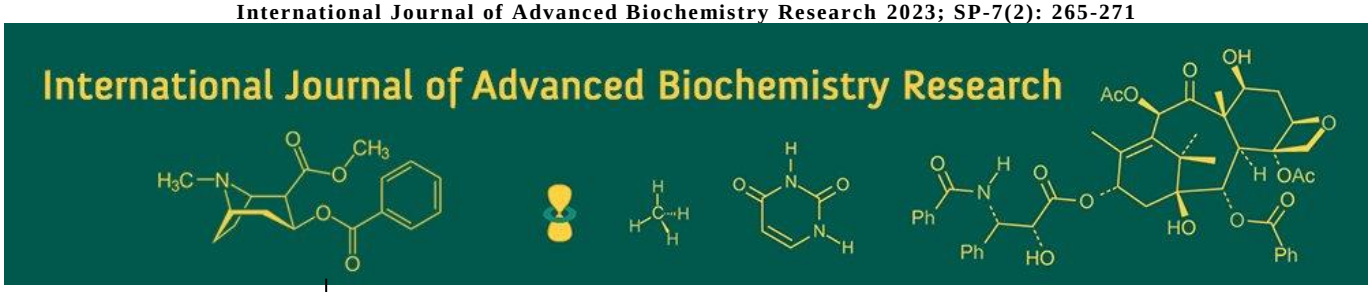

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Assessment of bio diversity in home garden agroforestry system of Yeshu Darbar area in SHUATS campus, Prayagraj

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Abstract
Biodiversity assessment plays a crucial role in understanding the composition and distribution of plant species within a specific area. This research paper aims to assess the biodiversity in homegarden agroforestry system of the Yeshu Darbar area in SHUATS Campus, Prayagraj during the rainy season. Prayagraj is situated at an elevation of 78 meters above sea level at 25.87 North latitude and 81.15° E longitudes. This region has a sub-tropical climate prevailing in the South-East part of U.P. with both the extremes in temperature, i.e., the winter and the summer. In cold winters, the temperature sometimes is low as 32°F in December-January and very hot summer with temperature reaching up to 115°F in the months of May and June. Frost during winter and hot scorching winds during summer are also common. The average rainfall is around 1013.4 (cm) with maximum concentration during July to September months with occasional showers in winters. The phyto-sociological analysis was conducted to study the composition and distribution of trees and herbs in Yeshu Darbar Area home gardens during the rainy season. The study focused on three different areas: North, South and East. The data collected included the density, frequency, abundance, relative density (RD), relative frequency (RF), relative dominance (RDO), and importance value index (IVI) of each species. Among all areas from the Phyto sociological structure of Tree Species and herb species The total number of each individual species found in Yeshu Darbar north Trees (14), Herbs (12), Yeshu Darbar South Trees (12), Herbs (12) species and in Yeshu Darbar East area Trees (12), Herbs (15), are found in total Yeshu Darbar area of SHUATS Campus. In the North home gardens, *Psidium guajava* and *Mangifera indica* were the dominant tree species, with IVIs of 32.14 and 45.48, respectively. Among the herbs, *Coriandrum sativum* and *Asarum canadense* had the highest IVIs of 24.24 and 22.40, respectively. In the South home gardens, *Mangifera indica* and *Callistemon* were the dominant tree species, with IVIs of 55.19 and 38.49, respectively. Among the herbs, *Trigonella foenum-graecum* and *Cynodon dactylon* had the highest IVIs of 28.79 and 38.90, respectively. In the East home gardens, *Cestrum nocturnum* and *Psidium guajava* were the dominant tree species, with IVIs of 43.58 and 33.36, respectively. Among the herbs, *Abelmoschus esculentus* and *Solanum lycopersicum* had the highest IVIs of 32.89 and 42.25, respectively. The study provides valuable insights into the composition and distribution of trees and herbs in the Yeshu Darbar Area home gardens during the rainy season. It highlights the importance of certain species in each area and can serve as a basis for future research and conservation efforts in the region.

