

PHYTO-ECOLOGY OF THE LION-TAILED MACAQUE (*MACACA SILENUS*) HABITATS IN KARNATAKA, INDIA: FLORISTIC STRUCTURE AND DENSITY OF FOOD-TREES. KRISHNAMANI, R. AND KUMAR, A.

Key words: Lion-tailed macaque, phyto-ecology, floristic diversity

Abstract

This paper deals with the phyto-ecology, floristic diversity and density of food-trees in the habitats of the lion-tailed macaque (*Macaca silenus*), in Karnataka State of peninsular India. Woody trees and lianas were sampled from three belt transects (250 m x 10 m) in each of the five study areas. A total of 190 woody plant species were identified from these plots, of which 74 (38.9 %) were food-trees of the lion-tailed macaque. The relative density of these species was high (57.1 %) indicating that the habitat in Karnataka can probably support a good population of lion-tailed macaque. However, this analysis does not take into account the relative importance of the plant species in the diet. Nearly 27 % of the food-trees of the lion-tailed macaques were exploited as non-timber forest products in the study area.

Introduction

The tropical rainforest of the Western Ghats is isolated between Africa and north-east India. The lion-tailed macaque (*Macaca silenus*) is endemic to these rain forests, and has evolved to occupy a specialized niche in these rainforests feeding primarily on fruits, seeds and insects (KUMAR, 1987). Several population surveys (ALI and SANTAPAU, 1956; GREEN and MINKOWSKI, 1977; KURUP, 1978; BHAT, 1984; KARANTH, 1985; KUMAR, 1995) and ecological studies (SUGIYAMA, 1968; GREEN and MINKOWSKI, 1977; KUMAR, 1987; MENON, 1994; UMAPATHY, 1998; JOSEPH, 1998) have been carried out on the species, but none have concentrated on the vegetation in its habitat in the context of feeding ecology. Vegetation is the most important component of an animal's habitat, since it integrates the effects of parent material, soils, rainfall, number of rainy days and altitude. It also provides food, hiding and thermal cover (STROMBERG, 1995). Vegetation studies on the dynamics of vegetation in tropical rainforest have been conducted in Karnataka (RAI, 1981; SWAMY and PROCTOR, 1994; PASCAL and PELISSIER, 1996; PASCAL et al., 1999). Descriptions of vegetation have been made in many areas where primates have been studied on a long-term basis (e.g., WHITTEN, 1982; WHITE, 1992 cited in WILLIAMSON, 1993).

Here we present the results of a vegetation analysis in the lion-tailed macaque habitat in the state of Karnataka. The aims of this survey were to: (1) describe the floristic structure of the lion-tailed macaque habitats, and (2) find the relative density and dominance of the food-trees on which the lion-tailed macaques are dependent.

Study Areas

The survey was conducted in Karnataka, one of the three states where the lion-tailed macaque is present, the other two states being Tamil Nadu and Kerala.

The rain forests in Karnataka are contiguous from Kodagu District in the south and extend beyond Goa State in the north. The survey was done between 14°17.5' to 12°7'N in the Western Ghats where the lion-tailed macaque is present (Fig. 1). Vegetation sampling was done in five areas, each in and around a protected area (Table 1). The elevation of the study areas ranged from 100 to 1300 m. The study areas had rain forests with varying degrees of anthropogenic degradation. These forests are generally classified as *Dipterocarpus indicus-Diospyros candolleana-Diospyros oocarpa* type, *Dipterocarpus indicus-Humboldtia brunonis-Poeciloneuron indicum* type, *Palaquium ellipticum-Poeciloneuron indicum-Hopea ponga* type (PASCAL et al., 1982a) and *Dipterocarpus indicus-Kingiodendron pinnatum-Humboldtia brunonis* type (PASCAL et al., 1982b).

