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Herb diversity and their medicinal uses in Biodiversity Conservation area of Jnanabharathi Campus, Bangalore University, Karnataka

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Abstract

Unnoticed, breeding beneath the canopy in the woods, the herb layer serves a special role in maintaining the structure and function of forests, this stratum remains an underappreciated aspect of forest ecosystems. The Bangalore University, Jnanabharathi campus, historically being a scrub forest facilitating the growth of enormous vegetation ranging from large canopied trees to understory layer comprising of herbs and grasses. The present study was intended to assess the herbs diversity, richness and medicinal use to emphasize its role in tropical dry forest ecosystems, using a quadrate method. A total of 61 species were recorded, comprising of 52 species of herbs, representing 28 families, of which (77%) belongs to native and (23%) exotic (non-native) category. In addition to herbs four species of grass and five climber species of procumbent were also recorded in the same quadrate. *Desmodium triflorum* with 1014 individuals and (IVI = 11.76) was found to be dominant species followed by *Evolvulus alsinoides*, *Vicoa indica* and *Calyptocarpus vialis*. *Astraceae* and *Fabaceae* was the most abundant family followed by *Lameaceae* and *Acanthaceae*. The diversity indices were estimated to determine the richness, diversity and evenness of herbaceous species, among three sectors, sector-1 is found to have Shannon index of 3.14 and Simpson index of 0.95, where highest Evenness index of 0.64 was associated with sector-3 followed by Sector-8 and Sector-1. From the study it was also revealed that all the three sectors were significantly depicting clumped or contagious pattern of herb distribution. The study indicates that understory herbaceous layer plays very important role in regeneration of canopy species in scrub forest and it support regeneration of many medicinal herbs. Hence University authorities should protect herb layer from fire, grazing and other anthropogenic disturbances.

Keywords: herb layer, ecosystem services, diversity, conservation, medicinal value

1. Introduction

Despite of its role in ecosystem processes the herbaceous layer is frequently ignored due to its nature of habit and small contribution to the overall biomass of the system [9]. Although, the understory layer called herbaceous layer is characterized by unique features that distinguish it from the woody vegetation of the forest stratum [21]. In scrub and deciduous forest ecosystem, the contribution of herbaceous layer to the plant diversity and richness is higher than the other vegetation stratum, such as shrubs and woody trees. However herbaceous species have preponderance natural extinction rates than other strata [9]. The extinction rates in herbs are more than three times that of hardwood tree species [10]. Thus, threats to forest biodiversity are most often a function of threats to herbaceous layer species [11]. Herbaceous plant functional traits provide a general and mechanistic basis for understanding plant behaviour in response to biotic stress [5].

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In ecological relationships it has been commonly observed that concentration of some foliar nutrients of herbs is found to be higher than in woody vegetation from the same site [10]. In addition, the role of herbaceous layer in modification of throughfall may strongly influence the amount of nutrients returned to the forest floor, which may varies depending on species composition of the understory herb layer and time of the year [2, 9]. In addition to all these contribution towards the ecological process of forest ecosystem, these plants have been the source of many medicines utilized in the treatment of both humans and animals diseases since ancient times [36].

The World Health Organization (WHO) estimated that in developing countries about 80% of the population depends on traditional herbal remedies for their daily needs, in developed countries it could be as high as 95% and about 855 traditional medicines include crude plant extracts [14]. This means that approximately 3.5 to 4 billion of the global population rely on plants resources for drugs [18]. Over time, the use of herbal medicines and other natural products has developed on the basis of both positive and negative experiences. The collected rich experiences have gradually developed into folk medicine [4].

The history of medicine can be traced to the past, in the Indian subcontinent, more than 500 indigenous communities use around 800 plant species for curing various diseases [13]. From professional as well as economical point the indigenous drugs of India hold a great status throughout the globe. The demand for herbal value-added extracts of medicinal herbs is gradually increasing in foreign countries, especially in Europe and other developed countries [3]. In many regions of the world including India herbaceous plants are unexplored, while majority of the discovered species are under threat due to land use land cover changes, over harvesting, grazing, poor management and lack of knowledge regarding its significance functional traits and poor conservation measures [10]. Hence the present study has been undertaken to document Composition, diversity, richness, distribution and medicinal uses of herb species of Jnanabharathi campus of Bangalore University.

