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Categorization of the flora and fauna: A study from the Uttara region, Dhaka, Bangladesh

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ABSTRACT

Categorization of living things in a particular area is helpful to know their hypothetical relationships, similarities, dissimilarities, and present status of a particular species. The present study focused on a comprehensive taxonomic survey of the present floral arrangement in the semi-natural area of the Uttara region from August 2021 to October 2022. Basic methodological approaches and field surveys were employed to elucidate the floral diversity of the Uttara region, Dhaka, Bangladesh. The findings revealed a total of 225 plant species including, seasonal plants in the study area. These species were categorized into 119 families, with 39.11% of the species belonging to 43 families and the remaining 60.89% belonging to 76 different families. Among all families, Fabaceae is the largest family having 7% of the species. The rest of the plant families occupied 44% of species is the minor family having one species each. The recorded species were represented by trees (28.0 %), shrubs (16.0 %), herbs (43.55 %), and climbers (12.40 %). The plant species found in the study area were categorized into several functional groups. The entire population of plant communities was 225 including seasonal species, which were divided into 203 genera, 119 families, and 126, 46, 17, 15, 29, 10, and 14 plant species classified as ornamental, fruit, vegetable, spice, medicinal, timber, and plantation crop, respectively. To enhance the floral diversity and ecological balance of the area, it is necessary to implement sustainable management practices, public awareness, and participation in plant conservation activities, and should introduce sustainable native plant species. This study could be useful to plant taxonomists, plant ecologists, or naturalists for conducting region-specific surveys on the present status of species, or even flora and fauna.

INTRODUCTION

Flora refers to the plant life or vegetation found in a particular region or ecosystem. It includes all plant species ranging from the smallest mosses and ferns to towering trees [1]. Eventually, flora plays a vital role in the ecosystem, as it supports the food chain, contributes to the oxygen cycle, and helps to maintain the balance of nature. The study of flora, known as floristics, involves identifying and classifying plant species, studying their distribution and relationships, and understanding their ecological and evolutionary significance [2]. Floral diversity plays a crucial role in maintaining the ecological balance of an ecosystem. Each plant species is part of a complex web of interactions between other species, including pollinators, herbivores, and predators [3]. Unlike a wide variety

of plants, the ecological system as a whole may go out of balance, which might have disastrous consequences for the environment and the organisms that rely on it [4].

Numerous attempts to study flowers have been made during the past few decades. Bangladesh has already conducted surveys and documented the plant species in on-premises areas of several universities [5-7]. Although, the Uttara region displayed a diversification of plants. However, no floristic study was conducted on the Uttara region. With 165 million citizens, Bangladesh is among the most populous countries in the world [8] and its population is now growing at a pace of 1.22%. Deforestation is a critical issue in Bangladesh. The country's forest cover has been drastically reduced over the past few decades due to logging, agricultural expansion, and illegal encroachments [9]. The loss of forests not only diminishes biodiversity but also disrupts water cycles, increases soil erosion, and contributes to the loss of livelihoods for many communities dependent on forest resources [10]. Carbon sequestration and nutrient dynamics constitute fundamental elements of ecosystem functionality [11]. Plant communities act as carbon sinks, absorbing carbon dioxide from the atmosphere and mitigating the effects of climate change. In addition, diverse plant communities can help regulate local climates by providing shade, reducing temperatures, and maintaining humidity levels [12]. In this scenario, plant resources are crucial for providing food, medicine, and other necessities. Nonetheless, it is regrettable that plant resources are disappearing globally, especially in Bangladesh (IUCN, 1990), and that this is a danger to farmland, the ecosystem, and the woodland [13].

In the center of Dhaka, Bangladesh, the Uttara region is a multicultural and active neighbourhood. The study area having incredible flower diversity, which gives the surroundings a special charm and beauty, is one of its most prominent qualities. The area is covered with a variety of trees, shrubs, and flowers that create a lush, green landscape and offer a welcoming setting for people. The goal of this research study is to examine the flora and fauna at the Uttara region by identifying the different plant species and exploring their ecological and monetary value. Hence, there is a high demand for enhanced knowledge in eco-friendly and cost-efficient methods to promote diverse plant population, maintain environment quality, and secure global food safety free from toxic substances[14]. The study will also provide insight into how the locality protects and preserves its unique plant history, including how it uses sustainable plantations.

MATERIALS AND METHODS

Study Location

Uttara region is in the northern part of the capital of Bangladesh, Dhaka City at the bank of river Turag. Uttara region Uttara Thana (Dhaka metropolitan) area 36.91 sq km, located in between 23'51' and 23'52' north latitudes and in between 90'22' and 90'24' east longitudes. Of 9 m beyond the average sea level [15]. The Uttara region Uttara Thana (Dhaka metropolitan) comprises an area of 36.91 sq km (Figure 1). To guarantee the plant resources of plant communities at the Uttara region for this study, a field investigation was carried out.

Physiographic and soil condition of the study region

Uttara region lies under the Agro-ecological Zone - Modhupur Tract (AEZ 28), and it has a wet tropical climate having an average yearly temperature of 29.96°C (85.93°F), 9.9 inches of rainfall per year, and 65.8% mean yearly humidity [16]. Reddish brown clay

soil with a pH ranging from slightly acidic to extremely acidic makes up the soil types in these places. The soil analysis reveals that both the total content of one nutrient and the concentration of organic matter are at low to moderate levels. There are low levels of another nutrient and an essential trace element [17, 18]. The study area is mentioned in Figure 1.