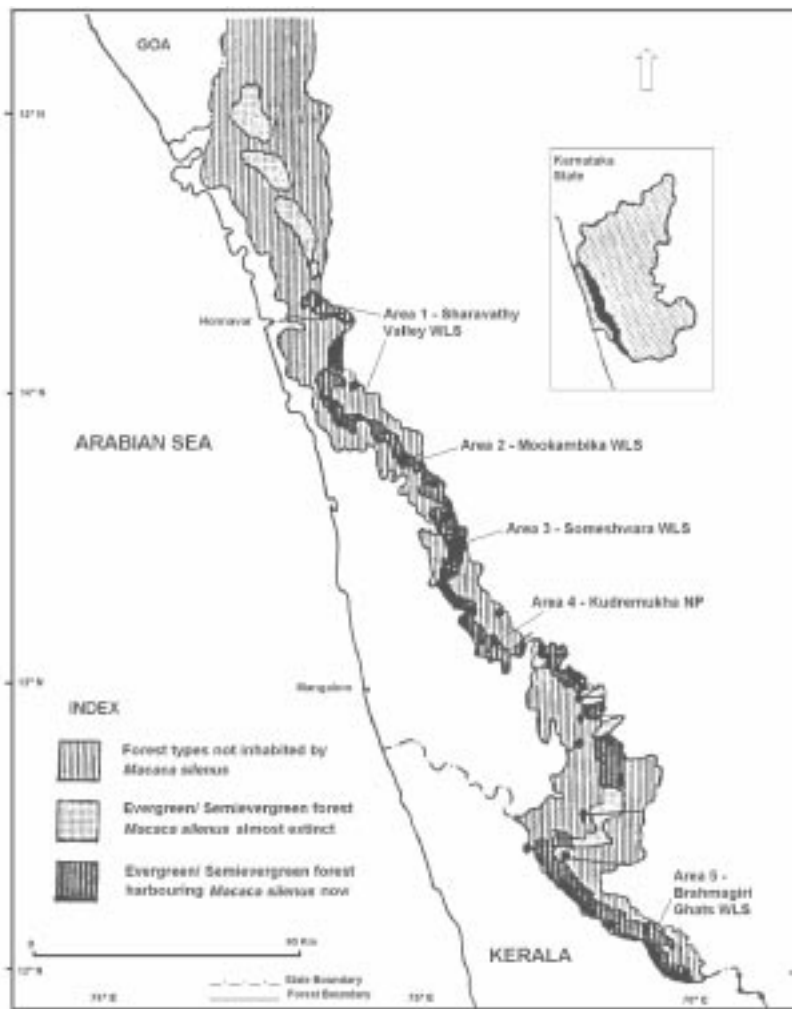


Fig. 1: Map of the lion-tailed macaque habitats in Karnataka, showing the study areas (adapted from KARANTH, 1992).

The study areas receive over 6,000 mm. of rainfall mainly from the southwest monsoon (Fig. 2 and Table 1) and the average number of rainy days is around 140. The first three months of the year are generally dry and the peak of the rainfall is from June to October. The study areas receive less rainfall from the northeast monsoon during November and December. The temperature is highly variable because of the wide range in elevation (100-1300 metres). The soils of the study areas are reported to be nutrient-rich compared to rain forest soils elsewhere (SWAMY and PROCTOR, 1994). A substantial portion of these rain forests is occupied by rocky facies.