2. Materials and methods

This study was conducted at Bangalore University (Jnanabharathi Campus), situated in the outskirts of Bangalore Metropolitan City with the area of 1200 acres, which is one among the biggest University in Asia. Out of 1200 acres, 400 acres is used for the construction of roads, buildings and remaining 800 acres of original thorn forest was developed as Biodiversity conservation area by University without altering the original landscape and vegetation. It lies between $12^0$39’ to $13^0$18’ N Latitude and $77^0$22’ to $13^0$52’ E Longitude, covering Arkavathi river basin and falls in an area of 6 km^2 in the village limits of Nayandahalli and Mudalapalya [22]. The University campus has been categorized into eight sectors based on topography and watershed features (Figure 1).

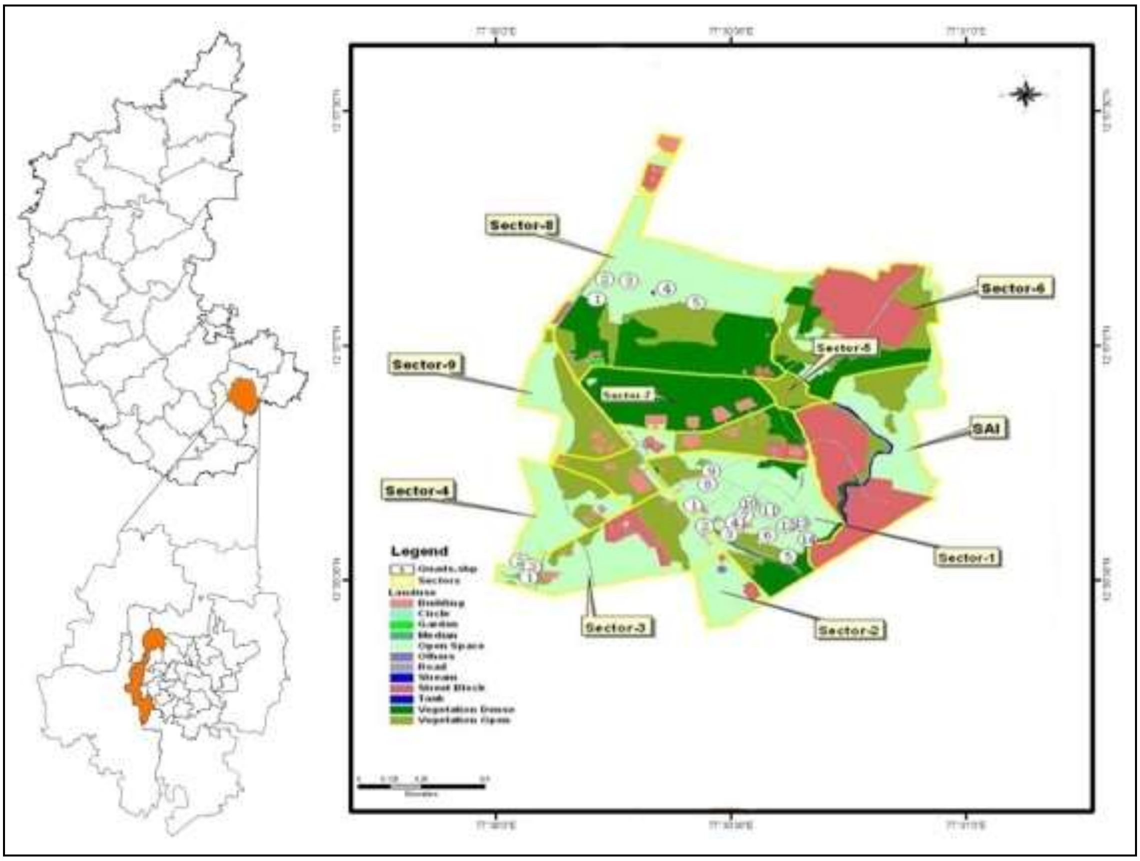

Figure 1. Study area map indicating sectors and sampling locations in Jnanabharathi campus of Bangalore University

Biodiversity conservation area occupies about 800 acre of the University campus area, where in more than 500 native species have been planted during the period of 1998-2008 in six sectors viz., sector 1, 2, 3, 4, 5 and 8, of which majority of the Biodiversity conservation area lies in three sectors i.e., 1, 3 and 8. As a part of long term monitoring program University established 22 permanent plots of 25 x 25m size randomly at a distance of 250 to 300 m in the year 2004 covering all the areas. Among the three sectors, sector-1 comprised of large area of the Biodiversity Conservation area followed by sector-8 and sector-3 which represents the species composition of the remaining sectors. Hence same sectors have been chosen for the sampling of herbaceous layer (Figure 1).