Keywords: Yeshu Darbar area, frequency, density, abundance, basal area, relative density, relative frequency, relative dominance, importance value index (IVI)

Introduction
Biodiversity refers to the variety of life forms present in a particular ecosystem or on Earth as a whole. It includes all species of plants, animals, fungi, and microorganisms, as well as the genetic diversity within each species. Biodiversity is essential for the stability and functioning of ecosystems and provides numerous ecological services, such as pollination, nutrient cycling, and climate regulation. Biodiversity plays a vital role in maintaining the health and resilience of the planet. It supports the stability of ecosystems, enhances ecosystem productivity, and helps to adapt to environmental changes. Additionally, biodiversity provides humans with essential resources, such as food, medicine, and raw materials. However, biodiversity is currently facing significant threats.

Human activities, including habitat destruction, pollution, climate change, overexploitation of natural resources, and invasive species introduction, are causing a rapid loss of biodiversity worldwide. High human density and resultant pressure on plant resources and habitats have pushed many species towards rarity and local extinction maintaining patches of natural vegetation within the human dominated landscape is the only way to conserve native flora (Pimm *et al*. 1995) [10]. This loss of biodiversity can have severe consequences for ecosystems, economies, and human well-being. Efforts are being made globally to conserve and protect biodiversity, including establishing protected areas, implementing sustainable management practices, and raising awareness about the importance of biodiversity conservation. These conservation measures aim to maintain and restore biodiversity for current and future generations. Trees have a crucial role in maintaining the ecological balance. Species diversity is an important concept and one of the major attributes of a natural community. Floristic inventory and diversity studies help us to understand the species composition and diversity status of forests and offer vital information for forest conservation (Gordon and Newton, 2006) [6]. Tree diversity can be measured in numerous ways the most commonly used measure is species richness, there are several reasons for this as it is often easier to count the number of species compared to other measures of biodiversity. Humans can visualize variation in biodiversity as variation in species richness (Purvis and Hector, 2000) [11].

The Terai landscape of north-eastern Uttar Pradesh (UP) constitutes a mosaic of human habitation, cultivation, natural and semi-natural vegetation comprising grasslands and forests. Most of the natural forests have been replaced by plantation of commercially important trees and agriculture. The areas free from human habitation continue to provide microhabitats for an array of native flora. A number of wild plants including those which occupy human-dominated landscape have been in use for various purposes since antiquity. High human density and resultant pressure on plant resources and habitats have pushed many species towards rarity and local extinction. Maintaining patches of natural vegetation within the human dominated landscape is the only way to conserve native flora (Pimm *et al*. 1995) [10]. In order to conserve maximum range of regional biodiversity better understanding of vegetation dynamics at spatiotemporal scale and successional trends would be required (Adler & Lauenroth 2003; Tilman 1999) [13, 15]. So far, very few attempts have been made to analyses the patterns of plant species diversity in the human dominated landscape, especially in relation to time scale (Carey *et al*. 2007) [2].

Vegetation analysis is important as its structure expresses most relevant result and is a flexible tool in the analysis of complex system. According to Mishra *et al*. (2005) [8], the most important characteristics of the tropical and subtropical humid forest are their species richness, heterogeneity, and complex community organization. Most of the inventories of plant diversity in tropical forests have been concentrated on tree species than other life-form sand primary concern is given on the distribution and abundance of tree species for the planning and implementation of biodiversity conservation. Bhat *et al*. (2001) [1] stated that in addition to the trees, the understory species is an integral part of the tropical forest community and has a distinct array of species.

Home gardens are traditional agroforestry systems that contribute significantly to local biodiversity conservation and provide various ecosystem services. Understanding the composition and structure of Home gardens is crucial for assessing their ecological significance. This study focuses on the Yeshu Darbar area of the SHUATS Campus in Prayagraj, aiming to evaluate the biodiversity of Home gardens during the rainy season.

Experimental methodology

Direct method involving sampling area i.e. as mentioned above (Yeshu Darbar area in SHUATS Campus, Prayagraj) and also based on secondary data. Experimental findings and Discussion.

