, Laos, Vietnam	Medicinal value	Vasak, Alok-bizak	White Draagon's Head	NMT	LC	1 09	1 64		

77	Beli Ful	*Jasminum sambac L.*	Oleaceae	I	India, Malaysia, Indonesia	Flower. Medicinal Value and ornamental	Bely,BanMallika, Mogra	Arabian Jasmine	NAT	LC	0 22	0 57		
78	Berachita	*Pedilanthus tithymaloides Poit.*	Euphobiaceae	I	India	Milky latex for warts and scorpion sting, Roots for emetic	Rangchita, Belatisiz	Jew's Slipper	NMT	LC	13 97	3 84		
79	Chameli	*Jasminum officinale L.*	Oleaceae	E	Arabia	Ornamental	Chamelicajati	Spanish Jasmine, Catalonian Jasmine	NMT	LC	0 11	1 44		
80	Dalim	*Punica granatum L.*	Lythraceae	I	Balkans to Himalayas	Fruit	No	Pomegranate	NAT	LC	0 44	1 26		
81	Dumur	*Ficus hispida L.f*	Moraceae	I	India, Pakistan, Myanmar, China, Malaysia, Australia	Fruit	Kakdumur	Opposite-leaved Fig, Rough-leaved Stem Fig	NT	LC	6 44	11 28		
82	Ghetuful	*Clerodendrum infortunatum L.*	Lamiaceae	I	India, Myanmar, Thailand, Malaysia, China, Sri Lanka	Medicinal value	Bhant, Ghetu, Ghetuphul	No	NT	LC	0 11	0 34		
83	Golab/Rose	*Rosa chinensis Jacq.*	Rosaceae	E	China & India	Ornamental	KantaGolab	Tea Rose	NMT	LC	0 33	1 15		
84	Gondhoraj	*Gardenia jasminoidesJ Ellis*	Rubiaceae	E	China, Japan	Ornamental	No	Gardenia, Cape jasmine	NMT	LC	0 76	1 93		
85	Hamjum	*Polyalthia suberosa (Roxb.)Benth and hook*	Annonaceae	I	India, Srilanka, Myanmar	Fruits	Barachali, Murmuri, Kukuriam	No	NMT	LC	2 07	5 32		
86	Hasna-hena	*Cestrum nocturnum L.*	Solanaceae	E	West Indies	Ornamental	No	Night Jesmine	NAT	LC	1 09	0 43		
87	Joba	*Hibiscus rosa-sinensis L.*	Malvaceae	E	China	Ornamental	Rokta Joba	China Rose, Shoe Flower	NAT	LC	7 21	4 58		
88	Kagoji Lebu	*Citrus aurantiifolia (Christm.) Swingle*	Rutaceae	E	East Indies	Fruit	Patilebu	Lime, Sour Lime, Common Lme	NMT	LC	2 07	5 79		
89	Kamini Ful	*Murraya paniculata (L.) Jack*	Rutaceae	I	South and SoutheastAsia	Ornamental	Kamini	Cosmetic Bark, Orange Jasmine	NAT	LC	3 82	4 90		
90	Karabi	*Thevetia peruviana (Pers.) K.Schum*	Apocynaceae	E	Tropical America	Ornamental	HaldeKarabi, KalkiPhul, Kanai Phul	Lucky Nut, Yellow Oleander	NT	LC	0 22	0 34		
91	Karamcha	*Carissa carandas L.*	Leguminosae	I	India, Malaysia	Medicinal value	No	Christ's Thorn	NMT	LC	0 44	2 56		

92	Kata Mirah	*Lawsonia inermis L.*	Lythraceae	E	No	Mehedi	No	No	NT	LC	3 38	1 18		
93	Kathal Ful	*Artabotrys odoratissimus R.Br*	Annonaceae	E	China	Ornamental	KanthaliChampa	Climbing Ylang-ylang	Less cultivated now a days, due to the scarcity of land	LC	0 22	0 29		
94	Kaujinga	*Not Identified*	Not Identified	E	Not Identified	Not Identified	Not Identified	Not Identified	Unknown	Unknown	0 33	1 06		
