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A Taxonomic Documentation of Kishalay Boy's Home Campus at Barasat in District North 24-Parganas, West Bengal

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ABSTRACT

Considering the preparation of a taxonomic document of the urban phytodiversity, present effort brings out a list of 137 vascular plant species. At all specific, generic and family levels, dicots have much greater contribution to the flora. The high number of angiospermic families, most of which nest few species gives an indication of considerable diversity (heterogeneity). The tree diagram, prepared on the basis of ten dominant families shows the closeness of the concerned flora to those of the Sonamukhi (Bankura), Gangetic Plain and pre-independent Bengal. Some ecological disturbances in the area possibly function as 'intermediate disturbance' and contribute to increase in diversity, lending support to the **intermediate disturbance hypothesis.**

Key words : Kishalay campus, urban phytodiversity, taxonomic documentation, intermediate disturbance hypothesis.

The North 24 Parganas is a district in southern West Bengal, India. The natural vegetation of the district consists of both forest flora and patches of dispersed urban community intermingled with the human settlement. Today we are losing at least one higher plant species per day from tropical forests alone[1] and approximately 1800 populations per hour are being destroyed[2]. The State of Forest Report[3] informs that the total quantity of forest in the district is 127 sqkm, *i.e.* only 3.1% of the total geographical area. Under the circumstances the urban vegetation, which is highly disturbed due to high population density and urban development, deserves more importance as it acts like the green lungs of the settlements. Present effort tries to execute a taxonomic documentation of urban vegetation of the district that would be helpful for ecorestoration purpose. The Kishalay Boy's Home Campus at Barasat (district headquarters) was picked up as an approximate proxy of the urban phytodiversity of the Noth 24 Parganas since the site (Kishalay) still harbours some more or less undisturbed small pockets and packets of local phytodiversity.

Study site :

The District North 24-Parganas

(latitudes 22º11´6´´N-23º15´2´´N and longitudes 88º20´E-89º5´E) is bordered to Nadia by north, to Bangladesh (Khulna Division) by north and east, to South 24 Parganas and Kolkata by south and to Kolkata, Howrah and Hooghly by west.

Elevation of the district is 2,134 m (7,001 ft). Soil status varies from alluvial to clay loam. The Monsoon lasts from early June to mid September. Annual rainfall is 1579 mm. Temperature remains 41°C in May (Max) and 10°C in January (Min). Relative humidity remains between 50% in March & 90% in July[4,5].

The Kishalay Boy's Home Campus is situated on the KNC Road of Barasat near Hatkhola (Ward 26, Hatkhola, Barasat Sadar Subdivision, **700 124**). It is actually an "Observation, Juvenile and after care Home for Boys". Since 1986 the Institute works as Kishalay Children's Home, now it is under the Women and Child Development and Social Welfare Wing of the West Bengal Government.

The Kishalay Boy's Home Campus was botanized thoroughly. Identification, nomenclature and systematic positions of these specimens were ascertained with the help of pertinent literature[6-16]. The names of the plants were then arranged alphabetically with their respective family names.

To determine the coefficient of generic diversity following formula was used: Coefficient of Generic Diversity = 100 * G/S [where G = number of genus, S = number of species]. To find out the closeness (and distance) among different sites cluster analysis was performed with the help of the software 'Statistica' version 5.0. For analysis purpose, the distance was measured by '**Euclidean Dstance**' which is the actual geometric distance in the multidimensional space used. The distance could be calculated as per the formula: $\mathbf{Distance\ (X, Y) = \{\sum_{i=1}^{n} (V_{xi} - V_{yi})^2\}^{1/2}}$ [where d(X, Y) = distance between X and Y; n = total number of characters; V_{xi} = the character-state value of X for character I; V_{yi} is the character state value of Y for character i]

Phytocensus and taxonomic analysis :

The aim of phytocensus was to determine the species diversity of Kishalay Campus as it is an approximate proxy for biodiversity and characterizes community structure[17], although the work was confined to vascular plant species diversity (phytodiversity) only. Table-1 presents an inventory of the vascular plants present in the ecotope. The data was further analyzed and presented in Tale-2. Table-2 shows that the overall number of vascular plant species in the site **137**. Out of 137 species, 116 species are dicotyledonous, 17 species monocotyledonous and 4 species pteridophytes. The taxonomic analysis covering 37 species (Table-2) shows that the family: genus: species ratio is **1: 2.2: 2.49**. The dicot vis-à-vis monocot ratio at specific level is **6.82:1**, at generic level **5.88:1** and at family level **6.43:1**. At all specific, generic and family levels, dicots score high percentages over monocots and thus have much greater contribution to the flora. In respect of total angiosperm species, contribution of dicots and monocots are **86.54**% and **13.46** % respectively at family lavel, **85.47**% and **14.53**% respectively at genus level and **87.23**% and

