PHYTOSOCIOLOGICAL ATTRIBUTES OF CLIMBER SPECIES IN NALLAMALAIS, INDIA.

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Abstract*- Nallamalais is one of the Centres of Plant Diversity sites in India which encompasses various lifeforms. Of which Climbers are one of the most neglected. Phytosiological attributes were used to know the status of climber species. The total number of individuals of climbers reported in the study area was 319 of which *Gymnema sylvestre* as the most important species followed by *Asparagus racemosu*s and *Cajanus scarabaeoides.* The lowest IVI value)1.91) wa observed in six species including *Aspidoteris cordata.

Key words: **Nallamalais, CPD site, Climber species, IVI, *Gymnema sylvestre.***

INTRODUCTION

Biodiversity is essential for human and economic well-being and for the ecosystem function and stability. Forests can release the stored carbon as Co_2 that form nearly 17-25% of the total greenhouse gas emissions, at the same time forest conservation, afforestation, reforestation and sustainable forest management can curb about 25% f emissions. Biodiversity interacting with the physical environment form the foundation of sustainable development. Biodiversity resources, mapping their geographical distribution and quantitative estimation of their natural stands is perhaps the most important information needed for any country in the post-CBD era. The worldwide destruction of the natural environment by population explosion, urbanization, industrialization and habitat fragmentation has led to a tremendous loss of biological diversity over the past few decades and hence warrants immediate attention especially on forestry sector as they harbor amazing biodiversity and has critical role on global climate change scenario.

World's forests extended over 4 billion hectares; corresponding to 31 percent of the total land area or an average of 0.6 ha per capita (FAO, 2020) has become a critical part of the international climate change agenda. Tropical forests in India comprising over 60% deciduous forests are poorly understood in terms of phytodiversity, phytosociology and quantification regimes Analysis of the quantitative relationship among the plant species growing in an area reflects structural property of, the community. Phytosiological investigation of vegetation serves as a pre-requisite for investigating the details of primary productivity of ecosystems.

In peninsular India, quantitative phytodiversity inventories are available from the forests of the Western Ghats, whereas study on Eastern Ghats is lacking. The wide range of topography, varied climate favours luxurious growth of vegetation and forest. It remain as a neglected area with very few attempts made for such studies in Eastern Ghats of Tamil Nadu (Kadavul and Parthasarathy, 1999a & b; Chittibabu and Parasarathy, 2000). Hence, the present study was undertaken to determine the structural and floristic composition of climber diversity in Nallamalais. The study area for the present work is considered as one of the significant biodiversity rich areas in Southern Eastern Ghats. Nallamalais one of the Centres of Plant Diversity)CPD) in India. It represents diversified habitats and supports a wide array of plant and animal life and provides basic livelihood for tribal and rural communities. Kumar & Bhanja (1992) produced a seed manual for forest trees of Andhra Pradesh. Sandhya rani & Pullaiah (2002) reported 560 tree taxa from eastern Ghats. Suryanarayana et al., (2002) inventoried the plant wealth of Veligonda hill ranges and reported 1004 species belonging to 558 genera and 149 families. Studies on plant resources include Ellis (1982, 1987, 1990), Reddy et al., (1998), Pullaiah et al., (2007). Thualsi Rao etal., (2007), Reddy et al., (2007), Raju and Pullaiah (1995) surveyed the Flora of Kurnool district and reported 1064 species of which 208 are trees covering 194 from Nallamalais of Kurnool district. Pullaiah and Sandhya Rani (1999) made the floristic studies on trees of Andhra Pradesh and reported 531 tree species covering over 2oo trees of Nallamalais.

While working on Flora of Andhra Pradesh, Pullaiah and Chennaiah)1997), Pullaiah and Ali Moulali (1997), Pullaiah (1997) and Pullaiah and Karuppusamy (2008) reported 2601 species, of which 531 are trees, Sunitha (2002) surveyed the scared groves of Kurnool district and reported 138 tree taxa, of which 119 are from Nallamalais. She made over 100 additions of the Nallamalais after Raju & Pullaiah (1995) of which 18 are trees. Shali Saheb (2008) studies the medicinal plants of Nallamalais and reported 501 taxa of which 137 are trees. Khadar Basha (2009) was studied quantitative assessment of Nallamalais and reported 249 tree species. Most of the studies have followed the plot methods including square plots of 100x100cm (Gentry, 1988); 10x10m (shalisaheb,2008) to rectangular plots 10x10m by Boom (1986). Shah Hussain et al, (2008) describes the species composition. Shali Saheb (2008) analysed the medicinal plant diversity in three one-hectare plots through ten quadrants of 10x10m and recorded 135 species belonging to 110 genera 45 families. Khadar Basha (2009) recorded a total of 249 tree species from 175 grids comprising 237 species belonging to 139 genera and 54 families.

