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SURVEY OF CLIMBERS IN ATCHANKULAM, KOTTARAM PANCHAYAT, KANYAKUMARI DISTRICT, TAMILNADU, INDIA.

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ABSTRACT

Climbing plants are one of the most interesting group but a much neglected group of plants. But, they also play a part in historical importance of our ancient buildings which owe their attraction to the green veil which covers up their architectural or structural defects making them assume perfect beauty in our eyes. The present survey reveals that angiospermic climbers of the study area are represented by 94 species under 63 genera belonging to 32 families. Among all families, Convolvulaceae, Papilionaceae (7 species) and Vitaceae are the most dominating family species as well as genera wise. The dominant families are Convolvulaceae, Papilionaceae, Vitaceae, Apocynaceae, Menispermaceae and Oleaceae. The most abundant liana species include the thorny stragglers *Pterolobium hexapetalun* (Caesalpiniaceae), *Lantana camara* (Verbenaceae), and the twiners *Jasminum angustifolium* (Oleaceae), *Gymnena sylvestre* (Asclepiadaceae) and *Aganosmacymosa* var. *cymosa* (Apocynaceae). The enumerated climbing modes were classified into woody vines, the lianas (75) and herbaceous vines (19). Six climbing modes of lianas were recognized as stem twiners (37) followed by stragglers-unarmed (28), stragglers unarmed (10), tendril climbers (17), root climbers (1) and hook climber (1).

Key words: Climbing plants, Atchankulam, Survey.

1. INTRODUCTION

Climbing plants are defined as plants incapable of autonomous vertical support once they reach a certain height and depend on other plants for support in their natural environment (Gentry, 1991). The climbing habit has arisen several times in the evolutionary history of Angiosperms, and this has resulted in a great taxonomic diversity of climbing plants (Gentry, 1985). Families such as Smilacaceae, Menispermaceae, Passifloraceae, Cucurbiaceae and Convolvulaceae are essentially entirely composed of or dominated by species with a climbing habit. Climbing plants are an interesting but much neglected group. This group consists of plants that are rooted in the ground but need support for their weak stems, and both herbaceous (vines) and woody (lianas) climbing plants can be found. Recent reviews of the role of climbers in forest ecosystems (Putz and Mooney, 1991; Schnitzer and Bongers, 2002; Wright *et al.,* 2004; Phillips *et al.,* 2005) have highlighted the abundance, competitive abilities, and contribution to disturbance regimes. Today, climbing plants typically contribute 2-15% of the leaf biomass and about 5% of the wood biomass to forests (Fearnside*et al.,* 1999; Gerwing and Farias, 2000; Clark *et al.,* 2008). In climber-rich areas, they can contribute as much as 40% of the estimated total biomass (Hegarty and Caballe, 1991; Perez-Salicrup*et al.,* 2001). Climbers not only form important structural components but also play an important ecological role in forest dynamics, diversity and nutrient recycling (Gentry and Dodson 1987; Schnitzer and Bongers, 2002). No comprehensive work is available for climbers in the study area. Therefore, the objective of the present study is to document the angiospermic climbers of Atchankulam, KottaramPanchayat, Kanyakumari District.

2. MATERIALS AND METHODS

2.1. Description of the Study Area

The present study was carried out in Atchankulam of KottaramPanchayat and AgastheeswaramTaluk of Kanyakumari District. This District constitute the southernmost step of India, with Kerala on the West-North, Tirunelveli District in the North-East Arabian sea in the South – West, Bay of Bengal in the south-East and Indian ocean in the south. The annual rainfall of this area is low when compared to other areas of the Kanyakumari District. There are nearly 1450 families are live in this panchayat. Most of the people are coolies or farmers.

2.2. Floristic Survey

The present study was carried out through intensive and extensive field visits during January 2014-July 2014. During field survey, the plants have been collected in their flowering and fruiting stages as far as possible from the natural habitats. They are identified with the help of local floras (Gamble and Fischer 1015-1936; Matthew 1983; Nair and Henry 1983; Henry *et al.,* 1987; 1989; Chandrabose and Nair 1988). Further the identities were confirmed is referring authentic specimens and the voucher specimens deposited in the Herbarium of Department of Botany, South Travancore Hindu College, Nagercoil.

