

Life classification and ethnobotanical survey of arasu cement factory, Ariyalur District, Tamil Nadu, India

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Abstract

Present expedition has identified with the different life form categories and biological spectrum of Arasu cement factory forest range, Ariyalur Tamilnadu, India. A total of 66 species belonging to 39 families and 65 genera has been recorded from the area which was categorized in different life forms based on the position of their perennating bud. The phanerophytes (72.72%), were found to be dominant followed by Therophytes (10.66%) and, Hemicryptophytes (4.54%), Helophytes (3.03%), Lianas (9.09%). Biological spectrum on life form was prepared and compared with Raunkiaer's normal biological spectrum as well as the spectra of the adjoining areas prepared by other workers. The study characterizes Thero-phanerophytic type of phytoclimate.

Keywords: biological spectrum, phytoclimate, life-form

1. Introduction

A life form is characterized by plant compromise to certain ecological conditions is an important physiognomic attributes that have been widely used in vegetation studies [15]. In throughout the world. Raunkiaer's principle would also inquire more deterioration thorough check and detailed observation of micro and macroclimate [23] as well as human disturbance of a particular area [1]. Most ecologist have been accepting Raunkiaer's view because of the fact that climate is main cause in the development of various life forms in an area. For the first time formulated the concept of the life forms for which he considered the location of perennating buds or organs [6]. used it as descriptive tool for classifying plant life forms based on the position and degree of protection of the renewing buds, which are responsible for the renewal of the plant's aerial body when the favorable season comes [18]. The preliminary to this is a classification of plants according to shoot-apex or bud protection and the biological types or life forms form the basis of the earlier remainders. According to this system, plant species can be grouped into five main classes: Phanerophytes, Therophytes, Hemicryptophytes, Lianas and Helophytes. The percentage of various life form classes put together is called as the biological spectrum. constructed a normal spectrum which could act as a null model against which different life form spectra could be compared [18]. Raunkiaer's normal spectrum indicates a phanerophytic community for the world and deviation from it determines the phytoclimate of the habitats. The occurrence of similar biological spectra in different regions indicates similar climatic conditions. Differences in the life form distribution between the normal spectrum and a biological spectrum would point out which life form characterizes the phytoclimate or the vegetation under study. When working with a species list, every species has the same equivalent in the biological spectrum. [18, 3]. Generally a complete list of plants called floristic configuration and their life-forms define the appearance of plant community. Since structure and rate of configuration are sensitive indicators of whole environment, it is important to study the floristic configuration and life-forms of different plants to find

phytoclimate of the area. The biological spectra of different regions of Arasu cement factory have been worked, [9, 8, 4, 9, 13, 24, 14, 12, 26, 10, 21, 7, 5, 16]. The present work has been carried out to study the assemblage of different life forms using floristic spectrum and to prepare the biological spectrum to infer the existing phytoclimate.

2. Materials and Methods

The present study has been carried out in Arasu cement factory range (Latitude 780 40' 100 300. 780 56' 18' 79° 31 East) located in Ariyalur district. This forest range covers an altitudinal range of 1km and experiences great extreme of temperature with January recorded as hottest and June coldest month with average maximum and minimum temperature of 31 °C to 21 °C. Average rainfall of area is 349.6 mm (Normal). Mostly rainfall occurs during monsoon season. Extensive field survey was conducted in the study area from March, 2016, in order to record the floristic composition and life form (on the basis of nature of perennating buds of plants species). All species were assigned a suitable life form according to Raunkiaer (1934) life form classification such as Therophytes (TH), Macrophanerophytes (MM), Nanophanerophytes (N), Chamaephytes (CH), Hemicryptophytes (H), Lianas (L), Geophytes (G), Hydrophyte (HH) and Epiphyte (E).

