



Phytosociological Studies on The Vegetation of Tryambakeshwar Forest of Nashik District (Maharashtra), India.

Jadhav Jagdish Tukaram

Department of Botany, M.S.G.College, Malegaon, Dist. Nashik.

Abstract :

The account of the quantitative analysis of the Phytosociology of Tryambakeshwar forest division based on frequency (%), density and abundance data is given for 6 localities and the forest division as a whole, the vegetation of the forests is of a dry deciduous type with thorny species having a good frequency percentage at some places. The dominant communities are variable in different localities, it is *Carissa - Alangifera - Strygium - Casearia - Bambusa - Woodfordia - Meryphylogna* for Tryambakeshwar forest division as a whole. A study of frequency classes shows that the vegetation is heterogeneous for all localities and the forest division as a whole. The variation of frequency classes in different localities may be due to I- biotic interference and II- occurrence of numerous sporadic or accidental species.

Key words: Phytosociology, frequency, density and abundance, Tryambakeshwar.

Introduction :

Phytosociology deals with the qualitative study of the structure of the vegetation with an emphasis on quantitative relationship of a few species which are judged to be dominant on the belief that these largely control the community and thereby the occurrence of a large number of rare species. There are detailed accounts on the Phytosociology of Chhotaudepur forest (1979), Panhambak (1980), Dang forest (Gujarat -1980), Talegaon (2016) and Supgaon (2018) forest. A similar investigation is carried out in Tryambakeshwar forests with a view to study the communities in different localities and to analyse them objectively with reference to frequency (%), density and abundance and to note variations if any in permanent vegetation.

Materials and Methods :

60 quadrats (10 m x 10 m) were laid down in different directions in each locality. The density, abundance, frequency (%) and heterogeneity of vegetation are determined following the formulae given by Braunton (1934). Only the frequency is tabulated in Table I for each species in a locality to reduce the size of the table, without affecting the merits of our observations. The communities are also named after the species having higher percentage of frequency (Table II). When two species have an equal frequency percentage, abundance is also taken into consideration. The species are divided into five frequency classes of Braunton (1934): Class A 1-20%; Class B 21-40%; Class C 41-60%; Class D 61-80%; Class E 81-100%.

The quadrats are studied in Tryambakeshwar (stand 1-6). The selection of the quadrats site in a locality was depended on the density and diversity of the vegetation. Tryambakeshwar is a dry, rocky and hilly area. Total area studied is 340.04 hecter. It is an important area from the view point of plants. It suffers from higher rain fall, winds and erosion. The place on top of the range has a height of about 2500 m. It is 25 Km distance and very famous place of pilgrimage on account of the temple of Tryambakeshwar. One of the holy twelve mountains of India. The temple is sacred to Maharashtra and Andhra people.

Observation:

From the Table I and II it is seen that though *Strygium - Bambusa - Alangifera - Meryphylogna - Carissa - Casearia* form a dominant community for the whole Tryambakeshwar forest. It is not so in different localities, where the dominant communities differ even among various localities.

Carissa - Alangifera are the members of the dominant community in most of the localities but they are absent in Stand 1 and 2. *Carissa* is also not a member of the dominant community in Stand 4.

Mangifera is not a member of dominant community at 2, 5 and 6. The other members frequently found in the dominant community compositions are *Vitex*, *Grewia*, *Woodfordia*, *Terminalia*, *Pavetta*, *Tectona*, *Tamarindus* and *Bauhinia*, *Bridellia* and *Erythrina* are in a few localities.

Carissa has the highest frequency at Stand- 1 and 2 only. but it has equal frequency with *Mangifera* in same stand and in another stand - 4. At other places it is *Casearia*(Stand -1), *Clerodendrum* (Stand -3)

Thus the species with wide range of distribution in many localities and with much higher frequency supports the visual observation that such species are common. Similarly those species which have restricted distribution in one or few localities have also higher frequency, including that their distribution is more in these localities than in others. Their non-occurrence in quadrats in other localities may be that they are rare to casual in such localities or their distribution in these localities is such that they have not been encompassed in the quadrats.

Some members of the permanent vegetation are not represented in the quadrats. They are *Acacia leucophloea*, *Anona squamosa*, *Atrocarpus heterophyllus*, *Boswellia serrata*, *Caesalpinia bonducella*, *Indigofera tinctoria*, *Jatropha gossypifolia*, *Lawsonia alba*, *Melia azadirach*, *Moringa concanensis*, *Pervia elephantum*, *Pithocolobium dulce*, *Prosopis spicigera*, *Rhus mysorensis*, *Santalum album*, *Sapindus laurifolius*, *Terminalia arjuna* etc. Such species are rare to very rare, at times very much restricted in distribution.