12.77% at species level. In respect of dicots solely, the family: genus: species ratio is **1: 2.22: 2.58**. In case of monocots, the ratio is **1: 2.43: 2.43**. For pteridophytes, the ratio is **1: 1.3: 1.3**. The species quota for each genus is **1.13**; each family is allotted with **2.2** genera and **2.49** species respectively. The value of coefficient of Generic diversity is 88.32 which certifies that the community is more or less heterogeneous.

Table-3 presents the allotment of genera and species in different families. From this table the ten dominant families of the site were determined. The family sequence regarding included genera and species in descending order is as follows: Euphorbiaceae (12 spp.) > Leguminosae (10) > Compositae (9) > Verbenaceae (7) > Graminae and Solanaceae (both 6) > Araceae, Malvaceae and Moraceae (both 5)>Apocynaceae and Rutaceae (both 4) >Acanthaceae, Amaranthaceae, Convolvulaceae, Menispermaceae and Rubiaceae (3).

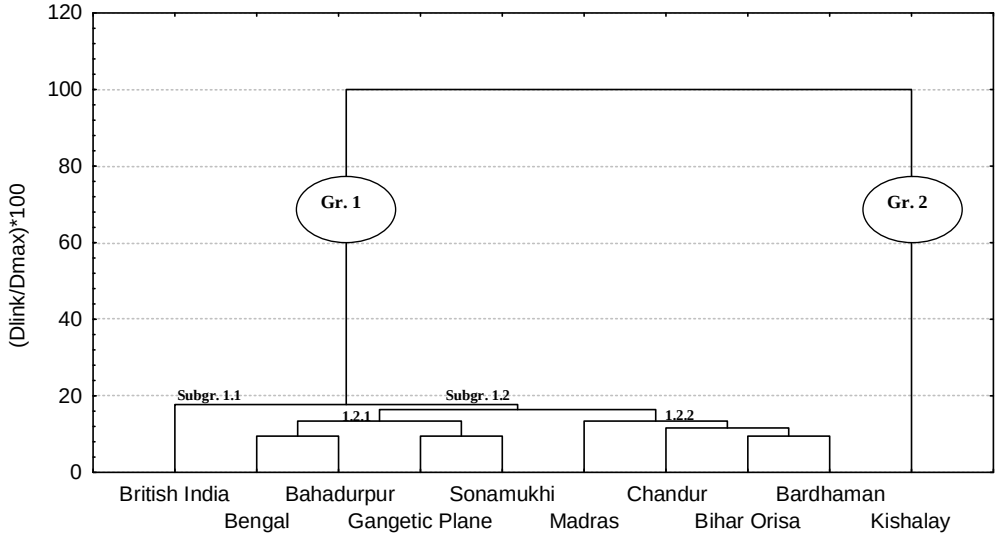
When the ten dominant families in Kishalay were listed along with those of India in general and of her different regions and also of the present Bangladesh region (Table-4[14, 18-25]), the closeness of the concerned flora to those of the Sonamukhi (Bankura), Gangetic Plain and pre-independent Bengal including Bangladesh, Bihar and Orissa is revealed. Thus the adjoining floras have pronounced influence on the concerned flora. In the site, high number of families most of which are with few species and high Generic Coefficient (88.32) give an indication of considerable diversity (heterogeneity) as is so for a tropical community.

Cluster Analysis :

The cluster analysis method provides opportunity to find out overall similarity in pairs between *Operational Site Units* (**OSU**s *i.e* 10 Sites.) and order (classify) all of them in accordance with their affinity (at present, on the basis of ten dominant families in each site). This ultimately yields a *tree diagram or dendrogram* (Fig. 1) (dendrogram of form-relationship) wherefrom interpretations regarding overall similarity or conversely distance between *Operational Site Units* can be conveniently made. Here a *complete-linkage cluster* has been prepared. This can be utilized to compare and determine the relationship of the study site (Kishalay) with other zones.