The percentage of life form was calculated as follows

$$\% \text{ Life Form} = \frac{\text{Number of species in any life form}}{\text{Total number of species of all life forms}} \times 100$$

Biological spectrum was prepared for the study area and was compared with the Raunkiaer's (1934) normal biological spectrum as well as the spectra of the adjoining areas.

3. Results and Discussion

Total number of species (66) recorded from study area Arasu cement factory has been classified in different life form classes based on the Raunkiaer's system of classification. Number of species of different life form has been depicted in Table 1. The phytospectrum of the present study shows variation from the normal biological spectrum of Raunkiaer

(1934) (Fig. 1). Perusal of the table revealed phanerophytes (72.72%) to be the largest class followed by Therophytes (10.66%) and Lianas (9.09%). Thus, the biological spectrum of the research area shows Thero-phanerophytic phytoclimate. The comparison of the biological spectrum of the study area with Raunkiaer's normal biological spectrum is presented in Table 3 (Fig-3) and Table-4 (Fig-4). The higher percentage of therophyte (72.72%) occurring in the area is the

characteristic of subtropics and often related to soil conditions and climate (Subramani *et al.*, 2007). The predominance of therophytes is attributed to various factors like prevalent microclimate of the region coupled with anthropogenic activities like grazing, logging, felling, deforestation, introduction of annual weeds, etc., as has also been advocated by other workers (Sharma, 2003; Sher and Khan, 2007; Khan *et al.*, 2011).