From Table II, it will be also seen that, for Tryambakeshwar forest area as a whole, frequency classes E and D collectively make up 0% and frequency classes B and C 29.02% of the total frequency. The preponderance of frequency class A is much higher (70.96%). The vegetation of the forest as a whole is much heterogeneous when compared to the frequency classes for homogeneous vegetation by Raunkiaer (1934).

Frequency class E is absent in stands 3, 5 and 6; class C in stand 2 and 4; class B in stand 6, and class A in stand 6. The classes B and C have higher frequency percentage than other classes in all localities, either of the classes may have equal frequency in some localities or both may be equal in the same locality. Class A in general has low frequency but it may have higher or lower frequency than classes D and E in most of the localities. The absence of class E suggests a much degree of disturbance in vegetation, where it may be equal to either of them. A comparison of frequency classes in each locality with those of Raunkiaer (1934) suggests that the vegetation is heterogeneous, with the degree of heterogeneity 0.12 - 0.61.

The relatively high frequency of the species in various localities in general suggests denseness of the vegetation

Discussion :

The values of frequency classes A and E in different localities are lower and classes B, C and D higher than those of Raunkiaer (1934) frequency classes for homogeneous vegetation. However, these values for classes A and B are much higher and of other classes much lower than those of Raunkiaer (1934). frequency classes for the Tryambakeshwar forest showing that the vegetation of the whole forest is heterogeneous.

Probably the better representation of class E in some localities indicates that the vegetation is still not much disturbed and is more or less uniform in nature. This is clearly seen from the 73.33%, 80% and 80% frequencies of first three dominant species at stand -1, 80%, 100%, 93.33% at stand-2. The absence of class E at Stand- 3, 5, 6 suggests some disturbance in vegetation due to factors like fire and anthropogenic conditions (Misra, 1974)

The relatively higher values of frequency class A in some localities like Stand- ; 1, 2 and much higher in Tryambakeshwar as a whole forest and class B in all localities are due to numerous sporadic or accidental species which in their turn have very low frequency (Oosting, 1956). They bring about changes in otherwise homogeneous vegetation. At the same time the dispersal of seeds also affect the value of class A (Pandya et. Al., 1968).



Thus phytosociological studies reveal a reliable picture of the vegetation and distribution of species and to some extent the factors operating on them in an area. It is clear, therefore, that the dominant communities are different in various localities and certainly differ from those recorded earlier in floristic accounts based on the visual observations (Suryanarayana, 1968). The biotic interference in the form of indiscriminate wood cutting for fuel and shifting cultivation operating for the past several years is one of the major factors that has affected the density of the forest and provided a congenial environment for some hardy thorny species i.e. *Acacia arebica*, *Acacia chundra*, *Caesalpinia decapetala*, *Erythrina variegata*, *Ziziphus jujuba* etc.,

With reference to the number of species in all 6 stands, the highest number of species is at stand - 1(28) and lowest at stand -6 (3). The low number of species may be attributed to destruction of forests in vicinity of these places.

Relationships between the total number of individual and frequency is also of interested. In general the following types of relationships can be assumed. Type I - species showing both a high frequency D and E class and a comparatively high number of individuals. Type II- species with low frequency and high density and abundance. They predominantly occur in larger groups, clusters or patches during our study a similar situation is found with reference to some of the species represented in various stands. Type I- *Pongamia pinnata*, *Mangifera indica*; *Bambusa arundinacea*, *Syzygium cumini*, *Tectona grandis* and *Carissa congesta*; *Acacia auriculiformis*, *Eucalyptus hybrida*.

Type II- *Bambusa arundinacea*, *Acacia auriculiformis*.

Thus, our phytosociological observations bring out a considerable new information on the vegetation of Tryambakeshwar forest, based on a systematic study of 6 stands of Tryambakeshwar, most of them not studied earlier from this view point.

Table-I

Showing the Frequency (%) of species represented in quadrats in different forest localities i.e. Tryambakeshwar, and mean frequency (%) of Tryambakeshwar forest as a whole. The species are arranged in order of higher frequency for the Tryambakeshwar forest.