Table 1: Angiosperm climbing plants enumerated from the study area, binomial, family, category and climbing mode.

S. No.	Species / Family	Category	Climbing Mode
	Annonaceae		
1	*Desmosviridiflora*(Bedd.) Safford	WV	Str-UA
	Apocynaceae		
2	*Aganosmacymosa*(Roxb) G. Don var. Cymosa	WV	ST
3	*Anodendronpaniculatum*A.DC.	WV	ST
4	*Carissa gangetica*Stapf	WV	Str-A
5	*Carissa salicina*Lam.	WV	Str-A
6	*Carissa spinarum*L.	WV	Str-A
	Aristolochiaceae		
7	*Aristolochiaindica*L.	HV	ST
	Asclepiadaceae		
8	*Gymnemasylvestre*(Retz.) R.Br.ex Roemer &Schultes	WV	ST
9	*Hemidesmusindicus*(L) R. Br.	HV	ST
10	*Pergulariadaemia*(Forssk.) Chiov.	HV	ST
11	*Sarcostemmaacidum*(Roxb.) Voigt	WV	Str-UA
	Caesalpiniaceae		
12	*Caesalpinia crista* L.	WV	Str-A
13	*Caesalpiniacucullata*Roxb.	WV	Str-A
14	*Pterolobiumhexapetalum*(Roth) Sant. &Wagh	WV	Str-A
	Capparaceae		
15	*Capparisbrevispina*DC.	WV	Str-A
16	*Capparissepiaria*L.	WV	Str-A
17	*Cappariszeylanica*L.	WV	Str-A
	Celastraceae		
18	*Celastruspaniculatus*Willd.	WV	Str-UA
19	*Maytenusheyneana*(Roth) Raju&Babu	WV	Str-A
20	*Maytenusroyleanus*(Wallich ex M. Lawson) M.A.Rau.	WV	Str-A
21	*Salaciachinensis*L.	WV	Str-UA
	Combretaceae		
22	*Combretumacuminatum*Lam.	WV	TC
23	*Combretumalbidum*G. Don	WV	ST
	Convolvulaceae		
24	*Argyreiaelliptica*(Roth) Choisy	WV	ST
25	*Argyreiainvolurata*Clarke	WV	ST
26	*Ipomoea asarifolia*(Desr.) Roem. &Schultes	HV	ST
27	*Ipomoea companulata*L.	WV	ST
28	*Ipomoea eriocarpa*R. Br.	WV	ST
29	*Ipomoea staphylina*Roem&Schultes	WV	ST
30	*Merremiavitifolia*(Burm. F.) Hall. F.	HV	ST
	Cucurbitaceae		
31	*Cocciniagrandis*(L) J. Voigt	WV	TC
32	*Kedrostiscourtallensis*(Arn.) Jeffrey	WV	TC
33	*Trichosanthesanaimalaiensis*Bedd. L	WV	TC
	Dioscoreaceae		
34	*Dioscoreaoppositifolia*L.	HV	ST
35	*Dioscoreapentaphylla*L.	HV	ST
36	*Dioscoreatomentosa*J. Koenig ex Sprengel	HV	ST
	Euphorbiaceae		
37	*Phyllanthusreticulatus*poir.	WV	Str-UA
38	*Tragiainvolucrata*L.	WV	ST
39	*Tragiaplukenetii*R. Smith	HV	ST
	Liliaceae		
40	*Asparagus racemosus*Willd.	HV	Str-A
	Linaceae		
41	*Hugoniamystax*L.	WV	HC
	Malpighiaceae		
42	*Hiptagebenghalensis*(L.) Kurz	WV	Str-UA
	Menispermaceae		
43	*Anamirtacocculus*(L) Wight &Arn.	WV	ST
44	*Cissampelospareira*L.	HV	ST
45	*Cocculushirsutus*(L) Diels	WV	ST
46	*Cycleapeltata*(Lam.) Hook.f. &Thoms.	HV	ST
47	*Pachygoneovata*(Poir.) Miers ex Hook.	WV	ST
	Mimosaceae		
48	*Acacia pennata*(L.) Willd.	WV	Str-A
49	*Acacia sinuata*(Lour.) Merr.	WV	Str-A
50	*Acacia tortao*(Roxb) Craib	WV	Str-A
51	*Mimosa intsia*L.	WV	Str-A
	Nyctaginaceae		
52	*Pisonia aculeate* L.	WV	Str-A
	Oleaceae		
53	*Jasminumangustifolium*(L.) Willd.	WV	ST
54	*Jasminumauriculatum*Vahl	WV	ST
55	*Jasminumcuspidatum*Rottl.	WV	ST
56	*Jasminummalabaricum*Wight	WV	ST
57	*Jasminumtrichotomum*Heyne ex Roth	WV	ST
	Papilionaceae		
58	*Abrusprecatorius*L.	WV	ST
59	*Buteaparviflora*Roxb.	WV	Str-UA
60	*Dalbergiacongesta*Graham ex Wight &Arn.	WV	ST
61	*Dalbergiarubiginosa*Roxb.	WV	ST
62	*Mucunamonosperma*DC.ex Wight	WV	ST
63	*Mucunapruriens*(l.)DC	WV	ST
64	*Pseudarthria viscid* (l.) Wight &Arn.	HV	ST
	Passifloraceae		
65	*Passiflorafoetida*L.	HV	TC
66	*Passiflorasubpeltata*Ortega	HV	TC
	Piperaceae		
67	*Piper nigrum* L.	WV	RC
	Ranunculaceae		
68	*Naraveliazeylanica*(l.) DC.	WV	TC
	Rhamnaceae		
69	*Sageretiafiliformis*(Schultes) Don	WV	Str-A
70	*Scutiamyrtina*(Burm.f.) Kurz	WV	Str-A
71	*Ziziphushorrida*Roth	WV	Str-A
72	*Ziziphusrugosa*Lam.	WV	Str-A
	Rosaceae		
73	*Rubusellipticus*Smith	WV	Str-A
	Rubiaceae		