Table 1

S.No	Plant Name	Family	Habit	Parts of used medicine	Life form
1	<i>Abutilon indicum</i> G.oon	Malvaceae	Herb	-	Phanerophytes
2	<i>Achyranthes aspera</i> Linn.	Amaranthaceae	Herb	Whole plant	Therophytes
3	<i>Aerva landa</i> (L.) Juss.	Amaranthaceae	Herb	-	Helophytes
4	<i>Polylthia langifolia</i> (Soon.) Th.W	Annonaceae	Tree	Fruit	Therophytes
5	<i>Cassia ariculata</i> L.	Caesalpinaceae	Shrub	Whole plant	Phanerophytes
6	<i>Cardios permum halicabum</i> L.	Sapindaceae	Climber	Whole plant	Phanerophytes
7	<i>Calatropis giganta</i> L.	Asclepidaceae	Shrub	-	Phanerophytes
8	<i>Cocinia indica</i> Wt & Arn.	Cucurbitaceae	Climber	Fruit	Lianas
9	<i>Coculus hersutes</i>	Menispermaceae	Climber	-	Phanerophytes
10	<i>Cynodan dactylan</i> Linn.	Papaceae	Shrub	Whole plant	Hemicryprophyte
11	<i>Cyprus rotundus</i> Linn.	Peraceae	Shrub	-	Hemicryprophyte
12	<i>Alangium solvifolium</i> L.f	Alangiaceae	Tree	-	Phanerophytes
13	<i>Lucus aspera</i> L.	Lamiaceae	Herb	Whole plant	Therophytes
14	<i>Morinda tendoriya</i>	Rubiaceae	Tree	Fruit	Phanerophytes
15	<i>Ocimum sandam</i> L.	Lamiaceae	Shrub	Whole plant	Therophytes
16	<i>Passiflora foetida</i> L.	Passifloraceae	Climber	-	Therophytes
17	<i>Pongamia pinnata</i> L.	Fabaceae	Tree	Seed	Phanerophytes
18	<i>Sygium cummi</i> (L.) Skeels	Myrtaceae	Tree	Fruit	Phanerophytes
19	<i>Tectona grandies</i> L.	Verbinaceae	Shrub	-	Phanerophytes
20	<i>Zizphus mauritiana</i> Lam.	Rhamaceae	Tree	Fruit	Phanerophytes
21	<i>Casurina equisetifolia</i> L.	Casurinaceae	Tree	-	Phanerophytes
22	<i>Delonix regia</i> (Bojj Rafi.)	Casalpinaceae	Tree	-	Phanerophytes
23	<i>Hibiscus rosasinesis</i>	Malvaceae	Herb	Flower,leaf	Phanerophytes
24	<i>Azadiracta indica</i> A.Juss.	Meliaceae	Tree	Whole plant	Phanerophytes
25	<i>Mangifera indica</i> L	Anacardiaceae	Tree	Fruit	Phanerophytes
26	<i>Moraga olefera</i> Lam.	Moringaceae	Tree	Whole plant	Phanerophytes
27	<i>Cassia fistula</i> L.	Caesalpinaceae	Herb	-	Phanerophytes
28	<i>Albizia amara</i> (Roxb.) Bojn in Encyl.	Mimosoideae	Tree	-	Phanerophytes
29	<i>Albizia lebbek</i> (L.) Benth in Hook.Lond.J.Bot	Mimosoideae	Tree	-	Phanerophytes
30	<i>Acacia leucophloea</i> (Roxp.) Wild .sp	Mimosoidea	Tree	-	Phanerophytes
31	<i>Ficus benghalensis</i> L.	Moraceae	Tree	Fruit	Phanerophytes
32	<i>Lowsoina inermis</i> L.	Lythraceae	Shrub	Leaf	Phanerophytes
33	<i>Catharanthus thevetia</i> (L.) Lippold	Apocynaceae	Shrub	Root	Phanerophytes
34	<i>Andrographis paniculata</i> (Burm.f.) Wallicher Nees in Wallach,	Acanthaceae	Shrub	-	Phanerophytes
35	<i>Barleria cristata</i> L. sp	Acanthaceae	Shrub	-	Phanerophytes
36	<i>Crossandra fundibuliformis</i>	Acanthaceae	Shrub	-	Phanerophytes
37	<i>Justicia adhatoda</i> L	Acanthaceae	Shrub	Leaf	Phanerophytes
38	<i>Leucas aspera</i> (Willd.) Link.	Lamiaceae	Herb	Whole plant	Therophytes
39	<i>Achyranthes aspera</i> L	Amaranthaceae	Herb	Whole plant	Hemicrotophytes
40	<i>Acalypha indica</i> L	Euphorbiaceae	Herb	Whole plant	Therophytes
41	<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	Shrub	-	Phanerophytes
42	<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	-	Therophytes
43	<i>Borassus flabellifer</i> L	Arecaceae	Tree	-	Phanerophytes
44	<i>Cocos nuifera</i> L.	Arecaceae	Tree	Fruit	Phanerophytes
45	<i>Cyprus rotundus</i> L	Cyperaceae	Herb	-	Helophytes
46	<i>Bambusa arundinacea</i>	Poaceae	Tree	Whole plant	Phanerophytes
47	<i>Bogainvillea buttiana</i>		Shrub	-	Phanerophytes
48	<i>Nerium indicum</i> L.	Apocynaceae	Shrub	-	Phanerophytes
49	<i>Mauritiana</i> Lam.	Rhamnaceae	Tree	-	Phanerophytes
50	<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub	Seed	Phanerophytes
51	<i>Tamarindus indica</i> L.	Casalpinaceae	Tree	Fruit,Leaf	Phanerophytes
52	<i>Ficus religiosa</i>	Moraceae	Tree	Whole plant	Phanerophytes