The *Dendrogram* (Fig. 1) shows that at the *Linkage Distance* of 100 as many as two major groups or clusters (OSU) are recognizable, viz. **Group 1** and **Group 2.** Gr. 1 is subdivided at Linkage Distance of 18 into Subgr. 1.1 (ends in British India) and 1.2; the later subgroup is again divided (at Linkage Distance 16) into subgroups 1.2.1 and 1.2.2. Subgr. 1.2.1 consists of two groups, one with Bengal and Bahadurpur Forest (Nadia District), the other with Gangetic Plane and Sonamukhi Forest (Bankura District). Subgr. 1.2.2 consists of two groups, one with Madras Presidency, other group consists of two groups, one namely Chandur Forest (Hooghly District), the other group consists of Bihar, Orisa and Bardhaman Forest Patches. In the tree diagram it is noteworthy that Kishalay differentiates from the tree at very high Linkage Distance (100). This is natural as the site is under stringent anthropogenic influence. And it is an urban community, while data present in Table-4 relates to forest sites.

Fig.–1. Tree Diagram for ten Sites on the basis of ten dominant families
Complete Linkage
Euclidean distances



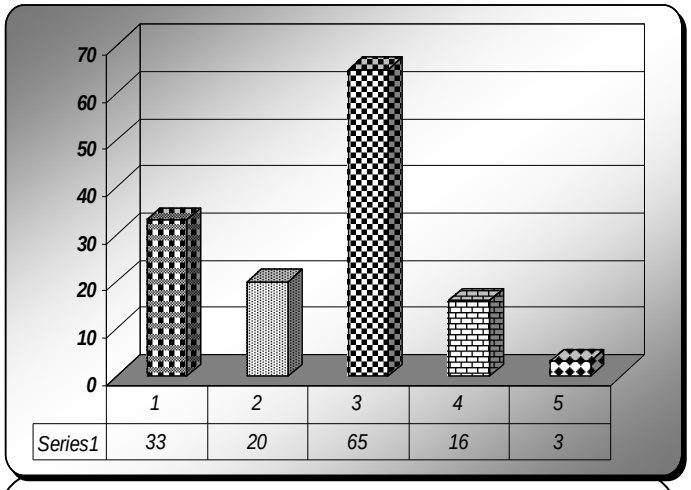


Fig.-2. Habit Analysis of the Concerned Flora; Column 1-5: Tree, Shrub, Herb, Vine and Epiphyte respectively; number below each column (33, 20, 65 and so on) indicates the no. of spp. in each habit category

Table-1. Plants present in the Kishalay Boy's Home Campus

Sr. No.	Plant Name	Family	Habit
1	*Acalypha indica* L.	Euphorbiaceae	herb
2	*Achyranthes aspera* L.	Amaranthaceae	herb
3	*Aegle marmelos* (L.) Corr.	Rutaceae (2)	tree
4	*Albizzia lebbek* Benth.	Leguminosae (2)	tree
5	*Alocasia fornicata* Schoot	Araceae (1)	herb
6	*Alstonia scholaris* R.Br.	Apocynaceae (2)	tree
7	*Alternanthera sessilis* (L.) R.Br.	Amaranthaceae (2)	herb
8	*Alternanthera tamalla*	Amaranthaceae	herb
9	*Anthocephalus chinensis* (Lamk.) A. Rich. ex Walp.	Rubiaceae (2)	tree
10	*Antidesma ghaesembilla* Gaertn.	Euphorbiaceae (2)	small tree
11	*Argemone mexicana* L.	Papaveraceae (2)	herb
12	*Artocarpus hetreophylla* Roxb.	Moraceae (2)	tree
13	*Asplenium nidus* L.	Aspleniaceae (Pt)	epiphytic herb
14	*Azadirachta indica* A. Jsss.	Meliaceae (2)	tree
15	*Bauhinia purpurea* L.	Leguminosae (2)	shrub
16	*Blumea lacera* (Burm. f.) DC.	Compositae (2)	shrub
17	*Blumea mollis*	Compositae (2)	herb
18	*Boerhavia repens* L.	Nyctaginaceae (2)	herb
19	*Bombax ceiba*	Bombacaceae (2)	tree
20	*Borassus flabellifer* L.	Palmae (1)	tree
21	*Brachiaria ramosa* (L.) Stapf.	Gramineae (1)	herb
22	*Calotropis procera* R.Br.	Asclepiadaceae (2)	shrub
23	*Canna indica* L. var. *orientalis*	Cannaceae (1)	herb
24	*Cardiospermum halicacabum* L.	Sapindaceae (1)	vine
25	*Carica papaya* L.	Caricaceae (2)	small tree
26	*Cassia siamea* Lamk.	Leguminosae (2)	tree
27	*Cassia sophera* L.	Leguminosae (2)	shrub
28	*Christella leveille*	Thelypteridaceae (Pt)	herb
29	*Chrozophora rottleri* (Geis.) A. Juss. ex Spreng.	Euphorbiaceae (2)	herb
30	*Citrus decumana* L.	Rutaceae (2)	tree
31	*Cleome rutidosperma* DC.	Capparidaceae (2)	herb
32	*Cleome viscosa* L.	Capparidaceae (2)	herb
33	*Clerodendron viscosum* Vent.	Verbenaceae (2)	shrub