74	*Morindaumbellata*L.	WV	ST
75	*Mussaendahirsutissima*(Hook.f.)ex Gamble	WV	ST
76	*Rubiacordifolia*L. *Rutaceae*	HV	Str-UA
77	*Paramignyabeddomel*Tanaka	WV	Str-A
78	*Toddaliaasiatica*(L.) Lam.	WV	Str-A
79	*Zanthoxylumovalifolium*Wight *Sapindaceae*	WV	Str-A
80	*Cardiospermumcanescens*Wall.	HV	TC
81	*Cardiospermumhalicacabum*L. *Smilacaceae*	HV	TC
82	*Smilax zeylanica*L. *Tiliaceae*	HV	TC
83	*Grewiaflavescens*juss.	WV	Str-UA
84	*Grewia obtuse* Wall *Verbenaceae*	WV	Str-UA
85	*Lantana camara*L.	WV	Str-A
86	*Premnacorymbosa*(Burm.f.) Rottler&Willd.	WV	Str
87	*Premnavillosa*clark *Vitaceae*	WV	Str
88	*Ampelocissusaraneosa*(Dalz. &Gibs.).	WV	TC
89	*Ampelocissustomentosa*(Heyne ex Roth) Planch.	WV	TC
90	*Cayratiapedata*(Lour.) A.L. Juss. Ex Gagnep.	WV	TC
91	*Cayratiaroxburghii*(Wight &Arn.) Gagnep.	WV	TC
92	*Cissusgigantea*(Bedd.) Planch.	WV	TC
93	*Cissusquadrangularis*L.	WV	TC
94	*Cissusvitiginea*L.	WV	TC

WV: Woody vines; HV: Herbaceous vines; ST: Stem twiners, Str-A: Stragglers –armed; Str-UA: Stragglers – unarmed, TC: Tendril climbers, RC: Root climbers, and HC: Hook climber.

Table 2: Family wise and Taxonomic data of distribution of identified plants.