53	<i>Vitex negundo</i>	Verbenaceae	Herb	Whole plant	Phanerophytes
54	<i>Datura metal L.</i>	Solanaceae	Herb	Leaf	Phanerophytes
55	<i>Tamarindus indica L.</i>	Casalpinaceae	Tree	Leaf,Fruit	Phanerophytes
56	<i>Cissus qundrangularis L.</i>	Vitaceae	Climber	Whole plant	Phanerophytes
57	<i>Sygium cummi (L).Skeels</i>	Myrtaceae	Tree	Fruit	Phanerophytes
58	<i>Tectona grandies L.</i>	Verbinaceae	Tree	-	Phanerophytes
59	<i>Tolpargiya longifolia</i>	Fabaceae	Tree	-	Phanerophytes
60	<i>Sydiu guzava</i>	Rutaceae	Tree	Fruit	Phanerophytes
61	<i>Citras medica</i>	Rutaceae	Tree	Friut	Phanerophytes
62	<i>Aole vera L.</i>	Liliaceae	Shrub	Whole plant	Phanerophytes
63	<i>Tridacs procumbans</i>	Asteraceae	Climber	Whole plant	Lianas
64	<i>Pillanthus emlica</i>	Solanaceae	Tree	Friut	Phanerophytes
65	<i>Musa paradiciyaga</i>	Mussaceae	Tree	Whole plant	Phanerophytes
66	<i>Nerium olindar</i>	Apocynaceae	Shrub	-	Phanerophytes

Table 2

S. No	Plant name	Family	Habit	Plant parts of used	Life from
1	<i>Achyranthesaspera.Linn.</i>	Amaranthaceae	Herb	Whole plant	Therophytes
2	<i>Polyalthialangifolia (Soon.) Th.W</i>	Annonaceae	Tree	Fruit	Therophytes
3	<i>Cassia ariculata L.</i>	Caesalpinaceae	Shrub	Whole plant	Phanerophytes
4	<i>Cardiopuspermumhalicabum L.</i>	Sapindaceae	Climber	Whole plant	Phanerophytes
5	<i>CociniaindicaWt&Arn.</i>	Cucurbitaceae	Climber	Fruit	Lianas
6	<i>Cynodandactylan Linn.</i>	Papaceae	Shrub	Whole plant	Hemicryprophyte
7	<i>Lucusaspera. L.</i>	Lamiaceae	Herb	Whole plant	Therophytes
8	<i>Morindatendoriya</i>	Rubiaceae	Tree	Fruit	Phanerophytes
9	<i>Ocimumsandam L.</i>	Lamiaceae	Shrub	Whole plant	Therophytes
10	<i>Pongamiapinnata L.</i>	Fabaceae	Tree	Seed	Phanerophytes
11	<i>Sygiumcummi (L.) Skeels</i>	Myrtaceae	Tree	Fruit	Phanerophytes
12	<i>Zizphusmauritiana Lam.</i>	Rhamaceae	Tree	Fruit	Phanerophytes
13	<i>Hibiscus rosasinesis</i>	Malvaceae	Herb	Flower,leaf	Phanerophytes
14	<i>AzadiractaindicaA.Juss.</i>	Meliaceae	Tree	Whole plant	Phanerophytes
15	<i>Mangiferaindica L</i>	Anacardiaceae	Tree	Fruit	Phanerophytes
16	<i>Moraga olefera Lam.</i>	Moringaceae	Tree	Whole plant	Phanerophytes
17	<i>Ficusbenghalensis L.</i>	Moraceae	Tree	Fruit	Phanerophytes
18	<i>Lowsoinainermis L.</i>	Lythraceae	Shrub	Leaf	Phanerophytes
19	<i>Catharanthusthevetia (L.)Lippold</i>	Apocynaceae	Shrub	Root	Phanerophytes
20	<i>Justiceadhatoda L</i>	Acanthaceae	Shrub	Leaf	Phanerophytes
21	<i>Leucasaspera (Willd.) Link.</i>	Lamiaceae	Herb	Whole plant	Therophytes
22	<i>Achyranthesaspera L</i>	Amaranthaceae	Herb	Whole plant	Hemicrotophytes
23	<i>Acalyphaindica L</i>	Euphorbiaceae	Herb	Whole plant	Therophytes
24	<i>Cocosnuifera L.</i>	Arecaceae	Tree	Fruit	Phanerophytes
25	<i>Bambusaarundinacea</i>	Poaceae	Tree	Whole plant	Phanerophytes
26	<i>Ricinuscommunis L.</i>	Euphorbiaceae	Shrub	Seed	Phanerophytes
27	<i>Tamarindusindica L.</i>	Casalpinaceae	Tree	Fruit,Leaf	Phanerophytes
28	<i>Ficusreligiosa</i>	Moraceae	Tree	Whole plant	Phanerophytes
29	<i>Vitexnegundo</i>	Verbenaceae	Herb	Whole plant	Phanerophytes
30	<i>Datura metal L.</i>	Solanaceae	Herb	Leaf	Phanerophytes
31	<i>Tamarindusindica L.</i>	Casalpinaceae	Tree	Leaf,Fruit	Phanerophytes
32	<i>Cissusqundrangularis L.</i>	Vitaceae	Climber	Whole plant	Phanerophytes
33	<i>Sygiumcummi (L).Skeels</i>	Myrtaceae	Tree	Fruit	Phanerophytes
34	<i>Sydiu guzava</i>	Rutaceae	Tree	Fruit	Phanerophytes
35	<i>Citrasmedica</i>	Rutaceae	Tree	Friut	Phanerophytes
36	<i>Aolevera L.</i>	Liliaceae	Shrub	Whole plant	Phanerophytes
37	<i>Tridacsprocumbans</i>	Asteraceae	Climber	Whole plant	Lianas
38	<i>Pillanthusemlica</i>	Solanaceae	Tree	Friut	Phanerophytes
39	<i>Musa paradiciyaga</i>	Mussaceae	Tree	Whole plant	Phanerophytes