34	*Clerodendron siphonanthus* R. Br.	Verbenaceae (2)	shrub
35	*Clitoria ternatea* L.	Leguminosae (2)	vine
36	*Coccinia grandis* (L.) Voigt	Cucurbitaceae (2)	vine
37	*Colocasia esculenta*	Ara	herb
38	*Costus speciosus* Smith	Costaceae (1)	shrub
39	*Croton bonplandianum* Baill.	Eupborbiaceae (2)	herb
40	*Cuscuta reflexa* Roxb.	Cuscutaceae (2)	vine
41	*Cynodon dactylon* Pers.	Gramineae (1)	herb
42	*Dalbergia sissoo* Roxb.	Leguminosae (2)	tree
43	*Datura metel*	Solanaceae (2)	shrub
44	*Delonix regia*	Leguminosae (2)	tree
45	*Desmodium gangeticum* DC.	Leguminosae (2)	herb
46	*Desmodium triflorum* (L.) DC.	Leguminosae (2)	herb
47	*Diospyros melanpxylon* Roxb.	Ebenaceae (2)	tree
48	*Echinocloa colonum*	Geramineae (1)	herb
49	*Eclipta prostrata* (L.) L.	Compositae (2)	herb
50	*Eleutheranthera ruderalis*	Compositae (2)	herb
51	*Eragrostris tenella* Roem. & Schult.	Gramineae (1)	herb
52	*Euphorbia hirta* L.	Euphorbiaceae (2)	herb
53	*Euphorbia microphylla* Hyne	Euphorbiaceae (2)	herb
54	*Evolvulus alsinoides* L.	Convolvulaceae (2)	herb
55	*Evolvulus nummularius* L.	Convolvulaceae (2)	herb
56	*Ficus religiosa* L.	Moraceae (2)	tree
57	*Ficus cunia* Ham.	Moraceae (2)	shrub
58	*Fioria vitifolia* (L.) Mattei	Malvaceae (2)	shrub
59	*Glycosmis pentaphylla* Corr.	Rutaceae (2)	shrub
60	*Heliotropium indicum* L.	Boraginaceae (2)	herb
61	*Hemigraphis hirta* T. And.	Acanthaceae (2)	herb
62	*Hibiscus rosa-sinensis* L.	Malvaceae (2)	shrub
63	*Ipomoea nil* Roth.	Convolvulaceae (2)	vine
64	*Lantana camara* L.	Verbenaceae (2)	shrub
65	*Leea macrophylla* Roxb. ex Horn.	Sapindaceae (2)	shrub
66	*Leonurus sibiricus* L.	Labiatae (2)	herb
67	*Lepidagathis roxburghiana*	Acanthaceae (2)	herb
68	*Lippia geminata* H.B. & K.	Verbenaceae (2)	herb
69	*Lippia nodiflora* Rich.	Verbenaceae (2)	herb