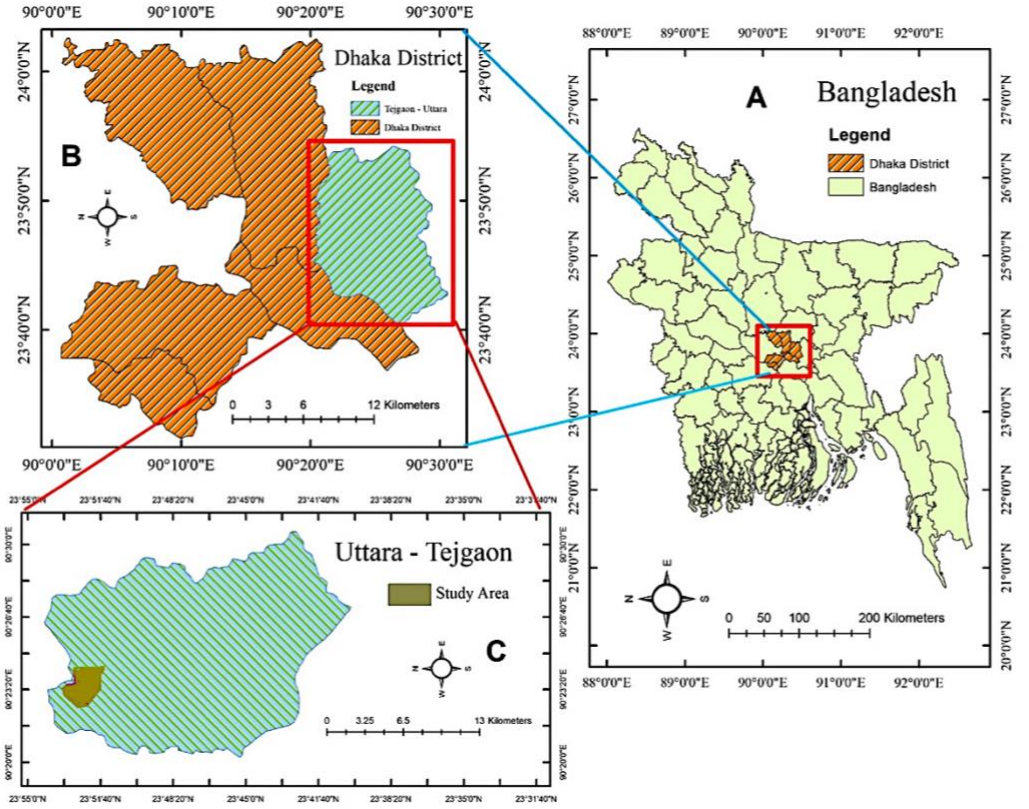

Figure 1. The study area. A) Administrative units of Bangladesh with the location of Dhaka district, B) The administrative part of Dhaka City Corporation, C) Tejgaon – Uttara area and the study area Uttara region. The figure is developed using ArcMap 10.5.

Collection and compilation of data

A field survey was carried out (Table 4). The fallow land (plain), pond side bank, roadside, waterbody, roof-top, etc. were all recognized as potential flora habitats. Data were collected from August 2021 to October 2022. The study was of basic methodological approaches and surveys. Data were taken separately followed by local name, scientific name, area of collection, collection time, habit, habitat, family, and collector's name attached with each data collection sheet. Most of these habitats were dispersed and intertwined throughout the study regions. We included every area that was accessible for the survey because the goal of the study was to find the full range of plant diversity in the study region. All kinds of witnessed plant species, including herbs, shrubs, trees, climbers, native and exotic species, cacti, orchids, and others, that were present in the habitats were recognized and named in the field.

Identification of the collected specimens and data analysis

With the use of published journals and textbooks of reference, Bengal Plants [19], Encyclopedia of Flora and Fauna of Bangladesh [20, 21], Trees of Bangladesh [22],

Medicinal Plants of Bangladesh [23], and Red Data Book of Vascular Plants of Bangladesh [24] the unidentified samples were recognized.

RESULTS

Number of plant species under different categories and habits

The comprehensive study of plant species in the Uttara region revealed a diverse floral community, categorized into Table 1, ornamental, fruit, vegetable, spice, medicinal, wood, plantation, and field crops, representing 39.11%, 16.44%, 16.0%, 4.44%, 12.44%, 2.22%, 3.11%, and 6.22%, respectively. Plants were further classified based on growth habits into trees (28.0%), shrubs (16.0%), herbs (43.55%), and climbers (12.44%). Ornamental plants predominated, followed by fruit and vegetable species, with timber plants showing the lowest density highlighting a trend towards urban gardening and ornamental horticulture [25, 26].

Table 1. List of total number of plant forms with their frequencies

Plant category	Pant forms					
	Tree	Shrub	Herb	Climber	Total	Frequency (%)
Ornamental	16	20	40	12	88	39.11
Fruit	26	7	3	1	37	16.44
Vegetables	1	4	19	12	36	16.0
Spices	2	0	8	0	10	4.44
Medicinal	6	3	16	3	28	12.44
Timber	5	0	0	0	5	2.22
Plantation Crop	7	0	0	0	7	3.11
Field Crop	0	2	12	0	14	6.22
Total	63	36	98	28	225	100%

Distribution of family, genus, and species

The comprehensive documentation of plant species in the Uttara region highlights rich biodiversity, with a total of 225 plant species categorized into Table 2, ornamental, fruit, vegetable, spice, medicinal, timber, plantation, and field crops. The ornamental plants dominate, comprising 36.13% of the total families, followed by fruit plants at 20.16%, vegetables at 10.92%, spices at 5.04%, medicinal plants at 16.80%, timber at 3.36%, plantation crops at 1.68%, and field crops at 5.88%. In terms of genera, there are 89, 31, 25, 8, 25, 4, 7, and 14 for each respective category, and species count at 88, 37, 36, 10, 28, 5, 7, and 14. This diversity underscores the significance of ornamental plants in enhancing the campus landscape and supporting local biodiversity.

Table 2. List of family, genus and species with their frequencies

Plant category	Family		Genus		Species	
	Total	Frequency	Total	Frequency	Total	Frequency (%)
Ornamental	43	36.13	89	43.84	88	39.11
Fruit	24	20.16	31	15.27	37	16.44
Vegetables	13	10.92	25	12.31	36	16
Spices	6	5.04	8	3.49	10	4.44
Medicinal	20	16.80	25	12.31	28	12.44
Timber	4	3.36	4	1.97	5	2.22
Plantation Crop	2	1.68	7	3.44	7	3.11
Field Crop	7	5.88	14	6.89	14	6.22
Total	119	100	203	100	225	100%

Plant families with the percentage

The comprehensive documentation of plant species in the Uttara region stated in Figure 2 reveals Fabaceae as the largest plant family, comprising 7% of all species. Following Fabaceae, Amaryllidaceae accounts for 4%, making it the second-largest plant family, with Cucurbitaceae, Moraceae, Rutaceae, and Solanaceae also contributing significantly to the floral diversity. Families such as Brassicaceae, Compositae, Euphorbiaceae, and Malvaceae each represent 3% of the total plant families, while Apocynaceae, Caesalpiniaceae, Combretaceae, Lamiaceae, Liliaceae, Palmae, Rubiaceae, and Zingiberaceae each account for 2%. The remaining 44% of plant families are represented by single species, highlighting a considerable presence of rare or less common families. This extensive diversity aligns with previous studies [27, 28], emphasizing Fabaceae's ecological and agricultural significance, particularly in nitrogen fixation and soil fertility [28, 29].