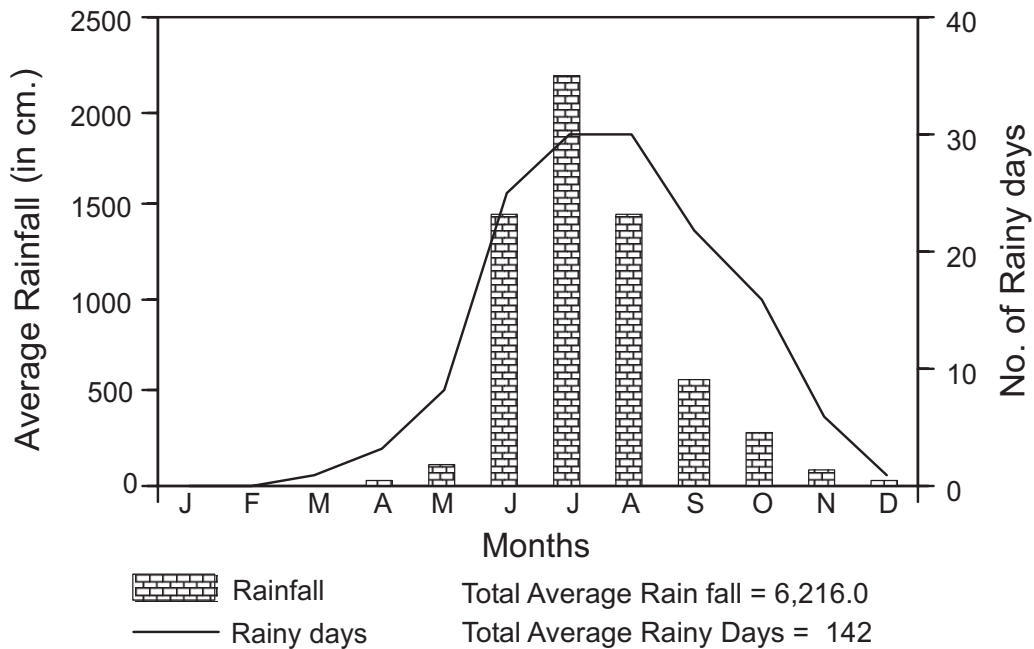


Fig. 2: Cumulative rainfall data and number of rainy days for the study areas. Sources are given in Table 1.

Methods

Even though preliminary vegetation surveys were begun in Someshwara Wildlife Sanctuary in 1994, special attention on the lion-tailed macaque habitats and fresh surveys were initiated in 1999. Vegetation in each area was sampled. Three belt transects were laid, each 250 m long and 10 m wide (0.25 ha). Thus, 15 belt transects were laid covering an area of 3.75 Hectares in total. Each belt transects was divided into 10 sub-plots of 50 m x 5 m. All trees >30 cm in girth at breast height (gbh) and lianas >10 cm were measured and identified within each plot. Apart from tree density, the vegetation was analysed with reference to the following parameters:

Table 1: The location and other details of the five study areas.

<b>Location and Altitude of the Plots</b>	<b>Topo Sheet No. (1 : 50,000)</b>	<b>Average Yearly Rainfall (in mm.)</b>	<b>Average No. of Rainy Days</b>
<b>AREA 1 – Mastimané &amp; Cogar Ghats</b>		6,745.6*	140*
Gersoppa Reserved Forest (14°17.5'N, 74°42.5'E) 450-500 metres	48 J / 12		
Sharavathy Valley Wildlife Sanctuary (14°3'N, 74°42'E) 190-200 metres	48 J / 12		
Sharavathy Valley Wildlife Sanctuary (14°1.5'N, 74°44'E) 260-320 metres	48 J / 12		
<b>AREA 2 – Nagodi-Kollur Ghat</b>		5,537.5§	129§
Mookambika Wildlife Sanctuary (13°53.8'N, 74°50'E) 440-560 metres	48 K / 13		
Kodachadri Reserved Forest (13°53.3'N, 74°51'E) 580-630 metres	48 K / 13		
Mookambika Wildlife Sanctuary (13°53'N, 74°46.5'E) 340-420 metres	48 K / 13		
<b>AREA 3 – Agumbe Ghat</b>		5,988.9†	128†
Someshwara Wildlife Sanctuary (13°29.4'N, 75°4.4'E) 160-170 metres	48 O / 3		
Balehalli State Forest (13°30'N, 75°5'E) 600-610 metres	48 O / 3		
Agumbe State Forest (13°30'N, 75°4.9'E) 620-640 metres	48 O / 3		
<b>AREA 4 – Kerékatté</b>		7,103.6‡	144‡
Kudremukha National Park (13°19.6'N, 75°9.4'E) 660-710 metres	48 O / 3		
Kudremukha National Park (13°8.6'N, 75°18.7'E) 720-740 metres	48 O / 3		
Kudremukha National Park (13°14'N, 75°11'E) 960-1020 metres	48 O / 4		
<b>AREA 5 – Makut</b>		5,675.6††	165††
Kerti Reserved Forest (12°7'N, 75°46'E) 580-600 metres	48 P / 16		
Kerti Reserved Forest (12°7.5'N, 75°48'E) 660-690 metres	48 P / 16		
Bramahagiri Ghats Wildlife Sanctuary (12°7.2'N, 75°48'E) 500-560 metres	48 P / 16		
* Forest Range Office: Cogar: 1998 – 1 Year; § P.W.D Guest House: Kollur: 1986-1998 – 13 Years † Forest Guest House: Sitanadi: 1989-1988 – 10 Years; ‡ Forest Range Office: Kerékatté: 1989-1998 – 10 Years †† P.W.D. Guest House: Bhagamandala: 1977-1997 – 21 Ye			