2.1. Assessment of Herb diversity and Composition

A total of 105 quadrates of 1x1m dimension were randomly laid in 3 sectors of Biodiversity conservation area, viz., 70 quadrates in sector-1, followed by 20 quadrates in sector-3 and 15 quadrates in sector-8. The herb sampling was done from August to November of monsoon and post-monsoon in 2019. The herb species were identified in the field and unidentified species were confirmed with help of local flora [26]. Along with the herbs, climbers and grasses falling in the quadrates were identified and documented. Quantitative community characteristics such as frequency, density, diversity indices were estimated using Bio-Diversity Pro Software (Version 2) and standard methods [19].

2.2. Medicinal value of herbs

Each species medicinal values were documented from published literature [1, 33,29, 12]. Discussions were also held with people living around the campus and Forest Department to ascertain the medicinal uses of the herb. The prioritized medicinal plants in National Medicinal Plant Board (NMPB), Government of India were referenced to understand the medicinal uses. Community ecologists have used many indexes to understand plant diversity, dominance and evenness. In the present study following index were used [30, 31, 25].

Shannon- Wiener Index (H)

$$\boldsymbol{H = -\sum (ni\ /\ N)\ ln\ (ni\ /\ N)}$$

where, H = Shannon-Wiener index; ni = Importance Value Index of i^{th} species; N = Total Importance Value of all species.

Simpson Dominance Index (D)

$$\boldsymbol{D = \sum (ni\ /N)2}$$

where, ni = importance value index; N = total importance value of all species.

Pielou's evenness Index(J)

$$\boldsymbol{J' = H'/Lns}$$

H'= Shannon wiener diversity index

s = number of species

2.3. Distribution pattern of herbs

Generally biotic populations are distributed heterogeneously in their habitats and the distribution itself is often patchy. In ecology, the structure of dispersion is conventionally classified into three categories: Frequency of distributions may be random, uniform (regular), or clumped (contagious).The empirical classification of the distribution pattern can be obtained by comparing the sample mean (n) with variance (s^2) of observed frequency distributions of the number of species per sampling unit. The distribution will be random if s^2/n = 1, uniform if s^2/n <1, and clumped if s^2/n >1, provided that these obtained relations are statistically significant [23].

3. Results

Historically Bangalore University was a Thorn scrub forest enriched with sandalwood reserve, used as an elephant corridor between Bannerghatta National Park and Savanadurga State Forest. In the year 1998 Bangalore University constructed series of check dams to harvest rain water on extensive scale with the support from State Forest Department and Central Ground water Board, which has significantly improved ecology and microclimate of the region. Then afforestation activities were undertaken in different sectors without altering the original landscape to conserve native species in 800 acres area (Table 1). This also improved wildlife and ground herbaceous layer. In spite of compound wall and protection, Biodiversity area is witnessing frequent grazing and forest fire which may affects the regeneration of herbs.

Table 1. Timeline of Conservation and management strategy adopted by Bangalore University.

Sl.no	**Major conservation and management efforts**	**Year**
1	Demarcation of sectors (8 sectors)	1998
2	Construction of check dams in conservation site	1998-2003
3	Afforestation programme in 800 acre area	1998-2008
4	Establishment of ex-situ field gene bank adjacent to Environmental science department	2002-2005

3.1. Herb species composition and diversity

A total of 52 herb species belongs to 28 families were recorded in the campus. Apart from that a total of four grasses and five climbers had been documented in the sampled areas. Species area curve indicates that the sampling is sufficient enough to capture maximum herb species richness in the Biodiversity area of the campus. Species-area curves also reflect the way that diversity is structured spatially and how environmental variables affect richness at different spatial scales (Figure 2).