95	Mehedi	*Lawsonia inermis L.*	Lythraceae	E	Africa, Arabia, Egypt, Srilanka, Pakistan< India	Leaves used as color	Mendi, Sudi	Henna, Indian Privet, Mignonette Tree	NT	LC	2 40	6 65		
96	Morich	*Capsicum frutescens L.*	Solanaceae	E	Tropical America	Vegetable	Kacha Morich, Lanka Morich	Spur piper, pepper, chillocs	NAT	LC	2 95	6 55		
97	Patabahar	*Codiaeum variegatum (L.) Rumph. exA.Juss.*	Euphobiaceae	E	Pan tropical	Ornamental	No	Golden Ring Croton	NMT	LC	34 06	11 86		
98	Pholsa	*Grewia asiatica L.*	Malvaceae	I	India And Sri Lanka	Vegetable and medicine	No	Phalsa	NMT	LC	0 11	0 34		
99	Piyara	*Psidium guajava L.*	Myrtaceae	E	India, Myanmar	Fruit	Sabri Aam	Guava	NT	LC	15 17	18 45		
100	Potka	*Microcos paniculata L.*	Malvaceae	I	China, Myanmar & Indo-Malaysia	Medicinal value	Pichandi, Aar	No	NMT	LC	0 11	0 72		
101	Rajanigondha	*Polianthes tuberosa L.*	Agavaceae	E	Mexico, Trinidad	Medicene for gonorrhoea, Ornamental	No	Tuberose	NMT	LC	0.11	1 44		
102	RanganPhul	*Ixora coccinea L.*	Rubiaceae	I	Sri Lanka, India, *Pakistan*	Ayurveda and folk Medicine	Jhumkaphul, Rajana	Flame of the Woods	NT	LC	0 55	2 21		
103	Sheuli	*Nyctanthes arbor-tristis L.*	Nyctanthaceae	I	Sub Tropical Himalaya, India, Pakistan, Myanmar	Flower and ornamental	Shefali, Shefalica	Night-flowering Jasmine, Coral Jasmine.Sorrowful Tree	NMT	LC	0 33	2 21		
Sl No	**Herb Species**	**Scientific Name**	**Family**	**Origin**	**Native country**	**Local Use**	**Other local name**	**English Name**	**Threats to The species**	**Conservation Status**	**R.D.**	**R.F.**	**R.Do.**	**IVI**

104	Aakh	*Saccharumofficinarum L.*	Poaceae	E	New Guinea	Food and drink, medicine, alcohol production, biofuel, hair removal	Ikkhu, Gendari, Kusa	Sugarcane	NT	Conservation Dependent	0 64	0 29		
105	Agrakata/ Ghagra	*Xanthium indicumKaonig*	Asteraceae	I	India, Malaysia & Indonesia	Medicinal Value	Hagra, Khagra,Ban-okra, Baksala	Rough Cocklebur	NMT	LC	0 16	0 35		
106	Apang	*Achyranthes aspera L.*	Amaranthaceae	I	Tropic and wormer region of world	Medicinal value	Bilaikhamchi, Upatlengra	Prickly Chaff-flower	NMT	LC	2 09	6 83		
107	Bas	*Dendrocalamuslongispathus Kurz.*	Poaceae	I	India, Northern Thailand & Myanmar	Construction work	Khang,Ora, Rupai, Taro	No	Indiscriminate harvesting	NE	1 77	6 67		
108	Basil Plant	*Ocimumbasilicum L.*	Lamiaceae	I	Throughout South Asia	Vegetable or shak	BabuiTulsi	Common Basil	Over-exploitation & Non-cultivation	NE	0 16	1 05		
109	Begun	*Solanummelongena L.*	Solanaceae	E	South Asia	Vegetable	Baigun	Brinjal, Egg Plant, Aubergine	NT	LC	0 97	0 73		
110	Bunopat	*CorchorusacutangulusLamk.*	Tiliaceae	I	Tropical Asia	Medicinal Value	Ban-pat, Titapat	Jute	NMT	LC	0 81	1 14		