**Relative Frequency** = (Number of plots containing a species x 100)/sum of frequencies of all species.

**Relative Density** = (Number of individuals of a species x 100)/total number of individuals of all species.

**Relative Dominance** = (Basal Area of a species x 100)/total basal area of all species.

**Species Importance Value Index (IVI)** = Relative Frequency + Relative Density + Relative Dominance.

The plant species were identified in the field with field keys (GAMBLE, 1928; PASCAL and RAMESH, 1988). Unidentified plant specimens were collected, tagged and pressed as herbarium specimens. These voucher specimens were identified at various herbaria in and around the study areas and later counter-checked and confirmed with the reference material available at the herbarium in the Kerala Forest Research Thrissur, Kerala.

A list of food-trees used by the lion-tailed macaques (see Appendix 2) was compiled from previous reports (GREEN and MINKOWSKI, 1977; KUMAR, 1987; MENON, 1993; UMAPATHY, 1998; JOSEPH, 1998; KRISHNAMANI, in prep.).



Fig. 3: Flowers, seeds and fruits of different *Artocarpus* (Jack fruit) species are consumed by lion-tailed macaques. (Photo: C. Knogge)

## Results and Discussion

### A. Floristics and forest structure

A total of 190 woody plant species were recorded from the 15 transects covering 125 genera and 49 families (Appendix 1); 15 species remained unidentified. Lianas constituted 17.9 % and the rest were canopy and small trees. The top ten families, with respect to the number of species, were Euphorbiaceae, Lauraceae (12 species each), Fabaceae (11), Moraceae (9), Anacardiaceae, Ebenaceae (10 each), Clusiaceae, Myrtaceae (7 each), Rubiaceae and Sapotaceae (6 each). These constituted 45.3 % of all the woody species. The percentages of individuals were higher in the smaller girth classes, decreasing almost monotonically with increasing girths (Fig. 4). This indicates that the stand harbours a growing and healthy population.

The top fifteen species in terms of IVI in each of the five areas are given in Table 2. The total number of species in each area varied from 57 to 78 (Table 3). The number of species was less in Area 3 but the basal area was comparable to other four areas (Table 4). The species area curves for the five areas were gradual, and seemed to reach an asymptote in at least two areas (Fig. 5).

### B. Relative density, relative dominance and rarity of species

The relative density and dominance of different woody species varied widely in the five study areas. Fifteen species contributed to the bulk of the relative densities (52.8 %) cumulatively. The relative densities of top fifteen species in the five areas were 68.7 % (Area 1), 61.9 % (Area 2), 76.5 % (Area 3), 58.7 % (Area 4) and 57.1 % (Area 5). The relative dominance of the top fifteen species were even greater 94.9 % (Area 1), 92.3 % (Area 2), 97 % (Area 3), 92.3 % (Area 4), 82.4 % (Area 5) and 86.5 % cumulatively for the five areas combined. Five species, *Poeciloneuron indicum* (143 stems in 3.75 ha), *Myristica dactyloides* (120 stems), *Dimocarpus longan* (83 stems), *Olea dioica* (66 stems) and *Aglaia elaeagnoides* (77 stems), had the highest number of individuals contributing to 63.8 % of the total.

Table 3: Sampling details and species abundances in each of the five areas.