Sr.No	Species	Localities						Ave Frequency
		1	2	3	4	5	6	
1	<i>Syzygium cumini</i>	66.66	20	0	100	80	60	54.44
2	<i>Bambusa arundinacea</i>	60	93.33	80	30	0	0	43.89
3	<i>Mangifera indica</i>	80	26.66	60	80	0	0	41.11
4	<i>Heterophragma quadriloculare</i>	26.66	20	33.33	20	60	80	40
5	<i>Carissa congesta</i>	73.33	80	60	20	0	0	38.89
6	<i>Casearia graveolens</i>	80	100	40	0	0	0	36.67
7	<i>Pongamia pinnata</i>	93.33	100	20	0	0	0	35.55
8	<i>Ficus recemosa</i>	46.66	13.33	40	0	30	60	31.66
9	<i>Vitex negundo</i>	46.66	0	20	0	60	0	21.11
10	<i>Grewia tinax</i>	66.66	0	53.33	0	0	0	20
11	<i>Eucalyptus hybrida</i>	46.66	6.66	40	20	0	0	18.89
12	<i>Clerodendrum phlomidis</i>	13.33	6.66	73.33	0	0	0	15.55
13	<i>Woodfordia fruticosa</i>	53.33	13.33	20	0	0	0	14.44
14	<i>Albizia lebbeck</i>	26.66	6.66	46.66	10	0	0	13.33
15	<i>Anogeissus latifolia</i>	33.33	33.33	13.33	0	0	0	13.33
16	<i>Ziziphus rugosa</i>	13.33	13.33	40	10	0	0	12.78

17	<i>Ziziphus jujuba</i>	33.33	13.33	26.66	0	0	0	12.22
18	<i>Terminalia bellirica</i>	13.33	13.33	33.33	0	0	0	10
19	<i>Terminalia chebula</i>	20	0	40	0	0	0	10
20	<i>Phyllanthus emblica</i>	13.33	40	0	0	0	0	8.89
21	<i>Ficus benghalensis</i>	40	0	13.33	0	0	0	8.89
22	<i>Erythrina variegata</i>	40	6.66	6.66	0	0	0	8.89
23	<i>Pavetta indica</i>	20	26.66	0	0	0	0	7.78
24	<i>Tectona grandis</i>	13.33	6.66	20	0	0	0	6.66
25	<i>Tamarindus inica</i>	13.33	6.66	0	10	0	0	5
26	<i>Coria dichotoma</i>	20	0	0	0	0	0	3.33
27	<i>Bauhinia variegata</i>	20	0	0	0	0	0	3.33
28	<i>Bridelia squamosa</i>	0	6.66	0	0	10	0	2.78
29	<i>Bauhinia racemosa</i>	0	6.66	6.66	0	0	0	2.22
30	<i>Erythrina subarosa</i>	13.33	0	0	0	0	0	2.22
31	<i>Grewia tiliacifolia</i>	0	6.66	0	0	0	0	1.11

Table-II
Showing communities, frequency classes and degree of heterogeneity in different localities in Tryambakeshwar forest.

Sr.No	Localities	Communities	Frequency Class					Degree of Heterogeneity
			A	B	C	D	E	
1	Tryambakeshwar- Stand-1	<i>Pongamia-Casaria-Mangifera-Carissa-Syzygium</i>	39.2	21.4	17.8	17.8	3.5	0.54
			8	2	5	5	7	
2	Stand-2	<i>Casaria-Pongamia-Bambusa-Carissa</i>	66.6	16.6			12.	1
			6	6	0	4.16	5	
3	Stand-3	<i>Bambusa-Clerodendrum-Mangifera-Carissa</i>	36.3	36.3	18.1			0.16
			6	6	8	9.09	0	
4	Stand-4	<i>Syzygium-Mangifera-Bambusa-Heterophragma-Carissa</i>	66.6	11.1		11.1	11.	2
			6	1	0	1	11	
5	Stand-5	<i>Syzygium-Heterophragma-Vitex-Ficus</i>	20	20	40	20	0	0.33
6	Stand-6	<i>Heterophragma-Syzygium-Ficus</i>	0	0	66.6	33.3	0	0.5
					6	3		
7	Tryambakeshwar forest as a	<i>Syzygium-Bambusa-Mangifera</i>	70.9	19.3				0
			6	5	9.67	0	0	

	whole	<i>Heterophragma-Carissa</i>						
8	Raunkiaer's normal frequency classes	-	53	14	9	8	16	1.05

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