70	*Mallotus repandus* Muell. –Arg.	Euphorbiaceae (2)	tree
71	*Mangifera indica* L.	Anacardiaceae (2)	tree
72	*Melochia corchorifolia* L.	Sterculaceae (2)	herb
73	*Mikania micrantha* Kunth	Compositae (2)	vine
74	*Mukia scabrella* Arn.	Cucurbitaceae (2)	vine
75	*Moringa pterygospermum* Gaertn.	Moringaceae (2)	tree
76	*Morus indica* L.	Moraceae (2)	tree
77	*Murraya koenigii* Spreng.	Rutaceae (2)	shrub
78	*Musa* sp.	Musaceae (1)	herb
79	*Nasturtium indicum* DC	Brasicaceae (2)	herb
80	*Nicotiana plumbaginifolia* Viv.	Solanaceae (2)	herb
81	*Nyctanthes arbor-tristis* L.	Oleaceae (2)	tree
82	*Odina wodier* Roxb.	Anacardiaceae (2)	tree
83	*Oldenlandia corymbosa* L.	Rubiaceae (2)	herb
84	*Oldenlandia paniculata* L.	Rubiaceae (2)	herb
85	*Oplismenus compositus* Beauv.	Graminae (1)	herb
86	*Oxalis cirniculata* L.	Geraniaceae (2)	herb
87	*Panicum maximum* Jacq.	Graminae (1)	herb
88	*Parthenium hysterophorus*	Compositae (2)	herb
89	*Passiflora suberosa* L.	Passifloraceae (2)	vine
90	*Pedilanthus tihymeloides* Poit.	Euphorbiaceae (2)	shrub
91	*Phoenix sylvestris* Roxb.	Palmae (1)	tree
92	*Phyllanthus fraternus* Webster	Euphorbiaceae (2)	herb
93	*Phyllanthus reticulatus* Poir	Euphorbiaceae (2)	shrub
94	*Phymatosorus longissimus* (Blume) Pichi Serm.	Polypodiaceae (Pt)	epiphytic herb
95	*Physalis minima* L.	Solanaceae (2)	herb
96	*Pilea microphylla* Liebm.	Urticaceae (2)	herb
97	*Plumeria lutea*	Apocynaceae (2)	tree
98	*Polyalthia longifolia* Benth. & Hook. f.	Annonaceae (2)	tree
99	*Polyalthia suberosa* Benth. & Hook. f.	Annonaceae (2)	Shrub
100	*Polycarpon prostratum* Stapf.	Caryophyllaceae (2)	herb
101	*Polygonum orientale* L.	Polygonaceae (2)	shrub
102	*Portulaca oleracea* L.	Portulacaceae (2)	herb
103	*Pothos sp*	Araceae (1)	vine
104	*Pouzolzia indica* Gaud.	Urticaceae (2)	herb
105	*Psidium guyava* L.	Myrtaceae (2)	small tree

106	*Pteris longifolia* L. var. *vittata*	Polypodiaceae (Pt)	herb
107	*Quisqualis indica* L.	Combretaceae (2)	vine
108	*Ricinus communis* L.	Euphorbiaceae (2)	shrub
109	*Ruellia tuberosa* L.	Acanthaceae (2)	herb
110	*Rumex dentatus* L.	Polygonaceae (2)	herb
111	*Scindapsus aureus* Schott.	Araceae (1)	vine
112	*Scoparia dulcis* L.	Scrophulariaceae (2)	herb
113	*Sida rhombifolia* var. *retusa*	Malvaceae (2)	shrub
114	*Sida rhombifolia var. rhombifolia*	Malvaceae (2)	shrub
115	*Solanum nigrum* L.	Solanaceae (2)	herb
116	*Solanum sisymbrifolium* Lamk.	Solanaceae (2)	herb
117	*Solanum torvum* Swartz.	Solanaceae (2)	shrub
118	*Stephania hernandifolia* Walp.	Menispermaceae (2)	vine
119	*Streblus asper* Lour.	Moraceae (2)	tree
120	*Swietenia mahagoni* L.	Meliaceae (2)	tree
121	*Syngonium podophyllum*	Araceae (2)	vine
122	*Tabernaemontana coronaria* R. Br.	Apocynaceae (2)	small tree
123	*Tamarindus indica* L.	Leguminosae (2)	tree
124	*Tectona grandis* L. f.	Verbenaceae (2)	tree
125	*Tiliacora racemosa* Colebr.	Menispermaceae (2)	vine
126	*Tinospora cordifolia* Miers	Menispermaceae (2)	vine
127	*Tragia involucrata* L.	Euphorbiaceae (2)	herb
128	*Trema orientalis* Bl.	Verbenaceae (2)	tree
129	*Tridax procumbens* L.	Compositae (2)	herb
130	*Triumfetta rhomboidea* Jacq.	Tiliaceae (2)	herb
131	*Urena lobata* L.	Malvaceae (2)	shrub
132	*Vanda tesselata* (Roxb.) Lodd ex G. Don	Orchidaceae (1)	epiphytic herb
133	*Vernonia cinerea* Less.	Compositae (2)	herb
134	*Vinca rosea* L.	Apocynaceae (2)	herb
135	*Vitis trifolia* L.	Ampelideae (2)	Vine
136	*Xanthium strumarium* L.	Compositae (2)	herb
137	*Zizyphus jujuba* Lamk.	Rhamnaceae (2)	Tree