Materials and Methodology

Study Area: Prayagraj is located at 25.87° North, 81.15° East, and has an elevation of 78 metres above sea level. The Yeshu Darbar area in SHUATS Campus, Prayagraj, were selected as the study area. The area is known for its rich vegetation and diverse plant species. SHUATS campus area were taken for data collection to estimate the biodiversity of Home gardens in Rainy (Kharif) season. Totally 12 Sites are used for taking measurements, in three areas - Yeshu Darbar Campus area North, Yeshu Darbar Campus area South, Yeshu Darbar Campus area East.

Climate: In the South-East of the U.P., have a subtropical climate with both seasonal temperature extremes-winter and summer - predominates. In extremely cold winters, it can get as cold as 32°F in December and January, while in extremely hot summers, it can be as hot as 115°F in May and June. Frost in the winter and sweltering summer winds are also frequent. The annual average rainfall is about 1013.4 millimetres, with the rainiest months being July through September and the winter months seeing sporadic showers.

Data Collection: Data on plant species were collected from the study area during the rainy season. The parameters recorded for each species included density, frequency, abundance, and basal area.

Data Analysis: The collected data were analyzed to calculate relative density, relative frequency, relative dominance, and importance value index (IVI) for each plant species. These calculations provide insights into the ecological significance of each species within the study area.

Methodology: Field vegetation were assessed in all the sample plots in terms of vegetative composition. The sum of all species encountered in all the sample plots (through counting the total number of species in each sample plot) will be used to determine the species richness of the study area. Based on the individuals recorded in the discrete sample plots, vegetation data will be quantitatively analyzed for density, frequency, abundance, basal area and Importance value index (IVI). The density of each woody species will be determined by converting the total number of individuals of the species encountered in the site in to a unit area of one hectare (individuals/ha). Importance value index for each species will also be computed and expressed as the sum of relative density, relative dominance, and relative

frequency of species (Curtis & McIntosh 1950; Curtis 1951; Curtis 1959) [5, 3, 4].

$$\text{Frequency} = \frac{\text{Number of sample plots in which species occurred}}{\text{Total number of sample plots studied}} \times 100$$

$$\text{Abundance} = \frac{\text{Total number of Individuals of the species}}{\text{Total number of plots of occurrence}}$$

Basal area of woody species with >5cm DBH will be calculated with the formula (Kent & Coker 1992) [7]:

$$\text{Basal Area} = \frac{\sum \pi D^2}{4}$$

$$\text{Relative Density} = \frac{\text{Number of Individuals of a species}}{\text{Number of individuals of all species}} \times 100$$

$$\text{Relative Frequency} = \frac{\text{Number of occurrenceof a species}}{\text{Number of occurrenceof all species}} \times 100$$

$$\text{Relative Dominance} = \frac{\text{Basal area of a species}}{\text{Basal area of all species}} \times 100$$

Importance value index (IVI) = Relative density + relative frequency + relative dominance

The species diversity will be determined using the Shannon-Weiner diversity index (H') according to the formula of Shannon & Weiner (1963) [14]:

$$\text{Shannon - Weiner Diversity Index}(H') = -\sum_{i=1}^{s} (P_i)(\log Pi)$$

Where,
S= number of species

Pi= proportion of species in the community

The Evenness or Equitability (J) will be quantified by expressing Shannon index using the formula (Pielou 1966) [16]:

$$\text{Shannon Evenness (J)} = \frac{H'}{\log(S)}$$

Where,
H' = Shannon's diversity index
S = Number of species found when all sample plots are pooled

Results and Discussion

Tree Species in Yeshu Darbar area North Home gardens of SHUATS Campus in Rainy Season