Climbers are one of the most interesting group of plants Species which are most neglected. These climbers contribute largely to the charm of our landscape by the manner in which they climb over trees, rocks. They also play a part in ancient historical buildings which their attraction to the green veil which covers their structural defects making them a perfect beauty in our eyes.
Climbers show great diversity in their climbing mechanism depending on which they are classified as root climbers, hook climbers, tendril climbers. leaf or stem climbers. Only few studies were carried out on climbers. Pandy et al., (2005), studies medicinal climbers in flora of Gujarat. 81 climbers were recorded by Jangid and Sharma (2011), Ghosh and Mukherjee (2006), recorded 149 herbacious climbers and 79 lianas from North Andaman covering 55 families while Mahajan (2006), reported 31 taxa used by tribal people of Nimar region in Madhya Pradesh to cure various human ailments. Earlier studies on plant resources of Nallamalais include Ellis (1987), Kumar (1995), Goud (1997), Thulasi Rao et al., (2007), Shali Saheb (2008) studied the medicinal plants Nallamalais and reported 501 taxa. Shali Saheb (2014), studies medicinal climbers of Nallamalais reported 92 species belonging to 27 families. Shali saheb et.al (2023) reported the diversity of shrubs of the Nallamalais forest the TNI value was 606, the abundance value of the shrubs is 210.22. No comprehensive work is available for phytosociology of climbers in the study area, therefore, the objective of the present paper is to Study of phytosociological attributes of climbers plant resources in Nallamalais.

STUDY AREA

Nallamalais, one of the Centres of Plant Diversity (CPD) (WWF & IUCN, 1995) is located in the Central Eastern Ghats between latitudes $15^0$20'- $16^0$30' N and longitude $78^0$30' – $80^0$10' E in Andhra Pradesh, Telangana states extended to an areaof 7640 sq km. Nallamalais cover five districts, viz. Kurnool, Prakasam, Guntur,of Andhra Pradesh, Mahaboob Nagar, and Nalgonda of Telangana. The hills cluster near gundlabrahmeswaram, which is the nucleus of the Nallamalais appearing asplateau. The vegetation of the Nallamalais is broadly categorized into 3 types; moist deciduous, dry deciduous, scrub type forests. Most primitive tribes, chenchus abd sugalis live in Nallamalais. From times immemorial the forests of Nallamalais have been inhabited by chenchus an aboriginal and oldest tribe of South India. .An ecological meaning is attributed to the word "chenchu" by interpreting that a person who lives under chettu (tree) is a chenchu. They are experts in collection of honey, wild fruits and plant crude drugs. Sugalis also known as lambadis and Banjara are largely found in the Nallamalais forest. These tribes in the study area have rich traditional botanical knowledge and still dependent on wild medicinal plant resources for curing their ailments.

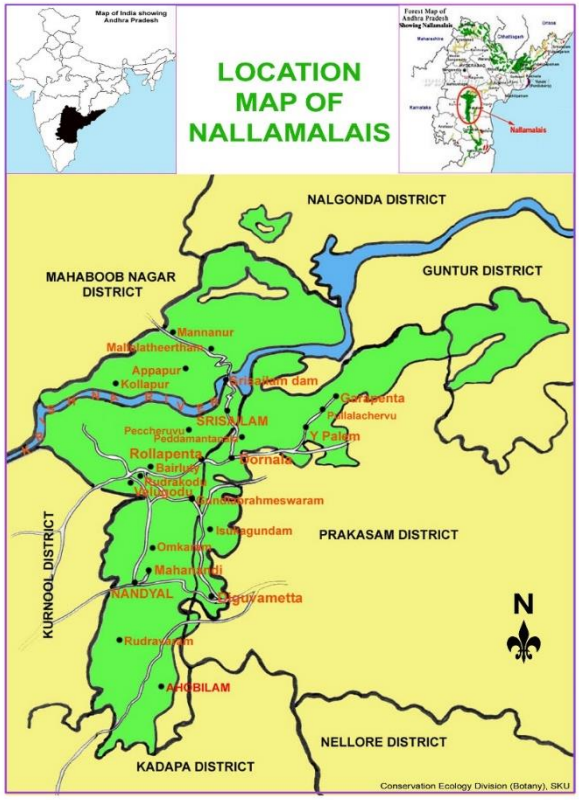

Figure: 1. Map of Nallamalais

METHODOLOGY

The main objective of the present paper to provide a study on phytosociological attributes of climbers random sampling method.