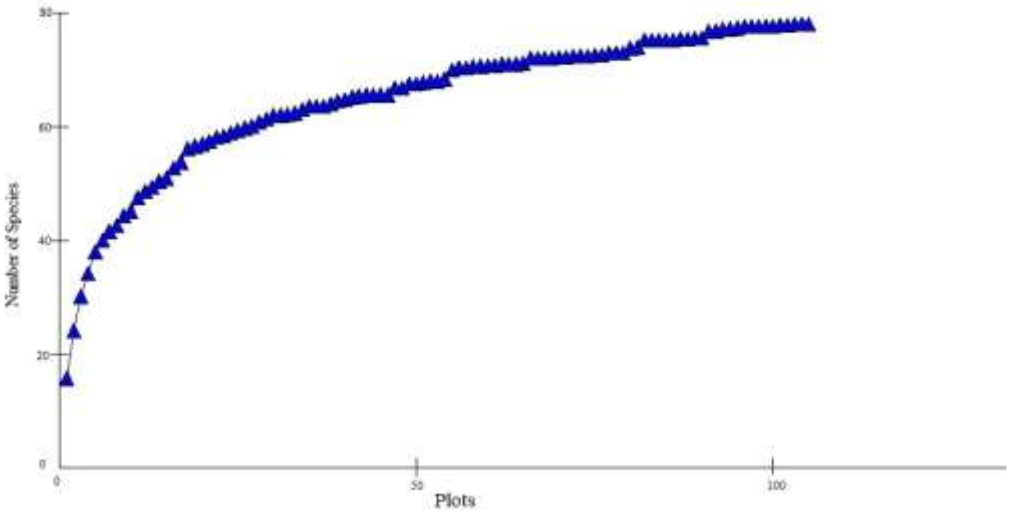

Figure 2. Species area curve

The diversity of species in an area depends on both the number of species observed and their total numbers, and evenness refers to the relative abundance of species. The data revealed that diversity index (H') and dominance index (D) obtained maximum value for the sector-1, followed by sector-3 and sector-8 respectively. While evenness index was found to be high at sector-3 in contrast with other two sectors, which represents that all the species in sector-3 are evenly distributed (Table 2). On the whole we can conclude that dense herbaceous layer in the studied sectors enriching soil health and sustain ground-nesting birds, honey bees, butterflies and many other faunal species.

Table 2. Sector-wise diversity indices for herb species

Sl.no	**Biodiversity index**	**Sector-1**	**Sector-3**	**Sector-8**
1	Shannon-Wiener index	3.419	3.149	3.014
2	Simpson index	0.955	0.944	0.911
3	Evenness index	0.407	0.647	0.452
	Average	**1.593**	**1.573**	**1.459**

3.2. Native and exotic species composition of herbs

Out of 52 species, (77%) were belongs to native and (23%) to exotic category. It shows that the Biodiversity conservation area of campus is relatively less disturbed by anthropogenic activities.

3.3. Density and Frequency of Herb

Out of 28 recorded families, majority of the herbs belong to the family Asteraceae followed by Fabaceae and Lameaceae (Figure 3).

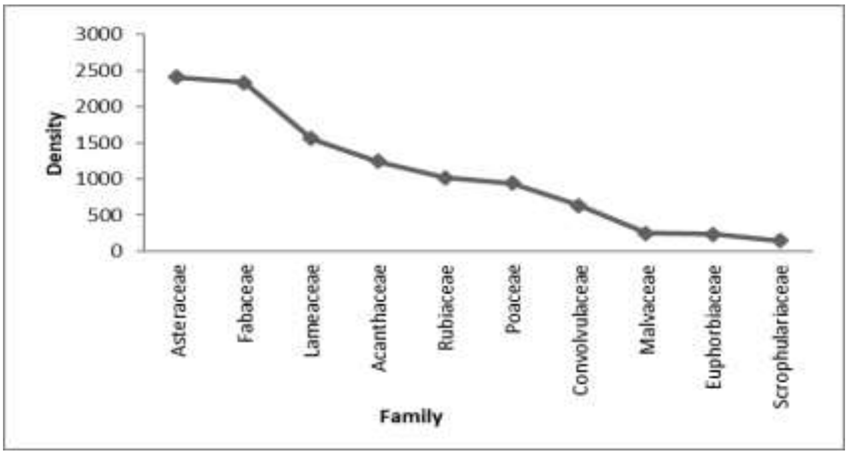

Figure 3. Top ten herb families found in Biodiversity Conservation Area

Desmodium triflorum (1014) was found to be dominant herb species followed by *Evolvulus alsinoides* (630), *Vicova indica* (616) and *Calyptocarpus vialis* (577) (Figure 4).