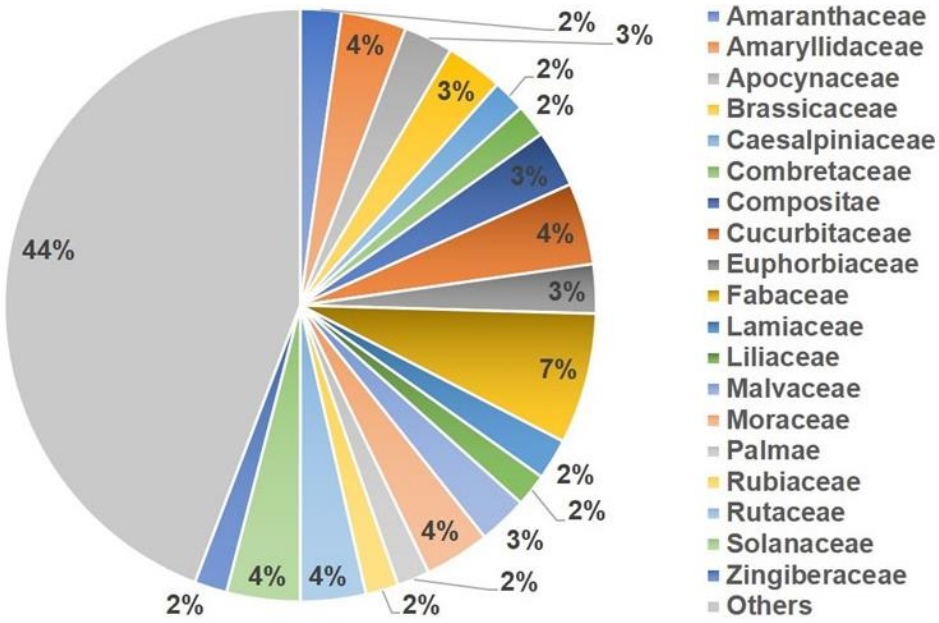

Figure 2. The distribution (%) of studied plant families from the Uttara, region, Bangladesh. Different colours on Pie chart indicate family-based plant distribution (%), and right panel shows the identified plant families in alphabetic order.

Fruit plant species under each family

The study recorded in Table 3 a total of 37 fruit tree species from 23 families in the Uttara region. The Rutaceae family had the highest number of species, with 6 species accounting for 16.21% of all fruit-producing plants. The Moraceae family followed with 4 species, representing 10.81% of the fruit tree species, while the Myrtaceae and Anacardiaceae families each contributed 3 species, making up 8.10% of the total fruit tree species. In contrast, only one species was found in several families, including Annonaceae, Caricaceae, Malvaceae, and Sapotaceae. These findings highlight the dominance of the Rutaceae family, consistent with its known diversity and economic importance, particularly in the cultivation of citrus fruits.

Table 3. List of fruit plant species with their families and frequencies

Family	Number of species	Frequency (%)	Family	Number of species	Frequency (%)
Anacardiaceae	3	8.10	Malvaceae	1	2.70
Annonaceae	1	2.70	Moraceae	4	10.81
Apocynaceae	1	2.70	Musaceae	1	2.70
Averrhoaceae	1	2.70	Myrtaceae	3	8.10
Caricaceae	1	2.70	Punicaceae	1	2.70
Combretaceae	1	2.70	Rhamnaceae	1	2.70
Dilleniaceae	1	2.70	Rosaceae	2	5.40
Ebenaceae	1	2.70	Rutaceae	6	16.21
Elaeocarpaceae	1	2.70	Sapindaceae	2	5.40
Euphorbiaceae	1	2.70	Sapotaceae	1	2.70
Fabaceae	1	2.70	Vitaceae	1	2.70
Lauraceae	1	2.70	Total	37	100%

List of flora of Uttara region with their respective common names, scientific names, family, and plant type

Plant genetic resources represent a wide range of plant species essential for upholding global food security and agricultural resilience [30]. The extensive variety of plant genetic resources highlights their importance in agricultural research, breeding initiatives, and conservation endeavors focused on preserving biodiversity and promoting agricultural sustainability [31]. The enumeration of the botanical species presented in the Uttara region, inclusive of their corresponding colloquial nomenclature, taxonomic designations, families of various fauna specimens stated in Figure 3, and plant type-based categorization was presented in Table 4.

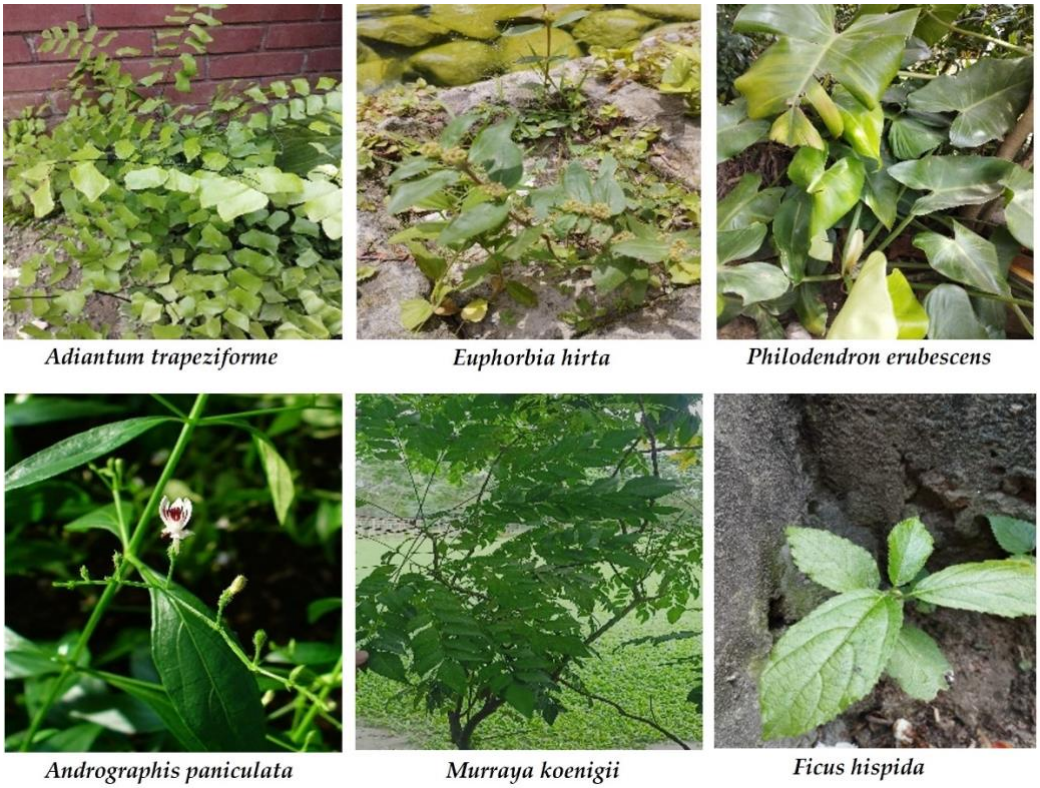

Figure 3. Photographs show various flora specimens and their corresponding scientific names. The plant species are identified from the Uttara region, Dhaka Bangladesh.