Number within parenthesis after each family name indicates number of cotyledons, ‘Pt’ stands for pteridophyte

Table-2. Habit analysis and taxonomic analysis of the concerned flora

<table>
<tr><td colspan="9">Habit Analysis</td></tr>
<tr><td colspan="9">Tree: Shrub: Herb: Vine: Epiphyte :: 33:20:65:16:3 :: 11: 6.67: 21.67: 5.3: 1;
% values – Tree: 24.09%, Shrub: 14.6%, Herb: 47.45%,Vine: 11.68%, Epiphyte: 2.19%</td></tr>
<tr><td colspan="9">Taxonomic Analysis</td></tr>
<tr><td colspan="2">Total no. plants: 137</td><td colspan="4">Family:Genus:Species :: 55: 121: 137 :: 1: 2.2: 2.49</td><td colspan="3" rowspan="4">Coefficient of Generic Diversity (total) = 100 * G/S = 100* 121/137 = 88.32</td></tr>
<tr><td colspan="2">Dicotyledons: 116</td><td colspan="4">Family:Genus:Species :: 45: 100: 116 :: 1: 2.22: 2.58</td></tr>
<tr><td colspan="2">Monocotyledons: 17</td><td colspan="4">Family:Genus:Species :: 7: 17: 17 :: 1: 2.43: 2.43</td></tr>
<tr><td colspan="2">Pteridophyte:4</td><td colspan="4">Family:Genus:Species :: 3: 4: 4 :: 1: 1.3: 1.3</td></tr>
<tr><td colspan="2" rowspan="3">Dicot:Monocot Ratio</td><td colspan="4">Dicot Fam : Monocot Fam :: 45:7 :: 6.43:1</td><td rowspan="3">Species quota for each family (total)</td><td rowspan="3">Species quota for each genus(total)</td><td rowspan="3">Genus quota for each family(total)</td></tr>
<tr><td colspan="4">Dicot Genus : Monocot Genus :: 100 :17 :: 5.88:1</td></tr>
<tr><td colspan="4">Dicot Spp. :Monocot Spp. :: 116:17 :: 6.82:1</td></tr>
<tr><td rowspan="4">%
Values</td><td>Total Angiosperms</td><td colspan="2">Dicotyledons</td><td colspan="2">Monocotyledons</td><td rowspan="4">137/55=2.49</td><td rowspan="4">137/121=1.13</td><td rowspan="4">121/55=2.2</td></tr>
<tr><td>Fam: 52</td><td>45</td><td>86.54%</td><td>7</td><td>13.46 %</td></tr>
<tr><td>Gen: 117</td><td>100</td><td>85.47%</td><td>17</td><td>14.53%</td></tr>
<tr><td>Spp: 133</td><td>116</td><td>87.23%</td><td>17</td><td>12.77%</td></tr>
</table>

Habit Analysis :

Sir Theophrastus of Eresus depending on the habit or stature of plants classified them into four categories: trees, shrubs, undershrubs and herbs. This ancient elementary habit classification can indicate some ecological features of a site. For example, high tree abundance in a tropical biome indicates the existence of some kind of forest formation, adequate soil moisture and nutrients. In the study site on the overall basis the tree:shrub:herb:vine:epiphyte ratio is **11: 6.67: 21.67: 5.3: 1**, their relative percent values are **24.09, 4.6, 47.45, 11.68** and **2.19** respectively (Table-2). Fig. 2 graphically shows the relative proportion of these habit categories. The partial abundance of trees (24.09) indicates the poverty of the site in arborescent diversity. The value of herb (47.45) also indicates poverty in trees and shrubs, so light is allowed to reach the ground to support high herbal diversity. The value of vines (11.68) and epiphytes (2.19) indicate that at least at some sites the canopy is dense (creating canopy hindrance for light to penetrate and reach the ground) to provide niches for vines and epiphytes. These vines are well established that seek sunlight and so approach canopy of trees by climbing. On the other hand the percent