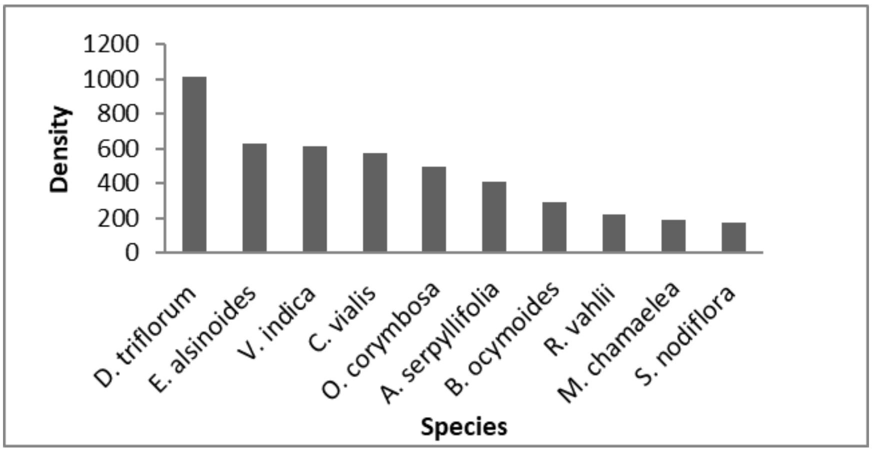

Figure 4. Density of top ten herb species in Biodiversity Conservation area

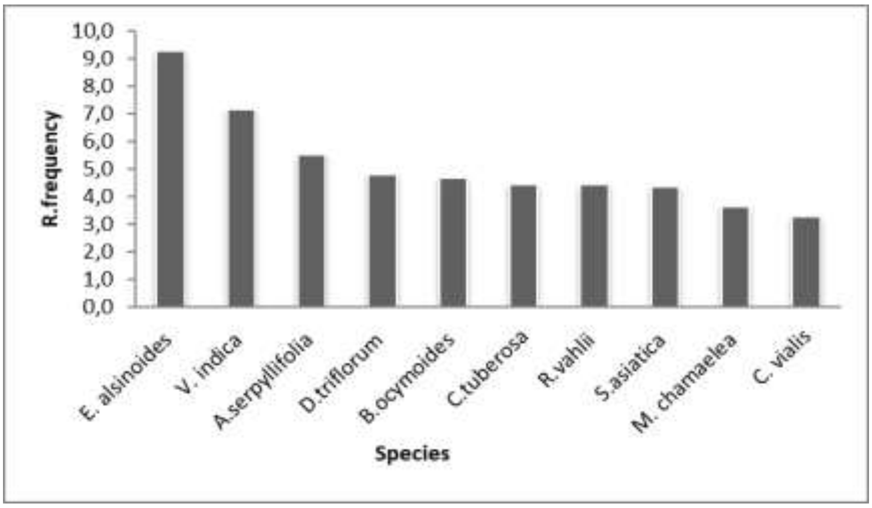

Figure 5. Relative Frequency of top ten herb species in Biodiversity Conservation area

E.alsinoides is the most frequently occurred species among all the three sectors with the rate of (12.8%) in sector-8, (9.6%) in sector-3 and (8.4%) in sector-1, followed by *V.indica, A.Serphylifolia, D.triflorum, B.ocymoides, R.vahlii and C.tuberosa* which represents that these species are widely distributed in all the three sectors (Figure 5).

3.4. Distribution pattern of Herbs

Based on the field data, comprising of 52 species of herbs from three sectors were examined for the relations between s2 (variance) and n (sample mean). The obtained result revealed that all the 3 sectors data were significantly judged with clumped or contagious pattern of distribution (Table 3).

Table 3. Sector wise distribution pattern of herbaceous layer in Biodiversity Conservation area

Sl.no	Sector	Value	Distribution
1	Sector 1	1.05	Clumped
2	Sector 3	1.29	Clumped
3	Sector 8	1.88	Clumped
	Average	**2.96**	

3.5. Medicinal uses of Herbs

Our study reveals that among 52 herb species recorded about 80% of the species have been widely used in Ayurveda and folk medicine. Some of these herbs found in the University campus were listed with their medicinal use in (Table 4).