In the Yeshu Darbar area north, during the rainy season, a phyto-sociological analysis was conducted on the Home gardens in the SHUATS campus. The analysis in given Table 1 revealed a total of 14 tree species and 12 herb species. Among the tree species, *Psidium guajava* had the highest density (1.00), followed by *Mangifera indica*, *Bougainvillea glabra*, *Tectona grandis*, and *Citrus grandis* (0.50). The lowest density was observed in *Bauhinia variegata*, *Ziziphus mauritiana* and *Hibiscus rosa-sinensis* (0.25). The primary trees in terms of frequency were *Mangifera indica* with a frequency (F) of 50.00, followed by *Psidium guajava*, *Bougainvillea glabra* and *Hibiscus rosa-sinensis* (25.00). The most abundant tree species was *Psidium guajava* (4.00), while the least abundant were *Mangifera indica*, Bauhinia variegate and *Hibiscus rosa-sinensis* (1.00). *Tectona grandis* had the highest basal area (1672.03), followed by *Mangifera indica* (1025.81), and *Bougainvillea glabra* had the lowest basal area (43.94). *Psidium guajava* had the highest relative density (19.05), while *Bauhinia variegata*, *Ziziphus mauritiana*, *Artocarpus heterophyllus* and *Hibiscus rosa-sinensis* had the lowest relative density (4.76). The primary trees in terms of relative frequency were *Mangifera indica* with a relative frequency of 13.33, followed by *Psidium guajava*, *Bougainvillea glabra* and *Hibiscus rosa-sinensis* (6.67). In terms of Importance Value Index (IVI), *Tectona grandis* had the highest IVI (53.07), followed by *Mangifera indica* (45.48), and *Hibiscus rosa-sinensis* had the lowest IVI (12.62).

Table 1: Phyto-sociological analysis of trees in Yeshu Darbar Area North Home gardens in Rainy Season

Species	B A	Density	Frequency	Abundance	RD	RF	RDO	IVI
Psidium guajava	291.49	1.00	25	4.00	19.05	6.67	6.43	32.14
Mangifera indica	1025.81	0.50	50	1.00	9.52	13.33	22.63	45.48
Bougainvillea glabra	43.94	0.50	25	2.00	9.52	6.67	0.97	17.16
Bauhinia variegata	140.40	0.25	25	1.00	4.76	6.67	3.10	14.53
Ziziphus mauritiana	114.99	0.25	25	1.00	4.76	6.67	2.54	13.96
Artocarpus heterophyllus	412.59	0.25	25	1.00	4.76	6.67	9.10	20.53
Tectona grandis	1672.03	0.50	25	2.00	9.52	6.67	36.88	53.07
Carica papaya	191.13	0.25	25	1.00	4.76	6.67	4.22	15.64
Annona reticulata	114.99	0.25	25	1.00	4.76	6.67	2.54	13.96
Moringa oleifera	121.15	0.25	25	1.00	4.76	6.67	2.67	14.10
Murraya koenigii	103.15	0.25	25	1.00	4.76	6.67	2.28	13.70
Citrus grandis	98.96	0.50	25	2.00	9.52	6.67	2.18	18.37
Leucaena leucocephala	149.14	0.25	25	1.00	4.76	6.67	3.29	14.72
Hibiscus rosa-sinensis	53.85	0.25	25	1.00	4.76	6.67	1.19	12.62
	4533.6				100.00	100.00	100.00	300.00

Herb Species in Yeshu Darbar area North Home gardens of SHUATS Campus in Rainy Season

In the Yeshu Darbar Area North during the rainy season, a phytosociological analysis was conducted on the herb species. Table-2 shows a total of 12 herb species identified. The primary herb species with the highest frequency (F) were *Eupatorium odoratum*, *Argemone mexicana*, *Chenopodium album*, and *Cleome gynandra*, with a frequency of 75.00. Following them were *Digitaria sanguinalis*, *Trianthema portulacastrum*, *Amaranthus spinosus*, and *Cassia occidentalis*, with a frequency of 50.00. The species *Coriandrum sativum*, *Asarum canadense*, and *Phaseolus vulgaris* had the lowest frequency at 25.00. In terms of density, *Coriandrum sativum* had the highest density of 5.25, followed by *Asarum canadense* with a density of 4.75. *Cassia occidentalis* and *Trianthema portulacastrum* had the lowest density at 1.25. The most abundant herb species was *Coriandrum sativum* with a count of 21.00, followed by *Asarum canadense* with a count of 19.00. The least abundant herb species were *Cleome gynandra* and *Chenopodium album*, with a count of 2.00. When considering relative density, *Coriandrum sativum* had the highest value of 19.81, followed by *Asarum canadense* with a value of 17.92. *Trianthema portulacastrum*, *Chloris barbata*, and *Cassia occidentalis* had the lowest relative density at 4.72. In terms of relative frequency, *Eupatorium odoratum*, *Argemone mexicana*, *Cleome gynandra*, and *Chenopodium album* had the highest values at 12.00. *Digitaria sanguinalis*, *Trianthema portulacastrum*, *Amaranthus spinosus*, *Chloris barbata*, and *Cassia occidentalis* had values of 8.00. *Phaseolus vulgaris*, *Asarum canadense*, and *Coriandrum sativum* had the lowest relative frequency at 4.00. The herb species with the highest Importance Value Index (IVI) was *Argemone mexicana* with a value of 49.52, followed by *Phaseolus vulgaris* with a value of 46.99. *Trianthema portulacastrum* had the lowest IVI at 13.15.