QUANTITATIVE STUDIES

The field work plan carried out in Nallamalais was sampled by lying of 50 quadrates in the study area. Each quadrate size is 20x20m. All life forms of plants such as trees, shrubs, climbers and herbs were enumerated. All trees were enumerated in 20x20m quadrates,

shrubs and climbers in 5x5m nested plot and herbs were studies in nested 1mx1m plot. The field work was carried out in two seasons to cover all the vegetation and phenology of climbers.

Importance Value Index (IVI)

IVI = Relative dominance + Relative density + Relative frequency

Diversity Indices: Species diversity indices namely Shannon-Wiener index (Shannon and Weiner, 1962), Simpson index (Simpson, 1949) and Margalef Index (Margalef, 1980) were calculated.

Dominance Indices (Simpson 1949): It is a measure of dominance since it weighted towards the abundances of commonest species. It is estimated by using following formula:

$D = \sum (ni/N)^2$or Pi^2

Shannon-Wiener index: It is a measure of the average degree of 'uncertainty' in predicting to what species an individual chosen at random from a collection of S species and N individuals will belong. It is estimated by using following formula:

$H' = -\sum (ni/N) \ln (ni/N)$

Where, ni = number of individuals belonging to the ith species

N = Total number of individuals in the sample.

RESULTS AND DISCUSSION

The total number of individuals (TNI), number of quadrates in which species occurred, and the quantitative characters like abundance (A), density (D), frequency (F), relative abundance (RA), relative density (RD), relative frequency (RF) and importance value index (IVI) (Fig. 5) for climbers were presented in **Table-1**

Abundance: The total number of individuals (TNI) of climbers in the study site was 319. The total abundance value for climbers is about 134.15, with an average of 2.63. *Gymnema sylvestre* (44.5) was recorded as the high abundant species and the lowest abundance was recorded for 7 species including *Oianthus disciflorus* with 1.0.

Density: The total density of 51 climbers is 6.38, with an average of 0.12. The highest density value was recorded for *Gymnema sylvestre* (0.7) and the lowest density was recorded for 6 species including *Puraria tuberosa* (0.02).

Frequency: The total frequency for all the climbers is 234, with an average of 4.5. The high frequency value was recorded for *Cajanus scarabaeoides* and *Decalepis hamiltonii* with 14 and least frequency was observed in 22 taxa with 2 (e.g. *Piper attenuatum*).

Importance Value Index (IVI): Importance Value Index of individual climbers encountered in the sampled quadrates was identified *Gymnema sylvestre* (20.91) as the most important species followed by *Asparagus racemosus* (13.88) and *Cajanus scarabaeoides* (13.54). The lowest IVI value (1.91) was observed in six species including *Aspidoteris cordata*. The top 10 dominant IVI climbers are presented in **Fig.2**

Diversity indices: The Simpson Index is 0.9609, Shannon-Wiener Index is 3.562.