Dominant tree species present in the study area comprised of *Polythia langifolia*, *Alangium solvifolium*, *Morinda tendoriya*, *Pongamia pinnata*, *Sygium cummi*, *Casurina equisetifolia*, *Zizyphus mauritiana*, *Moraga olefera*, *Albizia lebbek*, *Acacia leucophloea* and *Ficus benghalensis*. The understory is prominently represented by *Justica adhatoda*, *Zizyphus numularia*, *Ricinus communis*, etc. The herbaceous layer, structurally and numerically most prominent during

monsoon season, is represented by *Tridex procumbens*, *Cyanodon dactylon*, etc. while climbers have been represented by *Cardiopus permum halicabum*, *Cocinia indica*, *Coculas hersutes*, *Passiflora foetida*, *Bougivillea spp*, *Cissus qundrangularis* and *Tridacs procumbans*. Ethanobotanical serutiny has led to the doucumentation of a large number of wild plants used by local peoples for meeting their demands. In India, many organized ethanobotanical

studies trigger intensive field studies in the areas. The results of the ethanobotanical survey are presented in Table-1. The reported plants were arranged according to their scientific name, family, and parts used, it revealed 38 genera and 39 species belongs to it is more evident from this study that phanerophytes (29 plant species). Than any other form. Different parts of medicinal plants were used as medicine by the local traditional healers. The most frequently utilized plant parts percentage were whole plant (46.15%) followed by fruit (30.96%), leaf (15.38%), seed (5.12%), Root (2.56%), these medicinal plants are known to cure various types of ailments. (Table-2 and Fig-2).

Climatically, the study area in general is warm and dry during summer and warm and moist during rainy season, thus confirming the preponderance of therophytes (plants of warm and dry climate) and phanerophytes (of warm and moist climate). Table 3. Perusal of the table reveals that these regions show different type of phytoclimate despite being similar to one another. This may be because of the varied amount of disturbances and latitudinal and longitudinal difference in these areas. Among these areas, the phytoclimate of the study area resembles to that of Jammu (Sharma, 2003) and Mahamaya catchment (Sudan, 2007). Present study of forest range revealed that the vegetation is predominantly sub-tropical type having a higher percentage of therophytes and phanerophytes as compared to normal biological spectrum. On the basis of this study the phytoclimate of the area, as per Raunkiaer's terminology has been described as thermo-phanerophytic phytoclimate. This indicates influence of anthropogenic activities (overgrazing and developmental activities) in the forest range which favors the chances of growth of short lived annuals. Conditions for the growth of over-storey.