Table 4. List of the identified plant specimens in the Uttara region

Common name	Scientific name	Family	Type
Ornamental Plants			
Alocasia	*Alocasia sp.*	Araceae	Herb
Alamnda	*Allamanda cathartica*	Apocynaceae	Climber
Amaranthus	*Amaranthus sp.*	Amaranthaceae	Herb
Aparijita	*Clitoria Tarnatea*	Fabaceae	Climber
Arocearia	*Araucaria sp*	Araucariaceae	Tree
Aster	*Callistephus sp*	Compositae	Herb
Beli/Arabian Jasmine	*Jasminum sambac*	Oleaceae	Shrub
Bokul (Indian Medlar)	*Mimusops elengi*	sapotaceae	Tree
Bot	*Ficus benghalensis*	Moraceae	Tree
BotumPhul/Buttonhole	*Gomphrena globosa*	Onagraceae	Herb
Bougainvillea	*Bougainvillea sp*	Nyctaginaceae	Climber
Brake fern	*Pteris vittata*	Polypodiaceae	Herb
Cassia	*Cassia glauca*	Caesalpiniaceae	Shrub
Cactus	*Cactus sp*	Cactaceae	Herb
Casablanca	*Lilium auratum*	Liliaceae	Shrub
Chita (Zigzag Plant)	*Pedilanthus sp*	Euphorbiaceae	Herb
Champa	*Michelia champaca*	Magnoliaceae	Tree
Coleus	*Coleus sp*	Labiatae	Herb
Cosmos	*Cosmos sp*	Compositae	Herb
Croton	*Codiaeum craigii*	Euphorbiaceae	Shrub
Castor bean	*Ricinus communis*	Euphorbiaceae	Tree
Cycus	*Cycus sp*	Cycadaceae	Shrub
Dahlia	*Dahlia sp*	Compositae	Herb
Debdaru	*Polyalthia longifolia*	Annonaceae	Tree
Dianthus	*Dianthus sp*	Caryophyllaceae	Herb
Dolonchapa (Ginger Lily)	*Hedychium coronarium*	Amaryllidaceae	Herb
Dopati (Balsam)	*Impatiens balsamina*	Balsaminaceae	Herb
Dracaena	*Dracaena sp*	Liliaceae	Herb
Dupurmoni (Noon Flower)	*Pentapetes phoenicia*	Scrophulariaceae	Herb
Duranta	*Duranta sp*	Verbenaceae	Shrub
Football Lily	*Haemanthus multiflorus*	Amaryllidaceae	Herb
Gate Phul	*Quamoclit pinnata*	Convolvulaceae	Climber
Gerbera	*Gerbera sp*	Asteraceae	Herb
Ghora Chokkor (Snake Plant	*Sansevieria sp*	Liliaceae	Herb
Ghrito khumari (Aloe)	*Aloe vera*	Amaryllidaceae	Herb
Gladiolus	*Gladiolus sp*	Iridaceae	Herb
Gondhoraj	*Gardenia jasminoides*	Rubiaceae	Shrub
Hasnahena (Lady of the night)	*Cestrum nocturnum*	Solanaceae	Shrub
Jarul (Pride of India)	*Lagerstroemia speciosa*	Lythraceae	Tree
Java Bot (Java Fig)	*Ficus benjamina exotica*	Moraceae	Tree
Jhau (Australian Oak)	*Casuarina equisetifolia*	Casuarinaceae	Shrub
Jhumkolota (Passion Flower)	*Passiflora sp*	Passifloraceae	Climber
Joba (China Rose)	*Hibiscus rosa sinensis*	Malvaceae	Shrub
Jui (Common Jasmine)	*Jasminum auriculatum*	Oleaceae	Climber
Kadom (Cadamba)	*Anthocephalus cadamba*	Rubiaceae	Tree
Kamini (China box)	*Murraya sp*	Rutaceae	Shrub
Kanchon	*Bauhinia sp*	Caesalpiniaceae	Tree
Khude bash (Dwarf Bamboo)	*Bambusa nana*	Gramineae	Herb
Krishnochura (Peacock Flower)	*Delonix regia*	Caesalpiniaceae	Tree
Lantena	*Lantena sp*	Verbenaceae	Herb
Lemon Grass	*Cymbopogon citratus*	Gramineae	Herb
Lisianthus	*Eustoma sp*	Gentianaceae	Herb
Madhabilota	*Hiptage madablota*	Malpighiaceae	Climber
Malotilota (Aganosama)	*Aganosama caryophyllata*	Apocynaceae	Climber
Mandar (Coral)	*Erythrina sp*	Fabaceae	Tree
Marigold	*Tagetes sp*	Compositae	Herb
Money Plant	*Scindapsus sp*	Araceae	Climber
Morogjhuti (Cocks Comb)	*Celosia sp*	Amaranthaceae	Herb
Mussaenda	*Mussaenda sp*	Rubiaceae	Shrub
Nilmoni Lota (Purple wreath)	*Petrea volubilis*	Verbenaceae	Climber
Noyontara (Periwinkle)	*Vinca rosea*	Apocynaceae	Herb

