

## **Phyto-sociological study of herbaceous vegetation of Darjeeling Govt. College Campus in West Bengal, India**

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### **Abstract**

Phytosociology is a common term applied in plant ecology to know the actual status of any vegetation. It broadcasts the quantitative parameters to locate the position of species in connection with their community structure. At a glance the structure is unique but as the vegetation is cryptic so the structure might be dynamic due to passing time. Unique pattern may change from time to time due to some factors locally fit to deliver the variability of structural change of vegetation. Nutritional factors may have the role to pre-deposition of seeds or propagules to develop the new vegetation in a place. Therefore, repeated study is essential to know the actual structure of vegetation pattern in any community even to continue the process to generate an overview and to draw a comment on it. The present study, therefore is a preliminary study of phytosociology of herbaceous vegetation in the campus of Darjeeling Govt. College under Eastern Himalaya. Frequency, density and abundance of some herbaceous plants have been made to justify the position or status in the ecosystem of college campus.

**T**he occurrence of species in respect of unit space is called frequency. The size of a population in relation to a definite unit of space is called density. The measurement of the number of individuals per unit area is called crude density. Density measured in terms of the amount of area available as living space is ecological density. Abundance is another index which describes the occurrence of species in respect of quadrats in which species is present rather than quadrats studied. So, it is more valuable rather than the density of species in

terms of general discussion. All parameters are determinants of community structure in any ecosystem. The present study therefore tends to highlight on Goose grass, Fairy prime rose, Lady's purse, Stinging nettle, Daisy Fleabane, Field milk thistle, Calamint, Pali, Hairy bitter cress, Many stem cudweed and Knot weed or Bell flowers/ Smart weed which are common to the field of Darjeeling Himalaya.

### *Study Area :*

Drajeeling Government College was

established its function since 1948 onwards. The college has its unique position to deliver knowledge to the community in and around North East India, nay to Darjeeling and Sikkim Himalayan people. The serene environment attracts students, teachers and researchers from time to time. The campus has nice *Rhododendron*, *Castanopsis*, *Alnus*, *Juniperus*, *Cupressus*, *Elaeocarpus*, *Acer oblongum*, *Acer campbellii*, *Saurauria*, *Taxus*, *Abies*, *Michelia*, *Camellia* and *Pine* trees. Shrubby vegetation predominated by *Cestrum*, *Urtica*, *Abutilon*, *Geardina* etc. Other species blooming flowers in the garden round the year are *Dahlia*, *Abutilon*, *Cestrum*, *Marigold*, *Chrysanthemum*, *Dianthus*, *Viola*, Fox-glove, and different types of Roses. Orchids are common on the trees particularly on Maple and on *Rhododendron* trees near Geography department. Attractive tits and other birds of colourful kind visit the flowers and get the pollens collected to carry these to other sites for pollination. Medicinal and edible plants found were tree tomato, squash, radish, spinach, coriander etc. in different seasons. From upper Hooker's Road to Lower Hill Cart Road the valley exhibits different herbaceous vegetation. Among them some important and dominant species are *Polygonum*, *Geranium*, *Trifolium*, *Galium*, *Calanthe*, *Calceolaria* etc. Bryophytes and pteridophytes are common in the campus. Only the middle most position of habitat in between old Physics Department and Library section was taken for study. As there is no recorded evidence on College campus so the present study has been taken into consideration for further study on the beautiful and scenic college campus popular as Heritage College in Darjeeling Himalaya.

Groups of individuals of different species in different habitats and in different combinations form a community. So, for the complex aggregation it is essential to study the important community data. Billings<sup>1</sup> described it as the complex aggregation of plants. Remembering these it is essential to study the pattern of groups by individuals in any ecosystem. Therefore, a general idea of any study includes some items that is essential to study any scientific experiment or in field trials to determine the amplitude of any study result. Therefore, the present study includes linen tape, plastic scale, nails, threads, clips, board pen, pencil, graph paper, hammer, eraser, note book, camera, poly bags, old news papers, tags, GPS etc. for study and research. Plant species were identified using State Flora brought out by Prain<sup>3</sup>, Flowers of the Himalaya by Polunin and Stainton<sup>4</sup>. Other research papers published from time to time have also been consulted. Among them some are by Sharma<sup>6</sup> and Das<sup>2</sup> from the same area with the help of local people and some non-teaching staff members.