	Area 1	Area 2	Area 3	Area 4	Area 5	Cumulative Areas 1-5
Total Area sampled (ha) (3 x 0.25 ha)	0.75	0.75	0.75	0.75	0.75	3.75
Total No. of stems	380	323	349	395	385	1832
Total No. of species	75	78	57	79	76	190
Total Basal Area(m <sup>2</sup> )	476.98	219.74	461.46	445.43	207.34	4681.19
Predominant species (%)	1.3	0	1.8	0	0	3.7
Dominant species (%)	2.7	0	1.8	3.8	3.9	6.3
Common species (%)	6.7	11.5	12.3	6.3	10.5	13.2
Rare species (%)	56.0	42.3	45.6	55.7	48.7	51.6
Very rare species	33.3	46.2	38.6	34.2	36.8	25.3
Overall species rarity(%)	89.3	88.5	84.2	89.9	85.5	76.9

Table 2: Floristic composition and IVI of the top fifteen plant species sampled in each of the five areas. The variety name of the species is given as a footnote.

	AREA 1	IVI	AREA 2	IVI	AREA 3	IVI	AREA 4	IVI	AREA 5	IVI
1	<i>Maristicta dactyloides</i> *	54.2	<i>Olea dioica</i> *	45.7	<i>Poeciloneuron indicum</i>	76.0	<i>Poeciloneuron indicum</i>	73.6	<i>Semecarpus auriculata</i>	34.4
2	<i>Syzygium gardneri</i> *	37.2	<i>Aglaiia elaeagnoidea</i> *	24.6	<i>Dimocarpus longan</i> *	26.3	<i>Dimocarpus longan</i> *	23.4	<i>Dipterocarpus indicus</i>	25.4
3	<i>Olea dioica</i> *	30.1	<i>Dimocarpus longan</i> *	23.1	<i>Myristica dactyloides</i> *	24.4	<i>Garcinia morella 3</i> *	17.0	<i>Humboldtia brunonis</i>	16.0
4	<i>Hopea ponga</i>	21.3	<i>Poeciloneuron indicum</i>	16.0	<i>Dipterocarpus indicus</i>	17.0	<i>Palaquium ellipticum</i> *	13.2	<i>Knema attenuata</i> *	12.8
5	<i>Aglaiia elaeagnoidea</i> *	16.6	<i>Myristica dactyloides</i> *	12.8	<i>Syzygium gardneri</i> *	14.8	<i>Holigarna arnottiana</i>	13.0	<i>Mesua ferrea</i> *	12.4
6	<i>Reinwardtiendron anamalaiense</i>	9.6	<i>Lepisanthes tetraphylla</i>	12.7	<i>Garcinia morella</i> *	13.0	<i>Elaeocarpus tuberculatus</i> *	8.4	<i>Hopea ponga</i>	11.9
7	<i>Artocarpus hirsuta</i> *	9.4	<i>Canthium dicoccum</i> †*	12.7	<i>Lepisanthes tetraphylla</i>	11.8	<i>Ventilago madera spatana</i>	7.5	<i>Palaquium ellipticum</i> *	11.3
8	<i>Maristicta malabarica</i> *	9.2	<i>Lagerstroemia microcarpa</i>	10.1	<i>Knema attenuata</i> *	8.7	Unidentified species 53	6.2	<i>Syzygium gardneri</i> *	10.4
9	<i>Lepisanthes tetraphylla</i>	7.9	<i>Holigarna grahamii</i> *	8.6	<i>Cinnamomum malabathrum</i> *	8.5	<i>Myristica dactyloides</i> *	6.2	<i>Artocarpus hirsutus</i> *	10.1
10	<i>Diospyros candolleana</i>	6.1	<i>Diospyros saldanhae</i>	7.5	<i>Ficus nervosa</i> *	8.0	<i>Myristica malabarica</i> *	6.1	<i>Diospyros nilagirica</i> *	9.2
11	<i>Arenga wightii</i> *	5.5	<i>Lophopetalum wightianum</i>	7.2	<i>Palaquium ellipticum</i> *	7.3	<i>Aglaiia elaeagnoidea</i> *	5.7	<i>Hopea parviflora</i>	7.9
12	<i>Caryota urens</i> *	3.9	<i>Terminalia paniculata</i>	7.1	<i>Reinwardtiendron anamalaiense</i>	6.8	<i>Gordonia obtusa</i> *	5.0	<i>Lagerstroemia parviflora</i>	7.7
13	<i>Cinnamomum malabathrum</i> *	3.6	Unidentified species 41	7.1	<i>Garcinia spicata</i>	5.7	<i>Holigarna grahamii</i> *	5.0	<i>Myristica dactyloides</i> *	7.4
14	<i>Garcinia indica</i> *	3.4	<i>Bischofia javanica</i> *	6.8	<i>Persea macrantha</i> *	5.4	<i>Diospyros paniculata</i>	4.5	<i>Lophopetalum wightianum</i>	7.2
15	<i>Pterospermum diversifolium</i>	3.4	<i>Calycopteris floribunda</i>	5.8		5.0	<i>Fahrenheitia zeylanica</i> *	4.1	<i>Litsea insignis</i> *	6.1