Orchid	*Orchis sp*	Orchidaceae	Herb
Pakur	*Ficus infectoria*	Moraceae	Tree
Panika (Cuphea)	*Cuphea hyssopifolia*	Lythraceae	Shrub
Panthopadok (Travellers)	*Ravenala madagascariensis*	Musaceae	Herb
Petunia	*Petunia hybrida*	Solanaceae	Herb
Polash (Parrot)	*Butea monosperma*	Fabaceae	Tree
Morning Glory	*Ipomoea purpurea*	Convolvulaceae	Climber
Purple Heart	*Setcreasea purpurea*	Commelinaceae	Climber
Rabbit's Foot Fern	*Davallia fijiensis*	Polypodiaceae	Herb
Radhachura	*Caesalpinia pulcherrima var. Flava*	Caesalpiniaceae	Tree
Ribon Plant	*Dracaena sanderiana*	Liliaceae	Herb
Rongon	*Ixora sp*	Rubiaceae	Shrub
Rose	*Rosa sp*	Rosaceae	Shrub
Russelia	*Russelia equisetiformis*	Scrophulariaceae	Shrub
Shaora (Streblus)	*Streblus asper*	Moraceae	Tree
Shapla (Water Lily)	*Nymphaea sp*	Nymphaeaceae	Shrub
Shefali (Night Jasmine)	*Nyctanthes arbor-tritis*	Oleaceae	Shrub
Spider Lily	*Hymenocallis littoralis*	Amaryllidaceae	Herb
Straw Flower	*Helichrysum bracteatum*	Compositae	Herb
Sunflower	*Helianthus sp*	Compositae	Herb
Sword fern	*Nephrolepsis exaltata*	Polypodiaceae	Herb
Thuja	*Thuja sp*	Pinaceae	Shrub
Togor (Cape Jasmine)	*Tabernaemontana coronaria*	Apocynaceae	Shrub
Tuberose	*Polianthes tuberosa*	Amaryllidaceae	Herb
Zebrina (Wandering Jew)	*Zebrina sp*	Commelinaceae	Herb
Zephyr Lily	*Zephyranthes sp*	Amaryllidaceae	Herb
Zinnia	*Zinnia sp*	Compositae	Herb
Fruit Trees			
Apple	*Malus domestica*	Rosaceae	Tree
Alachi Lebu	*Feronia limon*	Rutaceae	Shrub
Amloki (Aonla)	*Phyllanthus emblica*	Euphorbiaceae	Tree
Amm (Mango)	*Mangifera indica*	Anacardiaceae	Tree
Amra (Hog Plum)	*Spondias dulcis*	Anacardiaceae	Tree
Angur (Grape)	*Vitis vinifera*	Vitaceae	Climber
Ata (Bullock's Heart)	*Annona reticulata*	Annonaceae	Tree
Avocado	*Presea americana*	Lauraceae	Tree
Bel	*Aegle marmelos*	Rutaceae	Tree
Chalta (Indian Dillenia)	*Dillenia indica*	Dilleniaceae	Tree
Chapalish	*Artocarapus chadlasha*	Moraceae	Tree
Cocoa	*Theobroma cacao*	Malvaceae	Tree
Dalim (Pomegranate)	*Punica granatum*	Punicaceae	Shrub
Deshi Gab (River Ebony)	*Diospyros peregrina*	Ebenaceae	Tree
Dewaa (Monkey Jack)	*Artocarpus lakoocha*	Moraceae	Tree
Jam (Jamun)	*Syzygium cumini*	Myrtaceae	Tree
Jambura	*Citrus grandis*	Rutaceae	Tree
Jamrul (Wax jambu)	*Syzygium samarangence*	Myrtaceae	Tree
Jolpai/ (Indian Olive)	*Elaeocarpus floribundus*	Elaeocarpaceae	Tree
Kajubadam (Cashew Nut)	*Anacardium occidentale*	Anacardiaceae	Tree
Kamrangga (Carambola)	*Averrhoa carambola*	Averrhoaceae	Tree
Kanthal (Jackfruit)	*Artocarpus heterophyllus*	Moraceae	Tree
kathbadam	*Terminalia catappa*	Combretaceae	Tree
Kola (Banana)	*Musa sp*	Musaceae	Herb
Komla (Mandarin)	*Citrus reticulata*	Rutaceae	Shrub
Koromcha (Carunda)	*Carissa carandas*	Apocynaceae	Shrub
Kul (Jujubee)	*Zizyphus sp*	Rhamnaceae	Tree
Lime	*Citrus sp*	Rutaceae	Shrub
Litchi	*Litchi chinensis*	Sapindaceae	Tree
Malta	*Citrus sinensis*	Rutaceae	Shrub
Mulberry	*Morus sp*	Moraceae	Herb
Payera (Guava)	*Psidium guajava*	Myrtaceae	Tree
pepe(papaya)	*Carica papaya*	Caricaceae	Shrub
Rambutan	*Nephelium lappaceum*	Sapindaceae	Tree
Sofeda (Sapota)	*Manikara achras*	Sapotaceae	Tree
Strawberry	*Fragaria ananassa*	Rosaceae	Herb

Tetul (Tamarind)	*Tamarindus indica*	Fabaceae	Tree
Timber			
Kalo koroi	*Albizia lebbeck*	Mimosaceae	Tree
Mahogany	*Swietenia mahagony*	Maliaceae	Tree
Shimul	*Bombax ceiba*	Boraginaceae	Tree
Sil koroi	*Albizia procera*	Mimosaceae	Tree
Sissoo	*Swietenia sissoo*	Fabaceae	Tree
Medicinal Plants			
Akangi (Black thron)	*Kaempferia galanga*	Zingiberaceae	Herb
Aloevera	*Calotropis gigantea*	Asclepiadaceae	Shurb
Akond (Gigantic swallowwort)	*Terminalia arjuna*	Combretaceae	Tree
Arjun	*Cajanus cajan*	Fabaceae	Herb
Arshogondha	*Dioscorea bulbifera*	Dioscoreaceae	Climber
Ban-alu, pagla-alu	*Adhatoda vasica*	Acanthaceae	Herb
Bashok	*Alstonia macrophylla*	Apocynaceae	Tree
Germany lota	*Mikania micrantha*	Asteraceae	Climber
Chatim (Bigleaf)	*Terminalia chebula*	Combretaceae	Herb
Heart leaved Moonseed	*Andrographis paniculata*	Acanthaceae	Tree
Horitoki(Chebulic Myrobalan)	*Azadirachta indica*	Meliaceae	Herb
Kalomegh (Creat)	*Kalanchae pinnata*	Crassulaceae	Herb
Neem	*Mentha arvensis*	Lamiaceae	Herb
Pathorkuchi	*Coccinia grandis*	Cucurbitaceae	Climber
Pudina (Mint)	*Centella asiatica*	Mackinlayaceae	Herb
Talakucha (Ivy ground)	*Ocimum basilicum*	Labiatae	Shurb
Thankuni (Indian pennywort)	*Abroma augusta*	Sterculiaceae	Herb
Tulsi	*Ocimum sanctum*	Lamiaceae	Herb
Ulotkombol (Devil's cotton)	*Abroma augustum*	Malvaceae	Tree
Wood neetles	*Laportea aestuans*	Urticaceae	Herb
Ylang-Ylang	*Cananga odorata*	Annonaceae	Tree
hatisur	*Heliotropium indicum*	Boraginaceae	Herb
Longevity spinach	*Gynura procumbens*	Asteraceae	Herb
Tokma	*Hyptis suaveolens*	Lamiaceae	Herb
Bohera	*Terminalia bellirica*	Combretaceae	Tree
Muktojhuri	*Acalypha indica*	Euphorbiaceae	Herb
Dhaincha	*Sesbania bispinosa*	Fabaceae	shrub
Setodrone	*Leucas aspera*	Lamiaceae	Herb
AmrulShak	*Oxalis europea*	Oxalidaceae	Herb
Spices			
Ada	*Zingiber officinale*	Zingiberaceae	Herb
Alach (Cardamom)	*Amomum aculeatum*	Zingiberaceae	Herb
Capsicum	*Capsicum sp*	Solanaceae	Herb
Curry Pata	Murraya koenigii	Rutaceae	Tree
Daruchini (Cinnamon)	*Cinnamomum verum*	Lauraceae	Tree
Dhonia (Coriander)	*Coriandrum sativum*	Apiaceae	Herb
Holud (Turmeric)	*Curcuma longa*	Zingiberaceae	Herb
Morich (chili)	*Capsicum annuum*	Solanaceae	Herb
Payaj (Onion)	*Allium cepa*	Amaryllidaceae	Herb
Rosun (Garlic)	*Allium sativum*	Amaryllidaceae	Herb
Tejpata	*Cinnamomum tamala*	Lauraceae	Tree
Vegetables			
Ash guard	*Benincasa hispida*	Cucurbitaceae	Climber
Badhacopi (Cabbage)	*Brassica oleracea var. Capitata*	Brassicaceae	Herb
Begun (Brinjal)	*Solanum melongena*	Solanaceae	Shrub
Broccoli	*Brassica oleracea*	Brassicaceae	Herb
Borboti	*Vigna unguiculata ssp.*	Fabaceae	Climber
Beet	*Beta vulgaris*	Amaranthaceae	Herb
Bootle guard	*Lagenaria siceraria*	Cucurbitaceae	Climber
Chinese cabbage	*Brassica rapa*	Brassicaceae	Herb
Cassava	*Manihot esculenta*	Euphorbiaceae	Shrub
Deros (Okra)	*Abelmoschus esculentus*	Malvaceae	Shrub
Fulcopi (Cauliflower)	*Brassica oleracea var. botrytis*	Brassicaceae	Herb
French Bean	*Phaseolus vulgaris*	Fabaceae	Climber
Gajor (Carrot)	*Daucus carota*	Apiaceae	Herb