111	Cactus	*Pachycereuspringlei (S.Watson) Britton & Rose*	Cactaceae	E		Ornamental	No	No	NT	LC	0 32	0 47		
112	Chutra	*Laportea cuneata (A. Rich.) Chew| Laporteainterrupta L.*	Urticaceae	I	Bangladesh	Medicinal value	LalBichuti	No	NMT	LC	1 13	3 20		
113	Chutrapata	*Tragiainvolucrata L.*	Euphobiaceae	I	China, India, Srilanka	Medicinal value	Bichuti, LataBichuti	Indian Stinging Nettle	NT	LC	0 16	1 14		
114	Dahlia Ful	*Dahlia pinnata Cav.*	Asteraceae	E		Ornamental			NT	LC	0 16	0 12		
15	Data Shak	*AmaranthuslividusRoxb.*	Amaranthaceae	I	Bangladesh	Vegetable, weeds, parasites,medicine	GoburaNotey	Livid Amaranth	NMT	LC	1 13	1 59		
16	Dheros	*Abelmoschusesculentus (L.) Moench*	Malvaceae	E	Southeast Asia	Vegetable	Bhendi	Lady's Finger, Okra	NT	LC	0 97	1 02		
17	DudmannKachu	*ColocasiaoresbiaA.Hay.Sandakania*	Araceae	I	Indonesia	Vegetable and Ornamental	Sadakachu	NO	NAT	Vulnerable	1 29	2 29		

118	Dupurful	*Pentapetesphoenicea L*	Nyctagineae	E	Sri Lanka, India, Australia, China, Japan, USA, Cuba	Ornamental	Bandhuli	Noon Flower, Copper Cup, Scarlet Mallow	NT	LC	0 64	0 79		
119	Fern	*Pterisvittata L*	Pteridaceae	I	India, Malaysia	Arsenic Indicators and Vegetable	Dhekia	Fern	Habitat Destraction	LC	2 09	1 94		
120	Fonimonsha	*Opuntiaaciculata Griffiths*	Cacteaceae	E	United States	Ornamental	Phanimanasa	Indian Fig, Erect Prickly Pear	NT	LC	0 32	0 50		
121	Gada Ful	*Tageteserecta L*	Asteraceae	E	Mexico	Medicinal value and decorative	Genda	African Marigold	NT	LC	4 83	2 72		
122	Gatkol	*Typhonium roxburaghii schoot*	Araceae	I	South India And Sri Lanka	Not Known	No	No	Deforestation and Habitat Destruction	Vulnerable	0 48	0 91		
123	Ghritakumari, Aloe Vera	*Aloe vera (L.) Burm.f.*	Asphodelaceae	I	Tropics & Sub Tropics	Ornamental and Medicinal value	Ghritakanchan, Musabbar	Barbados Aloe, Medicinal Aloe	NMT	LC	0 97	0 32		
124	GotmannKachu	*Not Identified*	Araceae	I	Not Identified	Vegetable	Not Identified	Not Identified	Unknown	Unknow	0 16	0 73		
125	GuriKachu	*Colocasiaaffinis Schott*	Araceae	I	Tropical Himalayan & South West India	Vegetable	No	No	Deforestation & Habitat Destruction	Vulnerable	0 64	1 23		
126	Holud	*Curcuma longa L*	Zingiberaceae	I	Tropics	Dyes and Medicine	Haldi	Turmeric	NT	LC	0 32	0 58		
127	Ilismas Shak	*Portulacaoleracea*	Portulacaceae	I	Sri Lanka, tropical Asia and Africa	Vegetable and Medicinal value	Lunia Shak, Munia	Common Purslane,GardenPurslane	NT	LC	0.16	1 05		
28	Jolpan/DudhKachu	*Xanthosoma violaceum schott*	Araceae	E	West Indies and South America	Vegetable and Ornamental	No	Blue Taro, Purple Stem Taro	NMT	LC	4 83	5 88		