Table 4. Important medicinal herbs of the campus and their uses

Sl.no	Species	Common name	Part used	Reference
1	**Andrographis serpyllifolia* (Vahl) Wight	Creeping bent grass	Leaves(G)	[1]
2	**Eclipta prostrata* (L.) L.	False daisy, Bhringaraj	Whole Plant (A,B,C,D, E)	[33]
3	*Evolvulus nummularius* (L.)	Round leaf Bindweed	Whole plant (D)	[29]
4	*Striga asiatica* (L.) Kuntze	Asiatic witchweed	Whole plant (F)	[12]
5	*Hemidesmus indicus* (L.) R. Br. ex Schult.	Indian Sarasaparilla	Root(C)	[17]
6	*Croton bonplandianus* Baill.	Railway Weed	Leaves, seeds (D,G,H,I)	[32]
7	*Cyanotis tuberosa* (Roxb.) Schult & Schult.f.	Greater Cat Ears	Leaves, Root (J,K,L,M)	[8]
8	*Heliotropium strigosum*Willd.	Red jasmine	Whole plant(D)	[16]
9	*Hybanthus enneaspermus* (L.) F.V.Muell.	Spade Flower	Whole plant(N,O)	[28]
10	*Synedrella nodiflora*(L.) Gaertn.	Cindrella weed	Leaves(A,P)	[35]

Note:A-Anti-inflammatory, B-Analgesic, C-Anti snake venome, D- Anti-microbial, E-Anti-depressant, E-Anticancer, F- anti-helmentic, G-antioxident, H-Wound healing, I-Skin disease, J-Worm infestation in cattle, K-Treat Liver problem, L-Menstrual disorder, M-Leafy vegetable, N-treatment of urinary infection, O- Bowel movement complents, P-Antiseptic.*-Listed under NMPB Prioritized list of medicinal plant under cultivation.

Figure 6. Few Medicinally important herbs found in Biodiversity Conservation area **(**a)-*Andrographis serpyllifolia (Vahl) Wight,* (b)-*Eclipta prostrata (L.) L.* (c)-*Hybanthusenneaspermus (L.)F.Muell.* (d)-*Cyanotistuberosa (Roxb.) Schult.*

4. Conclusions and discussion

During the study a total of 52 species of herbs were recorded, representing 28 families, of which (77%) belongs to native and (23%) exotic (non-native) category. The exotic species generally alters the regeneration potential of species and alters the overall richness and composition. Not surprisingly, the ecological impacts of invasive species have generated considerable interest among ecologists, particularly since the time of 1950s [9]. The undisturbed forest communities of herbaceous layer with intact canopies are generally resistant to invasion by exotic plant species. The potency of invasion by non-native plant species can be a function of the degree of anthropogenic disturbance such as harvesting, land cover change, atmospheric deposition of pollutants [9].

Out of 28 recorded families, majority of the herbs belong to Asteraceae followed by Fabaceae and Lameaceae (Figure 3).The Fabaceae members are very useful to the ecosystem, because they are having nitrogen-fixing bacteria in root nodules. This is good for the soil, because the nitrogen fixing Rhizobium bacteria fix atmospheric nitrogen into the soil which increases the natural level of soil nitrogen [7]. The other dominant family is Lameaceae, which is important both for fragrance and medicinal properties [34].

It is reported that among 52 species of herbs *Desmodium triflorum* (1014) was found to be dominant followed by *Evolvulus alsinoides* (630) (Figure 4). *D.triflorum* is a mat-forming prostate herb forming roots at nodes. This species had wide adoptability to different soil and climate and most commonly in heavily grazed or plantations and roadsides [6]. The second dominant herb is *E. Alsinoides* which is commonly seen in scrub forest even in poor soils, on bare exposed slopes [27].

The study revealed that all the 3 sectors data were significantly judged with clumped or contagious pattern of distribution (Table3). Similarly a study conducted by Mukherjee and Sarma, (2011) in Okhla Bird Sanctuary located in Uttar Pradesh also found a contagious pattern of distribution for herbaceous layer. The herbs distribution indicated the suitability of microclimatic conditions such as soil, moisture, nutrients, temperature etc. In ecology the structure of dispersion is classified into three categories, viz., contagious (clumped), random (unpredictable spacing), and uniform (regular). This classification is based on the frequency distribution of individuals in a statistical sense, e.g., based on quadrate counts. The distribution of species into clumped, uniform, or random depends on different abiotic and biotic factors. The distribution pattern of a species population is often related to its reproductive biology, and major abiotic factors like soil and water conditions are responsible in controlling species distribution patterns [20].

Our study disclosed that among 52 herb species recorded about 80% of the species have been widely used in Ayurveda and folk medicine. Historically these species were used by surrounding villagers to treat different ailments such as snakebites, skin diseases, liver problem, mental disorder, cure infertility, Skin disorders, etc. [15]. Due to rapid urbanization and unplanned plantations, herb species have been reduced in urban fringe [22]. India, being home for over 45,000 plant species, about 1500 plants with medicinal uses is mentioned in ancient texts and around 800 plants have been used in traditional medicine [24, 5]. Around 85% of traditional medicines are acquired from herbs and used for several ailments [14].