Table 2: Phyto-sociological analysis of Herbs in Yeshu Darbar Area North Home gardens in Rainy Season

Species	Total No. of Individual Spp	Density	Frequency	Abundance	RD	RF	RDO	IVI
Eupatorium odoratum	9	2.25	75	3.00	8.49	12.00	17.02	37.51
Digitaria sanguinalis	6	1.50	50	3.00	5.66	8.00	0.43	14.09
Trianthema portulacastrum	5	1.25	50	2.50	4.72	8.00	0.43	13.15
Argemone mexicana	8	2.00	75	2.67	7.55	12.00	29.97	49.52
Coriandrum sativum	21	5.25	25	21.00	19.81	4.00	0.43	24.24
Asarum canadense	19	4.75	25	19.00	17.92	4.00	0.47	22.40
Amaranthus spinosus	7	1.75	50	3.50	6.60	8.00	0.43	15.04
Cleome gynandra	6	1.50	75	2.00	5.66	12.00	0.43	18.09
Chloris barbata	5	1.25	50	2.50	4.72	8.00	1.20	13.92
Chenopodium album	6	1.50	75	2.00	5.66	12.00	0.11	17.77
Cassia occidentalis	5	1.25	50	2.50	4.72	8.00	10.79	23.51
Phaseolus vulgaris	9	2.25	25	9.00	8.49	4.00	38.30	46.99
	106				100	100	100	300

Tree Species in Yeshu Darbar area South Home gardens of SHUATS Campus in Rainy Season

In the Yeshu Darbar area South during the rainy season, shown in table-3. A total of 12 tree species and 12 herb species were found in the Phytosociological Analysis. The density of tree species varied, with *Mangifera indica* having the highest density (1.25), followed by *Phyllanthus emblica* and *Carica papaya* (1.0). The lowest density was observed in *Morus alba*, *Ficus racemosa*, *Murraya koenigii*, and *Aegle marmelos* (0.25). The primary trees in terms of frequency were *Mangifera indica* and *Phyllanthus emblica*, with a frequency of 75.00. *Psidium guajava* and Crimson bottlebrush had a frequency of 50.00, while *Annona reticulata*, *Aegle marmelos*, *Murraya koenigii*, *Citrus grandis*, *Ficus racemosa*, and *Morus alba* had the lowest frequency (25.00). The most abundant tree species were *Citrus grandis* and *Annona reticulata* (2.00), followed by *Mangifera indica* (1.67), and the least abundant were *Morus alba*, *Ficus racemosa*, *Murraya koenigii*, and *Hibiscus rosa-sinensis* (1.00). *Mangifera indica* was the dominant tree in terms of basal area (7.72), followed by *Phyllanthus emblica* (5.01), and *Annona reticulata* had the lowest basal area (0.48). The species with the highest relative density were *Mangifera indica* (17.24), *Phyllanthus emblica*, and *Carica papaya* (13.79), while *Morus alba*, *Ficus racemosa*, *Murraya koenigii*, and *Aegle marmelos* had the lowest density (3.45). *Mangifera indica* and *Phyllanthus emblica* had the highest relative frequency (14.29), followed by *Psidium guajava* and Crimson bottlebrush (9.52), and *Annona reticulata*, *Aegle marmelos*, *Murraya koenigii*, *Citrus grandis*, *Ficus racemosa*, and *Morus alba* had the lowest relative frequency (4.76). In terms of Importance Value Index (IVI), *Mangifera indica* had the highest IVI (55.19), followed by *Phyllanthus emblica* (43.44), and *Morus alba* had the lowest IVI (11.03).