29	KaloKachu	*Colocasiaesculenta (L.) Schott*	Araceae	I	Bangladesh	Vegetable and Ornamental	Kachu	Taro, Coco-Yam	NT	LC	1 13	1 49		
130	Kochoripana	*Eichhorniacrassipes (Mart.) Solms*	Pontederiaceae	E	Brazil	Bioenergy and Medicinal vale	Kachuripana, Jatmuni	Water Hyncinth	NAT	LC	0 97	1 87		
131	Kola	*Musa paradisiaca L*	Musaceae	I	Tropical asia	Fruit, Fiber	Kanch Kola	Banana	NAT	LC	24 32	16 90		

132	Kolabati	*Canna indica L.*	Cannaceae	E	Tropic & sub Tropic Region	Ornamental	Sarbajoya	Indian Shot, Canna Lily	NT	LC	0 16	0 58		
133	Man Kachu	*Alocasia macrorrhizos (L.) G.Don*	Araceae	I	India, Pacific island	Vegetable and Ornamental	Tankachu	Giant Taro	NAT	LC	7 89	9 20		
134	Mikeful	*Amaryllis belladonna L.*	Amaryllidaceae	E		Ornamental	No	No	NT	LC	2 09	1 49		
135	Modina			I							0 97	1 78		
136	Morog Ful	*Celosia argentea L.*	*Amaranthaceae*	I	Through India, Sri Lanka	Ornamental	Shet Morog Phul	Cock's Comb, Quail Grass	NMT	LC	3 06	3 86		
137	OolKachu	*Amorphophalluspaeoniifolius Dennst*	Araceae	I	India, Sri Lanka, Java	Vegetable and Medicinal value	No	Elephant -Yam	NMT	LC	0 32	0 29		
138	PalaoPata	*PandanusamaryllifoliusRoxb*	Pandanaceae	I	Malaysia	Cooking and medicene	No	Small Screw Pine	NT	NE	1 61	1 46		
139	Pani Kochu	*ColocasialihengiaeC L.Long*	Araceae	I	Yunnan (Southern China)	Vegetable and Ornamental	No	No	Deforestation & Habitat Destruction	Vulnerable	0 97	1 14		
140	Pargacha	*Hoya verticillata (Vahl) G Don*	Apocynaceae	I	India, Indo-China, Myanmar, Thailand	no use	No	No	NMT	LC	0 16	0 58		
141	Patahorkuchi	*Bryophyllumpinnatum (Lam.) Oken*	Crassulaceae	E	Pan tropical	Ornamental and Medicinal value	Kaphpata, Gatrapuri	Life Plant, Floppers	NT	LC	0 16	0 15		
142	Pathabahar Kochu	*Caladium bicolor Ait*	Araceae	I	South America, From Panama to Bolivia	Ornamental	No	Fancy-leaved Caladium	Defoorestation and Habitat Destruction	Vulnerable	0 16	0 20		
143	Peperomia	*Peperomiapellucida L.*	Piperaceae	E	Tropical America	Medicinal Value	Luchipata	Shiny Bush, Pepper Elder	NT	LC	0 16	0 15		
144	Piaj Ful	*ZephyranthesgrandifloraLindl*	Liliaceae	E	Warmer Part Of America	Ornamental	GolapiGhash phul	Pink Rain Lily, Fairy Lily, Zephar Lily	NT	LC	1 61	1 50		
145	Pteris	*Pterisvittata L.*	Pteridaceae	I	India, Malaysia, The Tropics & Sub Tropics	Ornamental	Dhekia	Fern	Habitat Destruction	LC	0 64	0 58		
146	Raam Tulshi	*Ocimumgratissimum L.*	*Lamiaceae*	I	Tropics of Africa,America,Asia	Medicinal value	NO	Shrubby Basil	NMT	LC	2 58	0 44		

147	Sadaful/Sadapakh atogor	*Tabernaemontanacorymbosa R oxb.*	Apocynaceae	E	China,India, Indonesia, Laos	Ornamental, Not Known	No	Flower of love	Habitat Loss	NF But seem to be rare	0 97	0 73		