Figure: 2. Top 10 IVI Climber species of Nallamalais

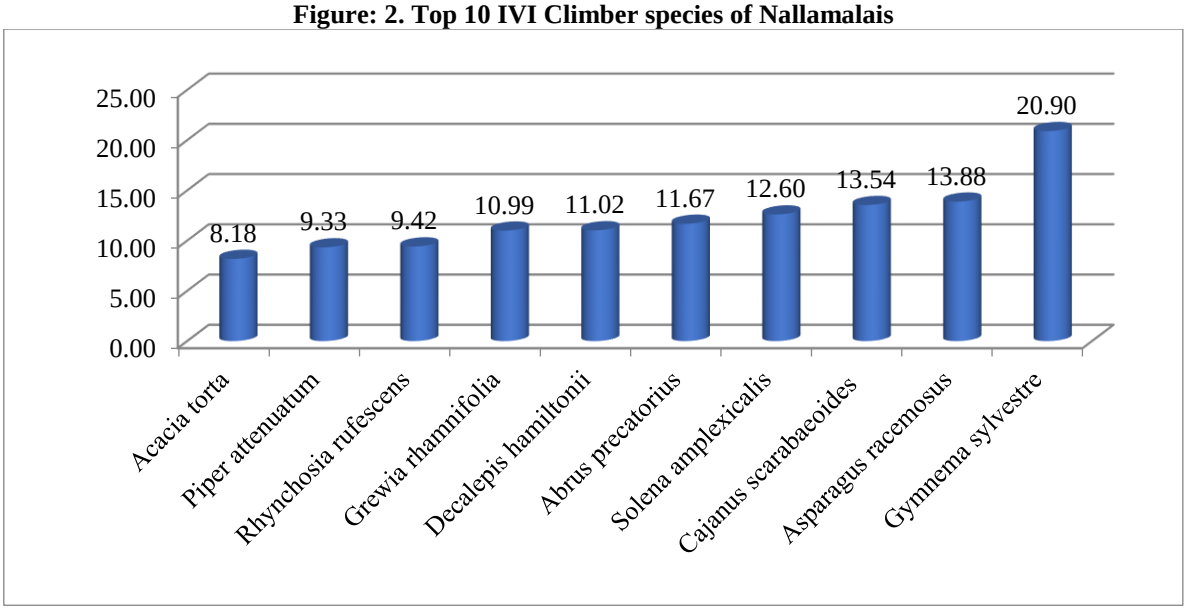

Table. 1. Phytosociological attributes of climbers

S.No.	Name of the taxon	TNI	Q	A	D	F	RA	RD	RF	IVI	A/F
1	*Abrus precatorius*	16	5	3.20	0.32	10	2.39	5.02	4.27	11.67	0.32
2	*Abrus pulchellus*	1	1	1.00	0.02	2	0.75	0.31	0.85	1.91	0.50
3	*Acacia caesia*	5	3	1.67	0.1	6	1.24	1.57	2.56	5.37	0.28
4	*Acacia intsia*	7	2	3.50	0.14	4	2.61	2.19	1.71	6.51	0.88