Sl.No	Family	% composition	Number of species	Number of genus
1	Annonaceae	1.06	1	1
2	Apocynaceae	5.31	5	3
3	Aristolochiaceae	1.06	1	1
4	Asclepiadaceae	4.25	4	4
5	Caesalpiniaceae	3.19	3	2
6	Capparaceae	3.19	3	2
7	Celastraceae	4.25	4	1
8	Combretaceae	2.12	2	2
9	Convolvulaceae	7.44	7	3
10	Cucurbitaceae	3.19	3	3
11	Dioscoreaceae	3.19	3	3
12	Euphorbiaceae	3.19	3	2
13	Liliaceae	1.06	1	1
14	Linaceae	1.06	1	1
15	Malpighiaceae	1.06	1	1
16	Menispermaceae	5.319	5	5
17	Mimosaceae	4.25	4	2
18	Nyctaginaceae	1.06	1	1
19	Oleaceae	5.31	5	1
20	Papilionaceae	7.44	1	1
21	Passifloraceae	2.12	2	1
22	Piperaceae	1.06	1	1
23	Ranunculaceae	1.06	1	1
24	Rhamnaceae	4.25	4	3
25	Rosaceae	1.06	1	1
26	Rubiaceae	3.19	3	3
27	Rutaceae	3.19	3	3
28	Sapindaceae	2.12	2	1
29	Smilacaceae	1.06	1	1
30	Tiliaceae	2.12	2	1
31	Verbenaceae	3.19	3	2
32	Vitaceae	7.44	7	3

Table 3. Dominant families of identified plants

Sl.No	Family	Number of Plants
1.	Convolvulaceae	7
2.	Papilionaceae	7
3.	Vitaceae	7
4.	Apouynaceae	5
5.	Menispermaceae	5
6.	Oleaceae	5

Table 4. Distribution of identified plants under climbing mode

Sl.No	Climbing mode	Number of plants	%
1	Woody vines	75	79.8
2	Herbaceous vines	19	20.2

3. RESULTS AND DISCUSSION

The present survey reveals that angiospermic climbers of the study area are represented by 94 species under 63 genera belonging to 32 families (Table-1 and 2) Among all families, convolvulaceae, papilionaceae (7 species) and vitaceae are the most dominating family species as well as genera wise (Table- 3). The dominant families are Convolvulaceae, Papilionaceae, Vitaceae, Apocynaceae, Menispermaceae and Oleaceae (Table 3).

The most abundant liana species include the thorny stragglers *Pterolobium hexapetalun* (Caesalpiniaceae), *Lantana camara*(Verbenaceae), and the twiners *Jasminum angustifolium* (Oleaceae), *Gymnena sylvestre* (Asclepiadaceae) and *Aganosma cymosa* var. *cymosa* (Apocynaceae). The enumerated climbing modes were classified into woody vines, the lianas (75) and herbaceous vines (19) (Table - 4). Six climbing modes of lianas were recognized as stem twiners (37) followed by stragglers-unarmed (28), stragglers unarmed (10), tendril climbers (17), root climbers (1) and hook climber (1).

Plasticity in eco-physiological traits has been related to the ecological breadth of forest forms (Saldana *et al.*, 2005) and shrubs (Valladares*et al.,* 2000) but this issue has not been addressed for climbing plants. It is verified that climbers and rest supporting species would share functional strategies to successfully cope with light heterogeneity, despite the intrinsic differences between these growth forms (Rowe and speck, 2005). It has been earlier shown that climbing plants exhibit life history trade-offs along forest light environments similar to those of trees (Gilbert *et al.,*2006) and that the relationship between photosynthetic rate and dark respiration is

comparable among lianas and trees (Domingueset *al.,* 2007). Because earlier work has suggested possible differences in the ecology of climbing plants in tropical and temperate rain forests.

This result is consistent with the conclusion of Rundel and Franklin (1991), who in their study on vines of arid and semiarid environments, reported that the great majority of arid zone climbers are herbaceous (Vines) .while woody climbers are rare. Even though *Olaxscandens* (Oleaceae), *Chilocarpusatrovinens* (Apocynaceae), *Artabtryszeylamicus* (Annonaceae) and *Calamusgamblei* (Arecaceae) were reported as most abundant species in the western Ghats and *Strychnos minor* (Loganiaceae) in the tropical dry evergreen forests on the colonnade coast of India (Parthasarathy*et al.,* 2004) these species did not occur in the study site. Only one climbing mode, the grapnel-like climbing (rattans) which was reported from Indian Western Ghats sites (Muthuramkumar and Parthasarathy, 2000) did not occur in our study sites.