Kakrol	*Momordica dioica*	Cucurbitaceae	Climber
Korola (Bitter Gourd)	*Momordica charautia*	Cucurbitaceae	Climber
Katabegun	*Solanum sisymbriifolium*	Solanaceae	Herb
Lal Badhacopi (Red Cabbage)	*Brassica oleracea var. Capitata*	Brassicaceae	Herb
Lal shak	*Amaranthus dubius*	Amaranthaceae	Herb
Miniature Cabbage	*B. oleracea gemmifera*	Brassicaceae	Herb
Misti kumra (Sweet Gourd)	*Cucurbita Moschata*	Cucurbitaceae	Climber
Mati aloo	*Dioscorea bulbifera*	Dioscoreaceae	Climber
Mula (Raddish)	*Raphanus sativus*	Brassicaceae	Herb
Potol (Pointed Gourd)	*Trichosauthes dioica*	Cucurbitaceae	Climber
Potato	*Solanum tuberosum*	Solanaceae	Herb
Puishak	*Basella alba*	Basellaceae	Herb
Ridge guard	*Luffa acutangula L.*	Cucurbitaceae	Climber
Palongshak	*Spinacia oleracea*	Amaranthaceae	Herb
Sajina (Drum Stick)	*Moringa olefera*	Moringaceae	Tree
Sheem (Country Bean)	*Phaseolus vulgaris*	Fabaceae	Climber
Shosha (Cucumber)	*Cucumis sativus*	Cucurbitaceae	Climber
Squash	*Cucurbita pepo*	Cucurbitaceae	Herb
Sweet potato	*Ipomoea batatas*	Convolvulaceae	Herb
Tomato	*Solanum lycopersicum*	Solanaceae	Herb
Roselle	*Hibiscus sabdariffa*	Malvaceae	Shrub
Taro	*Colocasia esculenta*	Araceae	Herb
Napa sak	*Malva parviflora*	Malvaceae	Herb
Colmishak	*Ipomoea aquatica*	Convulaceae	Herb
Plantation Crop			
Arica palm	*Chrysalidocarpus lutescense*	Palmae	Tree
Bottle palm	*Mascarena lagenicaulis*	Arecaceae	Tree
Khejur	*Phoenix sylvestris*	Palmae	Tree
Narikel	*Cocos mucifera*	Palmae	Tree
Oil palm	*Elaeis guineensis*	Arecaceae	Tree
Supari	*Areca catechu*	Palmae	Tree
Tal palm	*Barassus flabellifer*	Arecaceae	Tree
Field Crop			
Arohor (Pigeon pea)	*Withania somnifera*	Solanaceae	Herb
Rice	*Oryza sativa*	Poaceae	Herb
Maize	*Zea mays*	Poaceae	Herb
Chola	*Cicer arietinum*	Fabaceae	Herb
Mustard	Brassica spp.	Cruciferae	Herb
Soybean	*Glysin max*	Fabaceae	Herb
Mungbean	*Vigna radiata*	Fabaceae	Herb
Sesame	*Sesamum indicum*	Pedaliaceae	Herb
Jute	*Corchorus capsularis*	Tiliaceae	Shrub
Porso millet	*Panicum miliaceum L.*	Poaceae	Herb
Perilla	*Perilla frutescens*	Lamiaceae	Herb
Motor	*Pisum sativum*	Fabaceae	Herb
Masur	*Lens culinaris*	Fabaceae	Herb
Arhar	*Cajanus cajan*	Fabaceae	Shrub

Ornamental plant species under each family

This study recorded a total of 88 ornamental plant species from 43 families in the Uttara region. The Compositae family had the highest number of species, with 7 species making up 7.95% of all ornamental plants. Following Compositae, the Apocynaceae family comprised 6 species, contributing 6.81% to the ornamental plant diversity.

Table 5. List of ornamental plant species with their families and frequencies

Family	Number of species	Frequency	Family	Number of species	Frequency (%)
Annonaceae	1	1.13	Liliaceae	4	4.55
Amaranthaceae	2	2.27	Lythraceae	2	2.27
Amaryllidaceae	6	6.81	Magnoliaceae	2	2.27
Apocynaceae	4	4.55	Malvaceae	1	1.14
Araceae	2	2.27	Moraceae	4	4.55
Araucariaceae	1	1.13	Musaceae	1	1.14
Asteraceae	1	1.14	Nyctaginaceae	1	1.14
Balsaminaceae	1	1.14	Nymphaeaceae	1	1.14
Cactaceae	1	1.14	Oleaceae	3	3.41
Caesalpiniaceae	4	4.55	Onagraceae	1	1.13
Caryophyllaceae	1	1.14	Orchidaceae	1	1.13
Casuarinaceae	1	1.13	Passifloraceae	1	1.13
Commelinaceae	2	2.27	Pinaceae	1	1.13
Compositae	7	7.95	Polypodiaceae	3	3.41
Convolvulaceae	2	2.27	Rosaceae	1	1.13
Cycadaceae	1	1.13	Rubiaceae	4	4.55
Euphorbiaceae	3	3.40	Rutaceae	1	1.13
Fabaceae	3	3.41	sapotaceae	1	1.13
Gentianaceae	1	1.14	Scrophulariaceae	2	2.27
Gramineae	2	2.27	Solanaceae	2	2.27
Iridaceae	1	1.14	Verbenaceae	3	3.41
Labiatae	1	1.14	Total	88	100%

Vegetable plant species under each family

The examination of vegetable plant species at Uttara region revealed a total of 37 species classified into 13 families, highlighting the significant diversity present stated in Table 6. The Cucurbitaceae family emerged as the most abundant, containing 9 species, which constitutes 24.32% of the overall vegetable plant species. Following closely, the Amaranthaceae family ranked second with 7 species, underscoring its importance in providing nutrient-rich leafy vegetables essential for food security.