† var. *dicoccum*; \* indicates food-trees of the lion-tailed macaques.

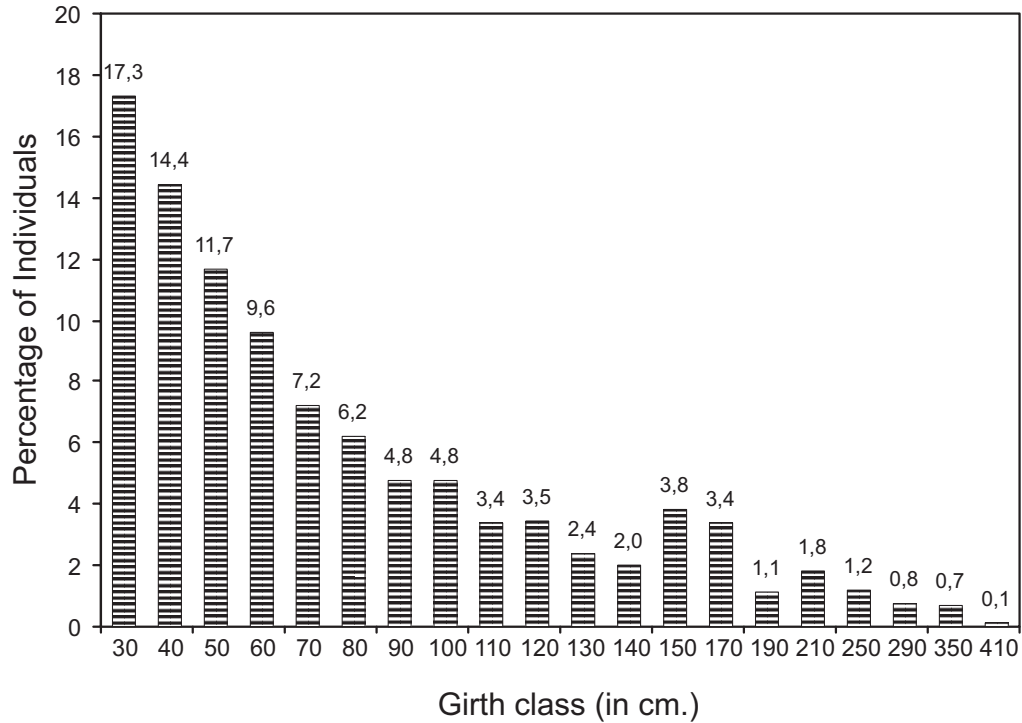


Fig. 4: Species-area curves for the study areas 1-5.

Table 4: List of non-timber forest products and its impact on the lion-tailed macaques.

	<b>Non-Timber Forest Products</b>	<b>Parts Used and Purpose</b>
1	<i>Ailanthus triphysa</i>	Resin – paint industry
2	<i>Aporosa lindleyana</i> *	Fruits – local consumption
3	<i>Arenga wightii</i> *	Fronds – thaches for huts
4	<i>Artocarpus gomezianus</i> ssp. <i>zeylanicus</i> *	Fruits – <u>local consumption</u>
5	<i>A. heterophyllus</i> *	Fruits – local consumption
6	<i>Bombax ceiba</i> *	Cotton from pods – stuffing mattresses
7	<i>Calamus thwaitzii</i>	Stem – for making furniture
8	<i>C. pseudo-tenuis</i> *	Stem – for making furniture
9	<i>Cinnamomum malabathrum</i> *	Bark, leaves, flowers – flavouring food
10	<i>C. sulphuratum</i> *	Bark, leaves, flowers – flavouring food
11	<i>Canarium strictum</i> *	Resin – for making Burgundy pitch; medicinal
12	<i>Caryota urens</i> *	Fruits – Toddy tapping
13	<i>Elaeocarpus serratus</i> *	Fruits – local use