5	*Acacia torta*	10	3	3.33	0.2	6	2.48	3.13	2.56	8.18	0.56
6	*Ampelocissus latifolia*	5	2	2.50	0.1	4	1.86	1.57	1.71	5.14	0.63
7	*Ampelocissus tomentosa*	2	1	2.00	0.04	2	1.49	0.63	0.85	2.97	1.00
8	*Argyreia cuneata*	4	2	2.00	0.08	4	1.49	1.25	1.71	4.45	0.50
9	*Argyreia nervosa*	5	2	2.50	0.1	4	1.86	1.57	1.71	5.14	0.63
10	*Asparagus racemosus*	20	6	3.33	0.4	12	2.48	6.27	5.13	13.88	0.28
11	*Aspidoteris cordata*	1	1	1.00	0.02	2	0.75	0.31	0.85	1.91	0.50
12	*Bauhinia vahlii*	2	1	2.00	0.04	2	1.49	0.63	0.85	2.97	1.00
13	*Cajanus scarabaeoides*	18	7	2.57	0.36	14	1.92	5.64	5.98	13.54	0.18
14	*Capparis sepiaria*	1	1	1.00	0.02	2	0.75	0.31	0.85	1.91	0.50
15	*Cayratia auriculata*	2	1	2.00	0.04	2	1.49	0.63	0.85	2.97	1.00
16	*Cayratia pedata*	4	3	1.33	0.08	6	0.99	1.25	2.56	4.81	0.22
17	*Celastrus paniculata*	3	2	1.50	0.06	4	1.12	0.94	1.71	3.77	0.38
18	*Cissampelos perira*	8	3	2.67	0.16	6	1.99	2.51	2.56	7.06	0.44
19	*Cissus quadrangularis*	4	2	2.00	0.08	4	1.49	1.25	1.71	4.45	0.50
20	*Combretum albidum*	7	2	3.50	0.14	4	2.61	2.19	1.71	6.51	0.88
21	*Corallocarpus epigaeus*	2	1	2.00	0.04	2	1.49	0.63	0.85	2.97	1.00
22	*Decalepis hamiltonii*	12	7	1.71	0.24	14	1.28	3.76	5.98	11.02	0.12
23	*Diascorea bulbifera*	9	4	2.25	0.18	8	1.68	2.82	3.42	7.92	0.28
24	*Dioscorea oppositifolia*	4	1	4.00	0.08	2	2.98	1.25	0.85	5.09	2.00
25	*Dioscorea pentaphylla*	2	2	1.00	0.04	4	0.75	0.63	1.71	3.08	0.25
26	*Dioscorea pubera*	4	1	4.00	0.08	2	2.98	1.25	0.85	5.09	2.00
27	*Grewia rhamnifolia*	15	3	5.00	0.3	6	3.73	4.70	2.56	10.99	0.83
28	*Gymnema sylvestre*	35	4	8.75	0.7	8	6.52	10.97	3.42	20.91	1.09
29	*Gymnopetalum cochinechinensis*	3	1	3.00	0.06	2	2.24	0.94	0.85	4.03	1.50
30	*Hemidesmus indicus*	7	5	1.40	0.14	10	1.04	2.19	4.27	7.51	0.14
31	*Ipomoea barlerioides*	4	2	2.00	0.08	4	1.49	1.25	1.71	4.45	0.50
32	*Jacquenmontia paniculata*	6	3	2.00	0.12	6	1.49	1.88	2.56	5.94	0.33
33	*Jasmimum angustifolia*	3	1	3.00	0.06	2	2.24	0.94	0.85	4.03	1.50
34	*Jasminum auriculatum*	4	1	4.00	0.08	2	2.98	1.25	0.85	5.09	2.00
35	*Jasminum roxburghianum*	2	1	2.00	0.04	2	1.49	0.63	0.85	2.97	1.00
36	*Maynia hwatariana*	3	1	3.00	0.06	2	2.24	0.94	0.85	4.03	1.50
37	*Oianthus disciflorus*	1	1	1.00	0.02	2	0.75	0.31	0.85	1.91	0.50
38	*Olax scandens*	1	1	1.00	0.02	2	0.75	0.31	0.85	1.91	0.50
39	*Piper attenuatum*	8	1	8.00	0.16	2	5.96	2.51	0.85	9.33	4.00
40	*Pterolobium hexapetalum*	3	1	3.00	0.06	2	2.24	0.94	0.85	4.03	1.50
41	*Puraria tuberosa*	1	1	1.00	0.02	2	0.75	0.31	0.85	1.91	0.50
42	*Rhynchosia rufescens*	12	4	3.00	0.24	8	2.24	3.76	3.42	9.42	0.38
43	*Rhynchosia suavelens*	4	1	4.00	0.08	2	2.98	1.25	0.85	5.09	2.00
44	*Rivea hypocroteriformis*	7	3	2.33	0.14	6	1.74	2.19	2.56	6.50	0.39

45	*Sarcostemma acidum*	3	1	3.00	0.06	2	2.24	0.94	0.85	4.03	1.50
46	*Secamone emetica*	2	1	2.00	0.04	2	1.49	0.63	0.85	2.97	1.00
47	*Smilax zeylanica*	4	2	2.00	0.08	4	1.49	1.25	1.71	4.45	0.50
48	*Solena amplexicalis*	18	5	3.60	0.36	10	2.68	5.64	4.27	12.60	0.36
49	*Thunbergia fragrans*	6	3	2.00	0.12	6	1.49	1.88	2.56	5.94	0.33
50	*Ventilago denticulata*	3	2	1.50	0.06	4	1.12	0.94	1.71	3.77	0.38
51	*Ziziphus oenoplea*	6	2	3.00	0.12	4	2.24	1.88	1.71	5.83	0.75
		319		**134.15**	**6.38**	**234**	**100.00**	**100.00**	**100.00**	**300.00**	

TNI- Total Number of Individuals, **Q**- Number of quadrates, **A**- Abunadance, **D**- Density, **F**- Frequency, **RA**- Relative Abundance, **RD**- Relative Density, **RF**- Relative Frequency, **IVI**- Importance Value Index, **A/F**- Abundance/Frequency Ratio.

CONCLUSIONS

Forests that are relatively undisturbed seem to possess these varied habitat conditions more upon certain specific areas should be with limited human and grazing disturbance to conserve these taxa. Nallamalais is a protected area needs further attention in terms of conserving valuable climbers species. Good marketing avenues have to be created for the local communities regarding climbers of medicinal value. Intensive training programmes have to be organized for tribal and other communities by governmental and non-governmental agencies regarding the sustainable collection, utilization and conservation of climbers resources. A highly coordinated action-oriented multi-disciplinary approach on plant resources conservation integrating the forest department, non-governmental organizations, scientific bodies and research institutions with the co-operation of local communities should be implemented

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