Presently, plant vegetation's are subjected to various anthropogenic pressures and the data so plant diversity such as this on lianas will be useful in highlighting the importance of this vegetation in species conservation and management.

Contrary to findings from tropical forests (Balfour and Bond, 1993, Sridhar Reddy and Parthasarathy, 2003, Dewalt*et al.,* 2006, Yan *et al.,* 2006) trees were not represented among the 94 climbing plants of study area. According to EL Hadidi*et al.,* (1992) some climbing plants were considered endangered, including *Cadapafarinosa, Maeruaoblongifolia, Ephedra foemina* and *Plicosepaluscurviflorus.* Tackholm (1974) considered another climbingg plant species to be very rare (eg. *Podostelma schimperi, Merremiasemis agittata, Corallocarpus suhimperi, Kedrostis foetidissima, Corallocarpus schimperi, Kedrostis foetidissima, Cissus quadragularis, Peatatropis rivalis* and *Pergularia daemia*)

The comparison between the members of desert climbing plants in Egypt and those of deserts in other continents revealed that ConvolvulaceaeLeguminosae, Cucurbitaceae and Asclepiadaceae were the dominant plant families (Parsons, 2005). In the present survey Convolvulaceae, Papilionaceae and Vitaceae are the dominant families Speciation in the family Convolvulaceae, has been more prolific in the Desert of India where it is the fourth largest family of vascular flora (Shmida, 1985). Vitaceae, the fifth largest vine family in the North American deserts were poorly represented in the Egyptian deserts but not known at all in Australian deserts. Australia has only about 34 species of the approximately 700 species of vitaveae found worldwide (Morley and Toelken, 1983), the family being considered Laurasian (Krings, 2000).

It has been reported that woody vines are increasing in dominance, relative in both tropical (Philips *et al.,* 2002; Wright *et al.,* 2004 and Swaine and Graace, 2007) and temperate forests (Allen *et al,* 2007). This pattern has been related to climate change (Malhi and Wright, 2004, Vander *et al.,* 2008). One of the global change drivers (Matesaaz*et al.,* 2010) but more comprisal evidence is needed. Schnitzer, (2005) reported that the abundance of woody vines in tropical forests is correlated negatively with precipitation and positively with seasonality. He further proposed that this pattern may be explained by the greater efficiency in water uptake and transport of woody climbers as compared to trees. Our study area is a wet, cold (Dorsch, 2003) where light availability is the major ecological factor affecting distribution and abundance of trees (Lusk *et al.,* 2006, Lusk, 2002 and Saldana of Lusk, 2003) but not woody vines (Gianoli*et al.,* 2010, Carrasco *et al.,*(2009) in the temperate rainforest, where the potential evapotranspiration is very low, water availability is not a limiting factor and therefore water use features are was likely to determine plant distribution and abundance. From an applied perspective, the results of the present study suggest that the dominant climbers in the southern temperate rainforest could be able to cope with another global change driver, and use change if forest clearing occurs due to human activities.

Because climbers are present in so many ecosystems today, the morphological characteristics of the climber communities in disturbed versus stable, wetland versus well drained and open versus shaded forest ecosystems should help us recreate the distribution and importance of climbers in ecosystems throughout the last 30 million years. However, destruction of habitat through deforestation and over exploitation for commercial purposes and changes in cultural attitude threatens to constrain many of these climbers in to extinction.

Over exploitation of some climber species particularly collection of roots and underground parts from the climbers causes damage to these plants. Therefore, there are a people for the importance as well as conservation of these climbers in their original habitat. Climber abundance is dependent on climate and forest structure. Site with short or absent dry season have. We propose that a great heterogeneity of potential sites for climbers, thus also increasing, their richness. It is possible that sites with different dry season combined with

tree heterogeneity can enhance the rates of climber speciation.

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