	Non-Timber Forest Products	Parts Used and Purpose
14	<i>Flacourtia montana</i> *	Fruits – local use
15	<i>Garcinia gummi-gutta</i> *	Fruits – local consumption
16	<i>Garcinia indica</i> *	Fruits – local consumption
17	<i>Kingiodendron pinnatum</i>	Oil from the heart – wood preservative
18	<i>Mangifera indica</i> *	Fruits – making pickles
19	<i>Myristica dactyloides</i> *	Aril, seeds – making dyes
20	<i>Myristica malabarica</i> *	Aril, seeds – making dyes
21	<i>Persea macrantha</i> *	Bark – perfumery
22	<i>Vateria indica</i> *	Resin, seeds – perfumery, soaps, candles and paint industry

\* indicates food-trees of the lion-tailed macaques

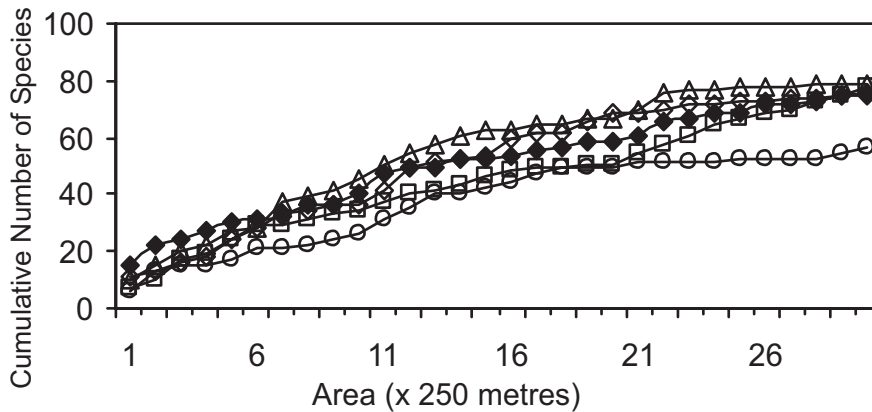


Fig. 5: Size class distribution of all individuals in the five areas (combined).

Based on the number of individuals, species were grouped into very rare (those represented by a single individual), rare (2 to 10), common (11 to 25), dominant (26 to 50) and predominant (> 50) (KADAVUL and PARTHASARATHY, 1999). On this criterion, 25.3 % of species were very rare, 51.6 % were rare, 13.2 % were common and 6.3 % dominant and 3.7% predominant. The overall species rarity (very rare + rare) cumulatively for the five areas was 76.9 %; 89.3 % (Area 1), 88.5 % (Area 2), 84.2 % (Area 3), 89.9 % (Area 4) and 85.5 % (Area 5); (Table 3).

In rainforests a small number of species generally account for a major part of the plant biomass and many species are represented by very few individuals. HUBBELL and FOSTER (1992) are of the view that many of the rare and very rare species are adapted to regenerate only under high-light conditions in large gaps. They further added that rare species are three times as likely to decrease than increase. Conversely, species that are predominant and/or dominant are three times more likely to increase than decrease.