Table 3

S. No	Habit	Total
1	Herb	12
2	Shrub	19
3	Climber	5
4	Tree	28

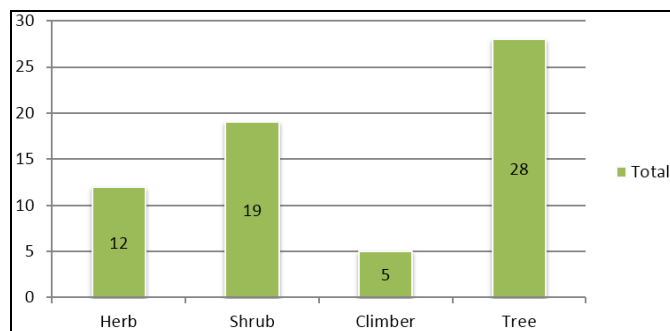


Fig 1: Habit wise plant

Table 4

S. No	Parts of used	Total
1	Whole plant	18
2	Leaf	4
3	Fruit	14
4	Seed	2
5	Root	1

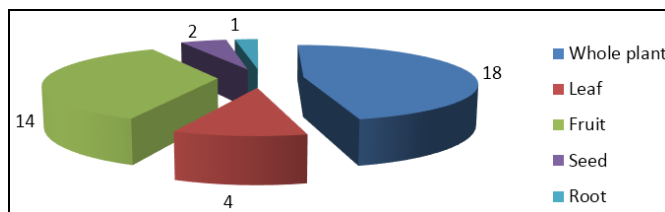


Fig 2: Parts of used Medicine

Table 5: Total number of species and percentage of different life from classes

S. No	Life from Classes	No. of Species	Percentage %
1	Phanerophytes	48	72.72
2	Therophytes	7	10.66
3	Lianas	6	9.09
4	Hemicrotophytes	3	4.54
5	Helophytes	2	3.03
		66	100

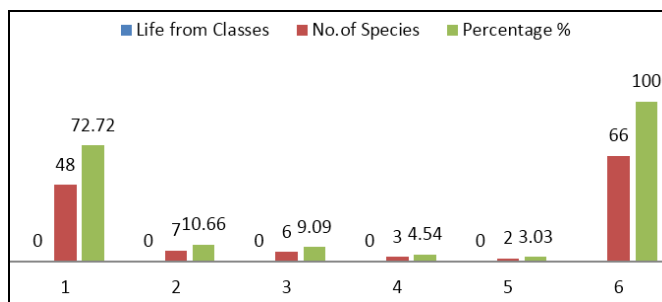


Fig 3: Total number of species and percentage of different life from classes.

Table 6: Comparison of biological spectrum study area with Ranikier's (1934) normal spectrum

Life from	Ph	Th	Li	Hemi	Helo
Percentage life from (Present study)	72.72	10.66	9.09	4.54	3.03
Percentage life from in normal spectrum	20	13.0	-	27	1
Percentage Deviation	52.72	-2.34	+9.09	-2.46	2.03

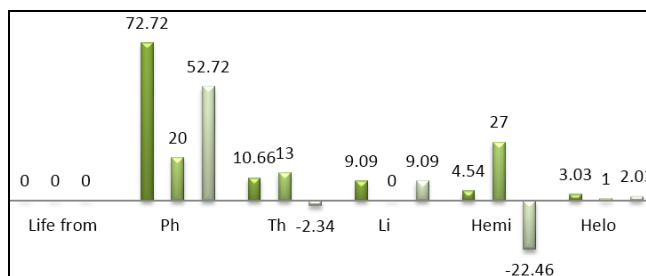


Fig 4: Comparison of biological spectrum study area with Ranikier's (1934) normal spectrum

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