Unlike its small contribution of biomass to the overall forest ecosystem, the herbaceous layer is remarkably known for its significant role in many ecological processes, which distinguish it from the Overstory vegetation stratum. However introduction of fast growing exotic tree species, forest fire, grazing and frequent disturbance in the habitat are major threats for the herbaceous layer. Thus, along with upper stratum it is recommended to give equal preference to the understory herbaceous layer while undertaking any forest conservation measures. Through this study it is recommended that the future plantations and conservation efforts of the University authorities should enhance the native herb diversity.

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Appendix 1. List of herbs and grass and climbers recorded in Biodiversity conservation area

List of herbs found in quadrate method				
Sl.no	**Scientific name**	**Family**	**Nativity**	**Medicinal use**
1	*Abildgaardia ovata* (Burm.f.) Kral	Cyperaceae	Native	Rheumatism
2	*Ageratum conyzoides* L.	Asteraceae	Exotic	Fever, Rheumatism, headache.
3	*Alternanthera tenella* Colla	Amaranthaceae	Exotic	Fever and genital inflammation.
4	*Alysicarpus monilifer* (L.)Dc.	Fabaceae	Native	Anti-inflammatory, & antidote to snakebite.

Appendix 1. Continues

5	*Andrographis serpyllifolia* (Vahl) Wight	Acanthaceae	Native	Snake bite, cancer, antipyretic &antimicrobial
6	*Bidens pilosa* L.	Compositae	Native	Antibacterial, antidysenteric and antimicrobial.
7	*Blepharis maderaspatensis* (L.) B.Heyne ex Roth	Acanthaceae	Native	Snakebites and wounds.
8	*Borreria articularis* (L.F.) Williams	Rubiaceae	Native	Malaria, diarrhea, fever and hemorrhage.
9	*Borreria ocymoides* (Burm.F.) Dc.	Rubiaceae	Native	Headache,urinary and respiratory infections.
10	*Buchnera hispida* Ex D. Don	Orobanchaceae	Native	Scabies & eczema
11	*Calyptocarpus vialis* Less.	Asteraceae	Exotic	Toothache, skin sores
12	*Cassia pumila* Lam.	Caesalpiniaceae	Native	antimicrobial, antimalarial and Skin diseases.
13	*Chamaecrista absus* (L.)H.S.Irwin & Barneby	Fabaceae	Native	Bronchitis, asthma, cough, conjunctivitis.
14	*Chamaecrista mimosoides* (L.)Greene	Fabaceae	Exotic	Diarrhea and stomach pains.
15	*Crotalaria calycina* Schrank	Fabaceae	Native	Treating pain & syphilis.
16	*Croton bonplandianus* Baill.	Euphorbiaceae	Exotic	Jaundice,asthma and acute constipation.
17	*Cyanotis tuberose* (Roxb.) Schult. & Schult.F.	Commelinaceae	Native	Liver problem and menstrual disorder.
18	*Desmodium triflorum* (L.)Dc.	Fabaceae	Native	Diarrhoea,antipyretic and Ulcers.
19	*Emilia sonchifolia* (L.) Dc. Ex Wight	Asteraceae	Native	Cancer, Diabetes, cataract and asthma.
20	*Erigeron canadensis* L	Compositae	Exotic	Diarrhoea, dysentery and internal haemorrhages.
21	*Euphorbia laciniata* Panigrahi	Euphorbiaceae	Native	Asthma, bronchitis
22	*Evolvulus alsinoides* (L.) L.	Convolvulaceae	Native	Nervous debility, loss of memory, syphilis.
23	*Heliotropium strigosum* Willd.	Boraginaceae	Native	Antibacterial and Antioxidant.
24	*Hibiscus lobatus* (Murray) Kuntze	Malvaceae	Native	Treating wounds, inflammation, coughs and diabetes.
25	*Hibiscus vitifolius* L.	Malvaceae	Native	Jaundice, inflammation and diabetes.
26	*Hybanthus enneaspermus* (L.) F.Muell.	Violaceae	Native	Diarrhoea, urinary infections, leucorrhoea.
27	*Justicia diffusa* Willd	Acanthaceae	Native	Asthma, coughs, and rheumatism.
28	*Justicia glauca* Rottl.	Acanthaceae	Native	Respiratory and gastrointestinal diseases.
29	*Justicia procumbens* L.	Acanthaceae	Native	Asthma, coughs, and Rheumatism.
30	*Lavandula bipinnata* O.Kuntze	Lameaceae	Native	Diarrhoea, Rheumatism, decayed tooth.
31	*Lepidagathis cristata* Willd.	Acanthaceae	Native	Fever, eczema, psoriasis, epilepsy.
32	*Leucas hirta* (B.Heyne ex Roth) Spreng	Lameaceae	Native	Cough, cold, diarrhoea and skin disorder.
33	*Malvastrum coromandelianum* (L.) Garcke	Malvaceae	Native	Antinoceceptive, anti-inflammatory and antibacterial.