148	SokalShondha		Amaranthaceae	E		Ornamental					0 48	0 28		
149	Soya Bean	*Glycine max (L) Merr*	Leguminosae	E	India,Pakistan ,Nepal	Oil	GariKalai,	Soya Bean, Soybean	Nt	LC	2 25	0 64		
150	Suti/shoti	*Curcuma zedoaria (Christm) Roscoe*	Zingiberaceae	I	Bhutan, India. Indonesia, Malaysia	Spice	Failla	Zedoary	NMT	LC	0 97	1 72		
151	Teraj	*Sennatora L.*	Caesalpiniaceae	I	Bhutan, India, Nepal	Medicinal Value	Araj, Kalkasam	Sickle Senna, Metal seed	NT	LC	0 81	0 35		
152	Thankuni	*Centellaasiatica (L.) Urb*	Apiaceae	I	Tropics & Sub Tropics Of the New And Old World	Medicinal value	Thulkuri, Brahmabuti, Brahmokuti	Indian Pennywort Spadeleaf	NMT	LC	0 16	0 29		
153	Time Ful	*Gomphrenaglobosa L.*	Amaranthaceae	E		Ornamental					3 06	2 06		
154	Tulshi	*Ocimum sanctum L.*	Lamiaceae	E	Old Tropics, China, Japan, Australia	Medicinal value	Kalo Tulshi	Sacred Basil	NMT	LC	4 03	3 04		
155	Vati	*Clerodendrumviscosum Vent.*	Verbanaceae	I	India, Myanmar,China Thailand	Medicinal value	Bhant, Ghetu, Ghetuphul	No	NT	LC	9 98	2 51		
	Climber Species	**Scientific Name**	**Family**	**Origin**	**Native country**	**Local Use**	**Other local name**	**English Name**	**Threats to The species**	**Conservation Status**	**R.D.**	**R.F.**	**R.Do.**	**IVI**
156	Angur	*Vitisvinifera L.*	Vitaceae	E	Mediterranean region, central Europe, and southwestern Asia, from Morocco and Portugal north to southern Germany and east to northern Iran	Fruit and Wine	No	Grape	NT	LC	0 88	1 56		
157	Bet	*CalamustenuisRoxb*	Arecaceae	I	India and Myanmar	Furniture	Jayot bet, Jali bet, Sachi bet	Rattan	NMT	LC	1 32	3 42		
158	Chal Kumra	*Benincasa hispida (Thunb) Cogn*	Cecuritaceae	I	Tropical & Subtropical Countries	Vegetable	No	Wax Gourd, White Gourd	NMT	LC	2 64	1 97		

159	Chui Jhal	*Piper retrofractumVahl*	Piperaceae	I	Thailand, India& china	Culinary use/cooing	Choi,Chab	javanese Long Pepper	NT	LC	0 44	1 30		
160	Dhaincha	*Sesbaniabispinosa (Jacq.) W Wight*	Fabaceae	F	Bangladesh	Green manure, rice straw wood and fodder	No	No	NT	LC	0 44	0 78		
161	Dhundul	*Luffa acutangula (L.) Roxb.*	Cucurbitaceae	I			TitaDhundul	Sponge Gourd	NMT	LC	1 32	0 99		
162	Goros	*Tinosporacrispa L. Hook*	Menispermaceae	I	India, Myanmar, Thailand, Cambodia, South China, Java	Medicinal Value	Gulancha	No	Habitat Loss	Near Threatened	0 44	0 78		
163	Harjoralota	*Cissus quadrangularis L.*	Vitaceae	I	Bangladesh, India, Sri Lanka, Africa, Arabia, and Southeast Asia	Treatment of bone fracture, menstrual disorder and scurvy, digestive problems	Harbhanga Lota	Veld grape,Devil's backbone, Bone setter,Climbing cactus		Vulnerable	0 440 529	0 44	0 78	