Table-3. Allotment of genera and species in different families

Sr. No.	Family	No. of genus	%	No. of species	%
1.	Acanthaceae	3	2.47	3	2.18
2.	Amaranthaceae	**2**	1.65	**3**	2.18
3.	Ampelidae	1	0.82	1	0.72
4.	Anacardiaceae	**2**	1.65	**2**	1.45
5.	Annonaceae	**1**	0.82	**2**	1.45
6.	Apocynaceae	**4**	**3.3**	**4**	2.91
7.	**Araceae**	**5**	**4.13**	**5**	3.65
8.	Asclepiadaceae	1	0.82	1	0.72
9.	**Aspleniaceae**	1	0.82	1	0.72
10.	Bombacaceae	1	0.82	1	0.72
11.	Boraginaceae	1	0.82	1	0.72
12.	Brassicaceae	1	0.82	1	0.72
13.	Cannaceae	1	0.82	1	0.72
14.	Capparidaceae	**1**	0.82	**2**	1.45
15.	Caricaceae	1	0.82	1	0.72
16.	Caryophyllaceae	1	0.82	1	0.72
17.	Combretaceae	1	0.82	1	0.72
18.	Compositae	**8**	**6.61**	**9**	6.56
19.	Convolvulaceae	**2**	1.65	**3**	2.18
20.	Costaceae	1	0.82	1	0.72
21.	Cucurbitaceae	2	1.65	2	1.45
22.	Cuscutaceae	1	0.82	1	0.72
23.	Ebenaceae	1	0.82	1	0.72
24.	Euphorbiaceae	**10**	**8.26**	**12**	8.75
25.	Geraniaceae	1	0.82	1	0.72
26.	Graminae	6	4.95	6	4.38
27.	Labiatae	1	0.82	1	0.72
28.	Leguminosae	**8**	**6.61**	**10**	7.29
29.	Malvaceae	**4**	**3.3**	**5**	3.65
30.	Moraceae	**4**	**3.3**	**5**	3.65
31.	Moringaceae	1	0.82	1	0.72
32.	Meliaceae	2	1.65	2	1.45
33.	Menispermaceae	3	2.47	3	2.18
34.	Musaceae	1	0.82	1	0.72
35.	Myrtaceae	1	0.82	1	0.72

36.	Nyctaginaceae	1	0.82	1	0.72
37.	Oleaceae	1	0.82	1	0.72
38.	Orchidaceae	1	0.82	1	0.72
39.	Palmae	2	1.65	2	1.45
40.	Papavaraceae	1	0.82	1	0.72
41.	Passifloraceae	1	0.82	1	0.72
42.	Polygonaceae	2	1.65	2	1.45
43.	**Polypodiaceae**	2	1.65	2	1.45
44.	Portulacaceae	1	0.82	1	0.72
45.	Rhamnaceae	1	0.82	1	0.72
46.	Rubiaceae	**2**	1.65	**3**	2.18
47.	Rutaceae	4	**3.3**	4	2.91
48.	Sapindaceae	2	1.65	2	1.45
49.	Scrophulariaceae	1	0.82	1	0.72
50.	Solanaceae	**4**	**3.3**	**6**	4.38
51.	Sterculiaceae	1	0.82	1	0.72
52.	**Thelypteridaceae**	1	0.82	1	0.72
53.	Tiliaceae	1	0.82	1	0.72
54.	Urticaceae	2	1.65	2	1.45
55.	Verbenaceae	**5**	**4.13**	**7**	5.1
	Total:	**121**		**137**	

value of herbs indicates discontinuous canopy that allow a portion of sunlight to penetrate which, support herbal growth.

Habitat Diversity :

The site shows a high degree of habitat diversity as well as heterogeneity. A penetrating road runs through the campus that contributes to increase species diversity by adding some ruderal (road-side) species like *Acalypha indica, Achyranthes aspera, Croton bonplandianum, Eleutheranthera ruderalis etc.* But ultimately this might result in ecological fragmentation and shrinkage of ecological niche of phanerophytes through edge effect. There are meadows and pastoral grounds also harbouring some grass species, *Alternanthera sessilis, Alternanthera tamalla, Argemone mexicana, Boerhavia repens, Cassia sophera, Chrozophora rottleri, Cleome rutidosperma etc.* There are two dry pond beds and some small wet places supporting species like *Alocasia fornicata, Borassus flabellifer, Colocasia esculenta, Costus speciosus, Lippia geminata, L. nodoflora, Panicum maximum, Polygonum orientale, Portulaca oleracea, Rumex dentatus etc*. Some large trees such as *Albizzia lebbek* and *Mangifera indica* provide niche for some epiphytes such as *Asplenium nidus, Phymatosorus longissimus* and *Vanda tesselata*. Litter and detritus from