Table 6. List of vegetable plant species with their families and frequencies

Family	Number of species	Frequency	Family	Number of species	Frequency (%)
Amaranthaceae	3	8.10	Dioscoreaceae	1	2.70
Apiaceae	1	2.70	Euphorbiaceae	1	2.70
Araceae	1	2.70	Fabaceae	3	8.10
Basellaceae	1	2.70	Malvaceae	3	8.10
Brassicaceae	7	18.91	Moringaceae	1	2.70
Convulaceae	2	5.40	Solanaceae	4	10.81
Cucurbitaceae	9	24.32	Total	37	100%

Spices of plant and field crop species under each family

Six families of spice plants included a maximum of 11 species in Table 7. The greatest number of species were found in the Zingiberaceae family, accounting for 3 and 27.27% of all spice plants, respectively (Table 7). Amaryllidaceae, Lauraceae, and Solanaceae together make up 18.18% of all species of spice plants. A minimum of one plant species from the Rutaceae and Apiaceae. This study identified a total of 14 field crop species across seven families, with the Fabaceae family leading the count with six species, representing 42.85% of all field crops. Following closely, the Poaceae family contributed three species, accounting for 21.42%. The remaining families, including Cruciferae, Lamiaceae, Pedaliaceae, Solanaceae, and Tiliaceae, had minimal representation,

collectively making up only 7.14% of the total. In parallel, the study also identified 11 species of spice plants from six families, where the Zingiberaceae family, with three species, constituted 27.27% of all spice plants.

Table 7. List of plants and field crop species with their families and frequencies

Spices plant Family	Number of species	Frequency	Field crop Family	Number of species	Frequency (%)
Amaryllidaceae	2	18.18	Cruciferae	1	7.14
Apiaceae	1	9.091	Fabaceae	6	42.85
Lauraceae	2	18.18	Lamiaceae	1	7.14
Rutaceae	1	9.091	Pedaliaceae	1	7.14
Solanaceae	2	18.18	Poaceae	3	21.42
Zingiberaceae	3	27.27	Solanaceae	1	7.14
Total	11	100%	Tiliaceae	1	7.14
			Total	14	100%

Medicinal plant species under each family

This study documented in Table 8 a total of 29 medicinal plant species across 20 families, with the Lamiaceae family showcasing the highest diversity, contributing four species, which represents 10.50% of all medicinal plants. The Combretaceae family followed, with three species accounting for 10.34% of the total. Families such as Acanthaceae, Asteraceae, Fabaceae, and Malvaceae each contributed two species, collectively making up 6.89% of the total. Individual species were also identified from families including Annonaceae, Boraginaceae, Cucurbitaceae, Dioscoreaceae, Euphorbiaceae, Labiatae, and Zingiberaceae, highlighting a diverse array of medicinal resources Table 8.

Table 8. List of medicinal plant species with their families and frequencies

Family	Number of species	%	Family	Number of species	Frequency (%)
Acanthaceae	2	6.89	Fabaceae	2	6.89
Annonaceae	1	3.44	Labiatae	1	3.44
Apocynaceae	1	3.44	Lamiaceae	3	10.50
Asclepiadaceae	1	3.44	Mackinlayaceae	1	3.44
Asteraceae	2	6.89	Malvaceae	2	6.89
Boraginaceae	1	3.44	Oxalidaceae	1	3.44
Combretaceae	3	10.34	Sterculiaceae	1	3.44
Crassulaceae	1	3.44	Urticaceae	1	3.44
Cucurbitaceae	1	3.44	Zingiberaceae	1	3.44
Dioscoreaceae	1	3.44			
Euphorbiaceae	1	3.44	Total	29	100%

Timber plant and plantation crop species of Uttara region, Dhaka under each family

A maximum of 5 spice plants was seen in 4 families of trees. The greatest number of species discovered belonged to the Mimosaceae family, which made up 2 and 40% of all woody plants, respectively. The Boraginaceae family, followed by the Fabaceae and Maliaceae, account for 20% of all species of timber plants, which is the least amount Table 9. The study identified a total of seven spice plant species across six families, with the Palmae family exhibiting the highest diversity, comprising four species, which account for 57.14% of all plantation crops. The Arecaceae family followed closely with three species, representing 42.86% of the total. Additionally, five spice plant species were documented across four families of trees, where the Mimosaceae family emerged as the most prevalent, encompassing two species and making up 40% of the woody plants. The

Boraginaceae, Fabaceae, and Maliaceae families contributed one species each, together constituting 60% of the overall timber plant species Table 9.

Table 9. List of timber plant species with their families and frequencies

Timber plant Family	Number of species	%	Plantation crop Family	Number of species	Frequency (%)
Boraginaceae	1	20	Arecaceae	3	42.86
Fabaceae	1	20	Palmae	4	57.14
Maliaceae	1	20	Total	7	100%
Mimosaceae	2	40			
Total	5	100%			

List of Fauna identified from the study area

The present survey findings displayed a variety of insect pests that were observed during the investigation Table 10. These pests appeared from several orders and families, highlighting the wide variety of insects that can endanger plants and crops. The list starts with widespread insects including White Fly (*Trialeurodes vaporariorum*) and Mealybug (*Ferrisia virgata*), that are infamous for infesting different plants and weakening them by consuming sap. The Leaf miner (*Tuta absoluta*), with larvae we found that tunnel through foliage and cause damage and decreased plant vitality is another serious pest. The commonly seen Common Fruit Fly (Drosophila melanogaster) is a noticeable presence because it contaminates ripening fruit, causing deterioration and monetary losses. Pests like Field Cricket (*Gryllus* sp.), Yellow stem borer (*Scirpophaga incertulas*), and Brown plant hopper (*Nilaparvata lugens*), which eat plant tissues or spread disease, can seriously harm crops like rice, also prevail in the present study. The survey revealed the pests unique to certain crops, such as the Rice root weevil (*Sitophilus oryzae*) and Rice gundhi bug (*Leptocorisa* spp.), which can severely harm rice grains. The Giant water bug (*Lethocerus americanus*), albeit not a significant agricultural pest, was also described as being present in rice fields.