164	Jarmani Lota	*Mikania cordata (Burm.f) B L.Rob*	Asteraceae	I	Tropical Asia, Philippines, Papua New Guinea	Remedy for snakebite, Medicinal	Assam-lata, Tarulata	Heartleaf Hempvine	NT	LC	8 81	9 36		
165	Jhinga	*Luffaacutangula (L.) Roxb.*	Cucurbitaceae	I	China, India, Pakistan, Nepal, Malaysia, Russia	Vegetable	Ghosalata	Angled Loofah, Ridged Gourd	NMT	LC	0 88	0 52		
166	Kakrol (buno)	*MomordicadioicaRoxb. ExWilld.*	Cucurbitaceae	I	Australia, China, Indo-Malaya, India	Vegetable	Golkak	Sweet Gourd, Giant Spine Gourd	NMT	LC	5 29	4 33		
167	Kalmi shak	*Ipomoea aquatic Forssk*	Convolvulaceae	I	Circumtropical	Shak	No	Swamp Cabbage, Water Spinach	NMT	LC	6 17	1 87		
168	Lajjabati	*Mimosa pudica L.*	Fabaceae	E	South America	Ornamental	Sarminda	Sensitive Plabt	NT	LC	2 20	0 62		
169	Lau	*Lagenaria siceraria (Molina) Standl*	Cucurbitaceae	I	Africa, China, India, Japan	Vegetable	Kodu, Pani Lau	Bottle Gourd, Club Gourd	NMT	LC	5 73	10.61		
170	Madhabilata	*Hiptagebenghalensis (L.) Kurz*	Malpighiaceae	I	India, Myanmar, China, Taiwan, Indonesia, Sri Lanka	Ornamental and Medicinal value	Madhublata, Basanti	Hiptage	NT	LC	2 20	0 78		

171	Mati Alu	*Dioscorea alata L.*	Dioscoreaceae	I	Bangladesh	Madicinal value and vegetable	Chuprialu, Kham Alu	Greater Yam, Water Yam,White Yam	NAT	LC	20 70	18 60		
172	Misti Kumra	*Cucurbita moschata Duchesne*	Cecurtaceae	E	Bolivia, Southern Peru & Northern Argentina	Vegetable	Mithakumra	Pumpkin, Winter Squash	NMT	LC	6 17	9 83		
173	Papoli	*Piper sylvaticumRoxb.*	Piperaceae	I	India, Myanmar, Nepal& Bhutan	Fruits are carminativ e & appetizer	Bon Pan, PahariPipal	No	Deforestation	Conservation Dependent	2 20	3 87		
174	Poi-shak	*Basella alba L.*	Basellaceae	E	Tropic of old World	Vegetable	Poi, Putika	Sri Lankan Spinach, Indian Spinach	NT	LC	17 18	14 81		
175	Roktokeuta	*Not Identified*	Not Identified	E	Not Identified	Unknown	Not Identified	Not Identified	Unknown	Unknown	0 16	0 29		
176	Sheem	*Lablab purpureus (L.) Sweet*	Leguminosae	I	Bangladesh	Vegetable	Urshi, Ushi	Lablab, Hyacinth Bean	NT	LC	7 49	5 86		
178	Shornolota	*CuscutareflexaRoxb.*	Cuscutaceae	I	India, Sri Lanka, Malaysia	Ornamenta l	Swarnalata	Giant Dodder	NT	LC	0 44	0 78		
179	Tela Kucha	*Coccinia grandis (L.) Voigt*	Cucurbitaceae	I	Africa, China, India, Japan	Medicinal value and weed control	No	Ivy Gourd, Scarlit Fruited Gourd	NMT	LC	3 08	3 79		
180	Uchta	*Momordicacharantia L.*	Cucurbitaceae	I	Tropical Country	Vegetable and medicine	Uchchhey	No	NMT	LC	3 52	2 80		

Here, I = Indigenous, E = Exotic, NMT = No Major Threat, NAT = N0 Apparent major Threat, NT = No Threat, LC = Least Concern and NE = Not Evaluated