Appendix 1. Continues

34	*Microstachys chamaelea* (L.) Müll.Arg.	Euphorbiaceae	Native	Vertigo, leucorrhea, vata and pitta.
35	*Mimosa pudica* L.	Fabaceae	Exotic	Dysentery, small pox, fever, ulcer, jaundice and leucoderma.
36	*Oldenlandia corymbosa* L.	Rubiaceae	Exotic	Appendicitis, hepatitis, pneumonia, cholecystesis.
37	*Oldenlandia herbacea* (L.) Roxb.	Rubiaceae	Native	Elephantiasis, verminosis, asthma and ulcers.
38	*Oxalis corniculata* L.	Oxalidaceae	Exotic	Anthelmintic, anti-inflammatory, and astringent.
39	*Parthenium hysterophorus* L.	Asteraceae	Exotic	Neurologic disorders and urinary tract infections.
40	*Pavonia zeylanica* (L.) Cav.	Malvaceae	Native	Arthritis, skin diseases and tumerous growths.
41	*Phyllanthus virgatus* G.Forst	Euphorbiaceae	Native	Diabetes, hypertension and sexual disorders.
42	*Rostellularia vahlii* (Roth) Nees	Acanthaceae	Native	Anthelmintic and antiphlogistic.
43	*Sida acuta* Burm.F.	Malvaceae	Native	Antioxidant, antimicrobial and cardiovascular diseases.
44	*Sida cordata* (Burm.f.) Borssum	Malvaceae	Native	Asthma and tuberculosis.
45	*Sida rhomboidea* Roxb. Ex Fleming	Malvaceae	Native	Heart diseases, anti inflammation,
46	*Spermacoce hispida* L.	Rubiaceae	Native	Conjunctivitis and haemorrhoids.
47	*Spermacoceocymoides* Burm.f.	Rubiaceae	Native	Eczema, worms and ringworm
48	*Striga asiatica* (L.) Kuntze	Scrophulariaceae	Native	To treat Intestinal parasites.
49	*Synedrella nodiflora* (L.) Gaertn.	Asteraceae	Exotic	Earache,diarrhoea,Mouth infections.
50	*Tephrosia tinctoria* Pers.	Fabaceae	Native	Antimicrobial, larvicidal and antidiabetic.
51	*Tridax procumbens* L.	Asteraceae	Exotic	Anticoagulant, antifungal, and insect repellent.
52	*Vicoa indica* (L.) DC	Asteraceae	Native	Antifertility agents
	Grass and Climbers			
1	*Alloteropsis cimicina* (L.) Stapf	Grass	Poaceae	Toothache
2	*Dactyloctenium aegyptium* (L.) Beauv.	Grass	Poaceae	Anti-helminthics
3	*Eragrostiella bifaria* (Vahl) Bor	Grass	Poaceae	Fever, malaria
4	*Setaria pumila* (Poiret) Roemer &Schultes	Grass	Poaceae	Dyspepsia,Rheumatism.
5	*Aristolochia Indica L.*	Climber	Aristolochiaceae	Seizures,snakebite,arthritis, and gout.
6	*Atylosia scarabaeoides* (L.) Benth.	Climber	Fabaceae	Diuresis,anaemia and gonorrhoea.
7	*Hemidesmus indicus*(L.) R. Br.	Climber	Asclepiadaceae	Demulcent, astringent, diaphoretic.
8	*Passiflora foetida* var. Foetida	Climber	Passifloraceae	Coughs and anthelmintic.
9	*Tylophora indica (Burm. F.) Merr.*	Climber	Asclepiadaceae	Asthma,allergic and Rhinitis.