Table-4. Ten dominant families of different forest flora in India

Kishalay	Bardhaman Forest Patches	Sonamukhi Forest[18]	Chandur Forest[19]	Bahadurpur Forest[20]	Bengal[14]	Gangetic Plain[21]	Bihar and Orissa[22]	Madras Presidency[23]	British India[24]	India[25]
Euphorbiaceae	Leguminosae*	Leguminosae*	Leguminosae*	Leguminosae*	Leguminosae*	Gramineae	Leguminosae*	Leguminosae*	Orchidaceae	Leguminosae*
Leguminosae	Gramineae	Graminae	Euphorbiaceae	Euphorbiaceae	Gramineae	Leguminosae*	Gramineae	Gramineae	Leguminosae *	Compositae
Compositae	Rubiaceae	Compositae	Acanthaceae	Verbenaceae	Cyperaceae	Cyperaceae	Cyperaceae	Rubiaceae	Gramineae	Scrophulariaceae
Verbenaceae	Euphoprbiaceae	Euphorbiaceae	Amaranthaceae	Gramineae	Compositae	Compositae	Compositae	Acanthaceae	Rubiaceae	Labiatae
Graminae and Solanaceae	Compositae and Cyperaceae	Acanthaceae	Malvaceae	Rubiaceae	Orchidaceae	Scrophulariaceae	Euphorbiaceae	Euphorbiaceae	Euphorbiaceae	Acanthaceae
		Amaranthaceae	Cucurbitaceae	Malvaceae	Euphorbi-aceae	Malvaceae	Acanthaceae	Orchidaceae	Acanthaceae	Rubiaceae
Araceae, Malvaceae and Moraceae	Acnthaceae	Convolvulaceae	Rubiaceae	Compositae	Urticaceae **	Acanthaceae	Rubiaceae	Compositae	Compositae	(only six dominant families were obtained from literature)
Apocynaceae and Rutaceae	Combretaceae and Malvaceae	Verbenaceae	Verbenaceae	Cyperaceae	Rubiaceae	Euphorbiaceae	Orchidaceae	Cyperaceae	Cyperaceae	
		Rubiaceae	Asclepiadaceae	Amaranthaceae	Scrophul-ariaceae	Convolvulaceae	Labiatae	Labiatae	Labiatae	
	Apocynaceae	Cypreraceae	Urticaceae**	Urticaceae**	Convolvula-ceae	Labiatae	Scrophularia-ceae	Asclepiadaceae	Urticaceae **	

G = Genus, S = Species; *Leguminosae *sensu lato* (consisting of Papilionaceae, Caesalpiniaceae and Mimosaceae)
** Urticaceae *sensu lato* (consisting of Urticacaea *sensu stricto*, Moraceae and Cannabinaceae)

some large trees provide niche for some basidiomycetan fungi. The long boundary wall and abandoned old houses provide mural habitats providing niches for *Ficus religiosa, Ipomoea nil, Pouzolzia indica, Pteris longifolia, Vinca rosea etc*. Constructional rubbish provides niches for *Argemone mexicana, Pteris sp., Solanum sisymbrifolium etc*. In the site, *Clerodendrum viscosum* indicates prevalence of disturbance in the community and *Lantana camara* indicates ecological degradation. The latter species may start either secondary succession or invasion of adjoining areas. Anthropogenically introduced species for religious purpose are *Anthocephalus chinensis, Hibiscus rosa-sinensis, Plumeria lutea etc*. There are some horticultural species also such as *Citrus decumana, Clitoria ternatea, Musa* sp. *etc*. Some other species, which once upon a time was introduced and fostered as garden plants such as *Canna indica, Quisqualis indica, Scindapsus aureus, Syngonium podophyllum etc*. now grow as escape species. All the ecological disturbances in the area such as road and other constructional works, boundary walls, abandoned houses, constructional rubbish, grazing *etc*. possibly function as 'intermediate disturbance' and contribute to increase in diversity, lending support to the **intermediate disturbance hypothesis**[26].

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