Table 3: Phyto-sociological analysis of trees in Yeshu Darbar Area South Home gardens in Rainy Season

Species	B A	Density	Frequency	Abundance	RD	RF	RDO	IVI
Mangifera indica	772.23	1.25	75	1.67	17.24	14.29	23.66	55.19
Psidium guajava	296.18	0.75	50	1.50	10.34	9.52	9.07	28.94
Morus alba	92.03	0.25	25	1.00	3.45	4.76	2.82	11.03
Ficus racemosa	130.92	0.25	25	1.00	3.45	4.76	3.99	12.20
Phyllanthus emblica	501.42	1.00	75	1.33	13.79	14.29	15.36	43.44
Citrus grandis	99.63	0.50	25	2.00	6.90	4.76	3.03	14.69
Murraya koenigii	104.33	0.25	25	1.00	3.45	4.76	3.19	11.40
Callistemon	607.26	0.75	50	1.50	10.34	9.52	18.62	38.49

Aegle marmelos	402.02	0.25	25	1.00	3.45	4.76	12.31	20.52
Annona reticulata	48.26	0.50	25	2.00	6.90	4.76	1.47	13.13
Carica papaya	150.18	1.00	75	1.33	13.79	14.29	4.59	32.67
Hibiscus rosa-sinensis	62.04	0.50	50	1.00	6.90	9.52	1.91	18.33
	3262.83				100.00	100.00	100.0	300.0

Herb Species in Yeshu Darbar area South Home gardens of SHUATS Campus in Rainy Season

The Phytosociological Analysis of the Yeshu Darbar Area South in Rainy Season reveals the presence of 12 herb species. Table 4 displays the total number of individual species. The primary herb species, with a frequency (F) of 75.00, are *Trianthema portulacastrum*, *Chloris barbata*, *Cynodon dactylon*, and *Cyperus rotundus*. *Trigonella* foenum-gracum, *Alysicarpus ovalifolius*, *Amaranthus spinosus*, *Digitaria sanguinalis*, *Chenopodium album*, *Cassia occidentalis*, and *Argemone mexicana* follow with a frequency (F) of 50.00. *Trigonella* foenum-gracum has the highest density (8.25), while *Cassia occidentalis* has the lowest density (1.75). In terms of abundance, *Trigonella* foenum-gracum is the most abundant herb species (16.5), followed by Ridge guard (6.0), and *Chloris barbata* is the least abundant (3.00). Trigonella foenum-gracum also has the highest relative density (21.57), Ridge guard has the second-highest (11.76), and *Cassia occidentalis* has the lowest (4.58). *Trianthema portulacastrum*, *Chloris barbata*, *Cynodon dactylon*, *Cyperus rotundus*, and Ridge guard have the highest relative frequency (10.34), while the remaining herb species have a relative frequency of 6.90. The Importance Value Index (IVI) of the herb species ranges from *Cynodon dactylon* with the highest (38.90) to *Chenopodium album* with the lowest (12.86).

Table 4: Phyto-sociological analysis of Herbs in Yeshu Darbar Area South Home gardens in Rainy Season

Species	Total No. of Individual Spp	Density	Frequency	Abundance	RD	RF	RDO	IVI
Trigonella foenum-graecum	33	8.25	50	16.5	21.57	6.90	0.33	28.79
Alysicarpus ovalifolius	9	2.25	50	4.5	5.88	6.90	1.07	13.85
Amaranthus spinosus	12	3.00	50	6.0	7.84	6.90	1.32	16.06
Digitaria sanguinalis	8	2.00	50	4.0	5.23	6.90	1.32	13.44
Trianthema portulacastrum	12	3.00	75	4.0	7.84	10.34	0.33	18.52
Chloris barbata	9	2.25	75	3.0	5.88	10.34	1.07	17.30
Chenopodium album	9	2.25	50	4.5	5.88	6.90	0.08	12.86
Cassia occidentalis	7	1.75	50	3.5	4.58	6.90	8.24	19.71
Argemone mexicana	8	2.00	50	4.0	5.23	6.90	21.10	33.23
Cynodon dactylon	13	3.25	75	4.3	8.50	10.34	20.06	38.90
Cyperus rotundus	15	3.75	75	5.0	9.80	10.34	2.97	23.12
	135				100.00	100.00	100.0	300