Table 10. List of fauna identified in the Uttara region, Dhaka, Bangladesh

S. No.	Common Name	Scientific Name	Order: Family
1	White Fly	*Trialeurodes vaporariorum*	Aleyrodidae
2	Mealybug	*Ferrisia virgata*	Pseudococcidae
3	Leaf miner	*Tuta absoluta*	Gelechiidae
4	Common fruit fly	*Drosophila melanogaster*	Drosophilidae
5	Field Cricket	*Gryllus sp.*	orthoptera
6	Yellow stem borer	*Scirpophaga incertulas*	Crambidae
7	Brown plant hopper	*Nilaparvata lugens*	Delphacidae
8	Rice gundhi bug	*Leptocorisa spp.*	Alydidae.
9	Rice root weevil	*Sitophilus oryzae*	Curculionidae
10	Giant water bug	*Lethocerus americanus*	Belostomatidae
11	Rice green leafhopper	*Nephotettix nigropictus*	Cicadellidae
12	Mango hopper	*Idioscopus niveoparsus*	Cicadellidae
13	Thrips	*Frankliniella tritici*	Thripidae
14	Okra shoots and fruit borer	*Chelonus blackburnii*	Lepidoptera
15	Epilachna beetle	*Epilachna varivestis*	Coccinellidae
16	Red palm weevil	*Rhynchophorus ferrugineus*	Curculionidae
17	Cigarette beetle	*Lasioderma serricorne*	Ptinidae
18	Aphid	*Myzus persicae*	Aphididae
19	Jassid	*Amrasca biguttula*	Cicadellidae
20	Pumpkin beetle	*Galleruca quadraria*	Chrysomelida
21	Black soldier fly	*Hermetia illucens*	Stratiomyidae
22	Termite	*Odontotermes obesus*	Isoptera
23	Rice meal moth	*Corcyra cephalonica*	Pyralidae
24	Fall army worm	*Spodoptera frugiperda*	Noctuidae

DISCUSSION

The floristic survey of Uttara region reveals a rich and diverse array of plant species, underscoring the ecological and socio-economic significance of urban green spaces. This study identified 225 plant species across 119 families, demonstrating a considerable botanical variety that can significantly contribute to urban biodiversity, ecological resilience, and the local economy. The presence of ornamental, fruit, and medicinal plants highlights their role in enhancing urban biodiversity and providing essential ecosystem services. Ornamental plants, such as those from the Compositae and Apocynaceae families, add aesthetic value and support urban wildlife by providing habitats and food sources for various pollinators. Integrating diverse plant species in urban planning can enhance ecological balance, mitigate urban heat island effects, and improve air quality.

The lower density of timber plants, reflective of urbanization and changing land use priorities, emphasizes the need for sustainable urban development that incorporates diverse plant species to maintain ecological resilience and promote biodiversity in densely populated areas like Dhaka [32]. The presence of key families like Moraceae, Myrtaceae, and Anacardiaceae underscores their ecological and agricultural value, contributing to ecosystem services and biodiversity [33, 34]. The substantial presence of fruit and medicinal plants indicates significant opportunities for educational and research endeavors in horticulture and pharmacognosy. Families such as Amaryllidaceae and Brassicaceae are notable for their diverse applications in food production and traditional medicine. For instance, plants from the Moringaceae family, including *Moringa oleifera*, are celebrated for their therapeutic properties, such as anti-diabetic, anti-inflammatory, and antioxidant effects [35]. Similarly, the Combretaceae family, with plants like Terminalia, is known for its potent antioxidant and antibacterial compounds[36]. These findings highlight the potential for utilizing these plant resources in developing new pharmaceuticals and enhancing nutritional health.

The variety of vegetable and spice plants identified in the study offers opportunities for culinary and nutritional studies, contributing to dietary health and agricultural economics. The prominence of families such as Solanaceae and Amaryllidaceae, which include staples like chili peppers and garlic, underscores their importance in local cuisine and food security [37]. Additionally, the presence of underutilized crops from families like Apiaceae and Dioscoreaceae suggests potential for expanding crop diversity and improving agricultural resilience [38]. The representation of timber and plantation crops points to avenues for agroforestry research. The substantial presence of the Palmae family, with economically important plants like coconut and oil palm, underscores their vital role in agriculture and economic development [39]. These findings align with previous studies emphasizing the role of plant diversity in promoting sustainable agricultural practices and supporting local economies.

The discovery of numerous rare plant families enhances overall biodiversity, essential for ecological resilience and research opportunities. The minimal representation of families like Annonaceae and Caricaceae suggests areas for potential expansion in cultivation and research, as these families may include species with unique traits beneficial for diversifying fruit production and improving crop resilience [40]. This detailed inventory of plant species serves as a foundation for future studies aimed at optimizing urban horticulture and promoting sustainable agricultural practices. Continued research and monitoring are essential to understand the dynamics of plant populations and their interactions with urban environments. Implementing conservation

strategies and sustainable management practices can help preserve plant diversity and ensure the long-term ecological health of urban areas.

The report also highlights the prevalence of various insect pests that pose significant threats to crop production. Effective pest management strategies are crucial to protect plant productivity and minimize financial losses. The diversity of pests identified, including the whitefly, mealybug, and rice green leafhopper, underscores the need for targeted control measures and integrated pest management practices. By focusing on pests that affect multiple crops, the study emphasizes the broader challenge of managing pest populations across various agricultural sectors. Implementing effective pest control measures can enhance crop yields, reduce economic losses, and contribute to sustainable agricultural practices.

CONCLUSION

The current study found that there are 225 different plant species, 119 families, and 203 different genera present in Uttara region. A total of 88 species of ornamental was categorized into 89 genera and 43 families (one was rare and endangered). Spice plants were displayed in ten species, with eight genera and six families each. Fruits were divided into 37 families, 37 genera, and 37 species. There were 36 species of vegetables divided into 25 genera and 13 families. A total of 5 species of timber plants were grouped into 4 genera and 4 families. Twenty families and twenty genera made up the 28 medicinal species. The plantation crops included 7 species, 7 genera, and 2 families. 14 species and 14 families made up the field crop. Many plant categories have a variety of behaviors, as well as a variety of species, genera, and families, and some insect pests are also observed. The variety and quantity of plant species in the study area showed a strong floristic diversity. The campus area has the potential to become a premier hub for the preservation of biological variety with the right management tactics, adoption of crucial laws, and conservation activities. This study offers important insights into the floral variety of the Uttara region and sets the groundwork for future ecological studies and conservation efforts.

AUTHORS CONTRIBUTION

SKR and MN conceived the research plan and improved the methodologies. NQC, ZSA, SM, JS, JN, IAI, and FA contributed to the survey. MN and FR conducted the data analysis and table preparation and wrote the manuscript. SKR, FB, PKM, and MOS did the manuscript review and edited the manuscript. All the authors approved the final version of the manuscript.

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CONFLICTS OF INTEREST

There is no conflict of interest among the authors.

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