A fixed quadrat of 1 m<sup>2</sup> was laid on a plain filled with herbaceous vegetation to study the frequency, abundance and density of herbaceous plants in College campus. Using nails, threads and tape the fixed quadrats were laid in 5 different micro habitats in Darjeeling Govt. College campus during March 2015-2016. The species available there were recorded by Post Graduate students of Botany Department as per the table format provided by me during practical class. From the data available in field from fixed quadrats we, *i.e.* teacher and students analysed the frequency, abundance and density of herbaceous species. Actual data was obtained using formulae

mentioned below given by Mishra,<sup>3</sup>.

$$\text{Frequency} = \frac{\text{Number of quadrats in which species present}}{\text{Number of quadrats studied}} \times 100$$

$$\text{Abundance} = \frac{\text{Number of individuals of species in all quadrats}}{\text{Number of quadrats in which species present}}$$

$$\text{Density} = \frac{\text{Number of individuals of species in all quadrats}}{\text{Number of quadrats studied}}$$

The serene campus comprised of a luxuriant floral element in which ground cover with a less or lesser number of vegetation during March (Table-1) when the environment was very charming. It is evident from the result that highest frequency was shared dually by *Primula malacoides* (16.6) and *Galium* sp. (16.6) followed by *Calceolaria* sp. (9.99), whereas lowest frequency was observed dually in case of *Gnaphalium* sp. (3.2) and *Polygonum* sp. (3.2). Similarly, highest abundance was observed in case of *Pilea umbrosa* (16.5) followed by *Primula malacoides* (16.2), whereas lowest abundance value was observed in case of *Polygonum* sp. (1.0). Likewise, highest density was observed in *Primula malacoides* (16.2) followed by *Pilea umbrosa* (13.2), whereas lowest abundance was observed in case of *Polygonum* sp. (0.2). It is argued that species like *Pilea umbrosa* was highly abundant (16.5) and *Polygonum runcinatum* was least abundant (1.0). Species like *Primula malacoides* was moderately abundant (16.2) in the said community of Darjeeling Govt. College Campus during summer (Fig 1).

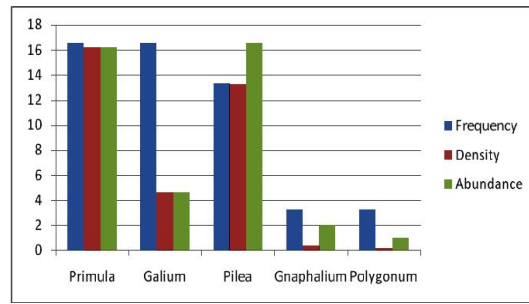


Fig. 1 Ecological status of herbaceous species in Darjeeling Govt. College Campus (Values are Frequency, density and abundance against herbaceous species)



Fig. 2. *Primula* with *Oxalis* sp.

To accurately measure the community structure, data should be collected seasonally and from more quadrats as replicas which might be a form for fixed study sites. Statistical analyses must be included to calculate and represent the overall data. The method employed is least quadrat method that has simplicity to determine the community characters without any labour for students study. But for complete study *i.e.* in research we need a range of data that may come out from a wide distribution of species so need a line transect study through slope. Recording of data should be followed for successive years to know the change or fluctuation of pattern of any composition.

Table 1 Eco-status of herbs available in Darjeeling Govt. College campus during March

Sl. No.	Name of species	Q1	Q2	Q3	Q4	Q5	Total	Quadrats in which species present	Total Quadrats studied (Qs)	F	RF	D	A
1.	<i>Primula malacoides</i> Franch.	13	08	31	10	17	81	05	05	100	<b>16.6</b>	<b>16.2</b>	16.2
2.	<i>Galium aparine</i> L.	01	01	10	05	06	23	05	05	100	<b>16.6</b>	4.6	4.6
3.	<i>Calceolaria mexicana</i> Benth.	02	00	00	07	04	13	03	05	60	9.99	2.6	4.3
4.	<i>Urtica dioica</i> L.	02	00	00	00	01	03	02	05	40	6.66	0.6	1.5
5.	<i>Erigeron bellidioides</i> Griseb.	06	02	02	00	00	10	03	05	60	9.90	2.0	3.3
6.	<i>Sonchus arvensis</i> L.	01	02	00	00	00	03	02	05	40	6.66	0.6	1.5
7.	<i>Calamintha nepeta</i> (L.) Savi	01	00	00	00	20	21	02	05	40	6.66	4.2	10.5
8.	<i>Pilea umbrosa</i> Blume	04	00	15	30	17	66	04	05	80	13.32	13.2	<b>16.5</b>
9.	<i>Cardamine hirsuta</i> L.	01	00	10	00	00	11	02	05	40	6.66	2.2	5.5
10.	<i>Gnaphalium polycaulon</i> Pers.	00	00	00	02	00	02	01	05	20	<b>3.20</b>	0.4	2.0
11.	<i>Polygonum runcinatum</i> Buch.-Ham. ex D. Don	00	00	00	00	01	01	01	05	20	<b>3.20</b>	<b>0.2</b>	<b>1.0</b>

Note: Q-quadrat, Qs-duadrats, F-Frequency, RF-Relative frequency, D-Density, A-Abundance, data taken from field on 15.03.2014 and 15.3.2016

Therefore, succession and any kind of perturbation study may be included with the study or study of other composition nearby to predict and qualify the goal in near future.

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