Tree Species in Yeshu Darbar area East Home gardens of SHUATS Campus in Rainy Season

In the Yeshu Darbar area, East Home gardens during the rainy season, shown in table-5. A total of 12 tree species and 15 herb species were found in the Phytosociological Analysis. the density of tree species was recorded. *Cestrum nocturnum* and *Moringa oleifera* had the highest density (1.00), followed by *Citrofortunella microcarpa*, *Hibiscus rosa-sinensis*, *Citrus maxima*, and *Psidium guajava* (0.75). The lowest density was observed in *Plumeria alba*, *Ixora chinensis*, *Plumeria rubra*, *Mangifera indica*, *Carica papaya*, and *Murraya koenigii* (0.25). The primary trees in terms of frequency were *Cestrum nocturnum* (100.00), *Citrofortunella microcarpa* (75.00), and the lowest frequency was found in *Plumeria alba*, *Ixora chinensis*, *Plumeria rubra*, *Mangifera indica*, *Carica papaya*, and *Murraya koenigii* (25.00). *Moringa oleifera* was the most abundant tree species (2.00), followed by *Hibiscus rosa-sinensis*, *Citrus maxima*, and *Psidium guajava* (1.50). The least abundant species were *Plumeria alba*, *Cestrum nocturnum*, *Ixora chinensis*, *Plumeria rubra*, *Mangifera indica*, *Carica papaya*, and *Citrofortunella microcarpa* (1.00). *Mangifera indica* had the highest basal area (3.86), followed by *Plumeria alba* (3.79), and *Ixora chinensis* had the lowest basal area (0.63). *Cestrum nocturnum* and *Moringa oleifera* had the highest relative densities (15.38), while *Plumeria alba*, *Ixora chinensis*, *Plumeria rubra*, *Mangifera indica*, *Carica papaya*, and *Murraya koenigii* had the lowest (3.85). *Cestrum nocturnum* had the highest relative frequency (19.05), followed by *Citrofortunella microcarpa* (14.29), and the lowest relative frequency was observed in *Plumeria alba*, *Ixora chinensis*, *Plumeria rubra*, *Mangifera indica*, *Carica papaya*, and *Murraya koenigii* (4.76). In terms of the Importance Value Index (IVI), *Cestrum nocturnum* had the highest value (43.58), followed by *Moringa oleifera* (33.59), and *Ixora chinensis* had the lowest value (11.29).

Table 5: Phyto-sociological analysis of trees in Yeshu Darbar Area East Home gardens in Rainy Season

Species	B A	Density	Frequency	Abundance	RD	RF	RDO	IVI
Plumeria alba	379.13	0.25	25	1.00	3.85	4.76	16.10	24.71
Cestrum nocturnum	215.76	1.00	100	1.00	15.38	19.05	9.15	43.58
Ixora chinensis	63.32	0.25	25	1.00	3.85	4.76	2.68	11.29
Plumeria rubra	268.85	0.25	25	1.00	3.85	4.76	11.38	19.99
Mangifera indica	386.36	0.25	25	1.00	3.85	4.76	16.41	25.01
Carica papaya	140.23	0.25	25	1.00	3.85	4.76	5.96	14.57
Citrofortunella microcarpa	116.43	0.75	75	1.00	11.54	14.29	4.92	30.75
Hibiscus rosa-sinensis	80.47	0.75	50	1.50	11.54	9.52	3.42	24.48

Moringa oleifera	204.83	1.00	50	2.00	15.38	9.52	8.68	33.59
Citrus maxima	126.93	0.75	50	1.50	11.54	9.52	5.35	26.42
Murraya koenigii	87.23	0.25	25	1.00	3.85	4.76	3.68	12.28
Psidium guajava	290.46	0.75	50	1.50	11.54	9.52	12.29	33.36
	2355.04				100.00	100.00	100.00	300.0

Herb Species in Yeshu Darbar area East Home gardens of SHUATS Campus in Rainy Season

In the Yeshu Darbar area East during the rainy season, shown in table-6. A phytosociological analysis was conducted on the herb species found in the Home gardens of Yeshu Darbar area east. A total of 15 herb species were identified, as shown in table-5.The primary herb species in terms of frequency were *Eleusine indica*, with a frequency (F) of 100, followed by Common dandelion, Cleome monophyla, and *Digitaria sanguinalis*, each with a frequency (F) of 75.00. The herbs with the lowest frequency were *Abelmoschus esculentus*, *Spinacia oleracea*, and *Capsicum frutescens*, each with a frequency of 25.00. In terms of density, *Solanum lycopersicum* had the highest density of 5, followed by *Spinacia oleracea* with a density of 4.25. *Cleome gynandra* had the lowest density of 1.25. When considering abundance, *Spinacia oleracea* was the most abundant herb species with a count of 17.00, followed by *Abelmoschus esculentus* with a count of 14.00. *Cleome gynandra* was the least abundant herb species with a count of 2.50.In terms of relative density, *Solanum lycopersicum* had the highest value of 11.83, followed by *Spinacia oleracea* with a value of 10.06. *Cleome gynandra* had the lowest relative density of 2.96. *Eleusine indica* had the highest relative frequency of 12.12, followed by Common dandelion, *Cleome monophylla*, and *Digitaria sanguinalis*, each with a relative frequency of 9.09. *Abelmoschus esculentus*, *Spinacia oleracea*, and *Capsicum frutescens* had the lowest relative frequency of 3.03. Based on the Importance Value Index (IVI), *Solanum lycopersicum* had the highest IVI of 42.25, followed by *Abelmoschus esculentus* with an IVI of 32.89. *Cleome gynandra* had the lowest IVI of 9.78

Table 6: Phyto-sociological analysis of Herbs in Yeshu Darbar Area East Home gardens in Rainy Season

Species	Total No. of Individual spp	Density	Frequency	Abundance	RD	RF	RDO	IVI
Taraxacum officinale	9	2.25	75	3.00	5.33	9.09	5.39	19.81
Amaranthus cruentus	16	4	50	8.00	9.47	6.06	12.13	27.66
Cynodon dactylon	10	2.5	50	5.00	5.92	6.06	0.76	12.74
Cleome monophylla	10	2.5	75	3.33	5.92	9.09	1.71	16.71
Cleome gynandra	5	1.25	50	2.50	2.96	6.06	0.76	9.78
Abelmoschus esculentus	14	3.5	25	14.00	8.28	3.03	21.57	32.89
Chloris barbata	7	1.75	50	3.50	4.14	6.06	0.76	10.96
Spinacia oleracea	17	4.25	25	17.00	10.06	3.03	10.20	23.29
Digitaria sanguinalis	11	2.75	75	3.67	6.51	9.09	2.11	17.71
Solanum lycopersicum	20	5.00	50	10.00	11.83	6.06	24.35	42.25
Eleusine indica	14	3.5	100	3.50	8.28	12.12	0.76	21.16
Portulaca oleracea	8	2	75	2.67	4.73	9.09	1.35	15.17
Alysicarpus ovalifolius	7	1.75	50	3.50	4.14	6.06	0.34	10.54
Capsicum frutescens	13	3.25	25	13.00	7.69	3.03	16.52	27.24
Stellaria media	8	2	50	4.00	4.73	6.06	1.35	12.14
	169	42.25			100.00	100.00	100.0	300.00

Conclusion

The assessment of biodiversity in the Yeshu Darbar area of SHUATS Campus, Prayagraj, during the rainy season through a phyto-sociological analysis provides valuable insights into the distribution and composition of plant species. The results of this study can contribute to the conservation and management of biodiversity within SHUATS Campus, Prayagraj. These findings contribute to the understanding and conservation of biodiversity in the Yeshu Darbar area, Future research can focus on extending the analysis to other seasons and exploring the ecological interactions between different plant species in Yeshu Darbar area.

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