### C. Food-trees of lion-tailed macaques

A food-tree is defined as any tree species whose edible plant parts (such as leaves, flowers, fruits etc.) are eaten by the primate being studied. Data compiled from three different study sites (Ashambu Hills, Anamalai Hills, and Silent Valley) show that the lion-tailed macaques feed on at least 218 species from 61 families; these include trees, liannas, herbs, shrubs, epiphytic parasites and hemiepiphytes (Appendix 2). The top twelve families, with respect to the number of species used as food-resources, are Moraceae (19 species), Euphorbiaceae (14), Rubiaceae (11), Myrtaceae (9), Myrcinaceae, Annonaceae (8 each), Fabaceae, Arecaceae (7 each), Eleoarpaceae, Flacourtiaceae, Anacardiaceae, and Rutaceae (6 each). These contributed to 49.1 % of the total species utilized by the lion-tailed macaques

The relative dominance and densities of the food-trees of the lion-tailed macaques are given in Table 4 (for a complete list of food-trees see Appendix 2). Seventy-four species (38.9 %) of the 190 species enumerated in the five areas have been reported to be food-trees of the lion-tailed macaque. In the five areas sampled Area 1 had ten food-trees in the top fifteen species enumerated (66.7 %). Area 2 had seven (46.7 %), Area 3 had ten (66.7 %), Area 4 had ten (66.7 %) and Area 5 had eight (47.2 %). The relative dominance of the food-trees was 62.2 % and relative density was 57.1 % for all the five study areas together. Hence the Karnataka forests are better suited for the survival potential of the lion-tailed macaques. However, the importance of food species in the diet has not been considered here. A compilation of this information might drastically bring down the abundance of food trees in the study areas.

### D. Non-timber forest products

Vegetative or reproductive parts of at least 22 plant species are being collected from these forests as non-timber forest products (NTFPs) and twenty of these are food-trees of the lion-tailed macaques (Appendix 2). The harvest of the fruits of five species (*Artocarpus gomezianus* ssp. *zeylanicus*, *Artocarpus heterophyllus*, *Garcinia gummi-gutta*, *Garcinia indica* and *Mangifera indica*), may have short and long-term impacts on the lion-tailed macaques. The impact is greater because branches are often lopped while harvesting fruits. In the short term, removal of fruits affects the food availability. All the five species which are heavily harvested have been reported to be major food trees of the lion-tailed macaques elsewhere (GREEN and MIN-KOWSKI, 1977; KUMAR, 1987). In the long term, sustained harvest could affect regeneration and this leads to decline in food availability. Continued NTFP harvest, without proper management may lead to substantial changes in the phyto-sociological attributes of a forest community.

For example, in a study on NTFPs collected in the Biligiri Rangan Hills, SHANKAR et al. (1998) found that larger woody species were being replaced by smaller woody species. The population structure was also getting skewed towards the smaller size classes due to extraction-bound mortality of the individuals, particularly those species with a girth of 22 cm (gbh) and above. Their study suggested that the scrub community could have been a manifestation of long persisting anthropogenic pressures in the form of extraction of a variety of NTFPs and it currently represents a downward transition from a deciduous forest to a shrub thicket.

#### E. Lion-tailed macaques in Karnataka

The evergreen forests of Karnataka came under the State management at the turn of the century (KARANTH, 1992). The forests were largely left intact but the burgeoning growth of plywood industries after the 1960's put pressure on these rainforests. Selective felling of hardwoods for railway sleepers (*Poeciloneuron indicum*, *Mesua ferrea*, *Hopea parviflora*) and softwoods for the match industries (*Ailanthus triphysa*, *Dipterocarpus indicus*, *Vateria indica*, *Canarium strictum*) also began to put pressure on these forests. Even as recently as 1997 trees were "scientifically" felled and exploited even inside Protected Areas. Timber lobbyists are mainly responsible for the forestry policies that are more deleterious to these forests and KARANTH (1992) clearly outlines the main reasons for the serious deterioration of quality for the lion-tailed macaque habitats.

The rainforests in Karnataka, which harbour lion-tailed macaques, are presently more or less contiguous. However, it exists as a linear strip along the western slope of the Western Ghats not more than 5 to 6 km in width. The lowland monsoon rainforests of the coastal Karnataka were cleared for agriculture more than 100 years ago. The remaining lowland habitats have degraded into semi-evergreen and deciduous forest formations due to anthropogenic pressures (PASCAL, 1988). These habitats no longer have lion-tailed macaque. The lion-tailed macaques in Karnataka, are confined to the steep slope of the Western Ghats where human pressure is minimal. KARANTH (1992) gives a detailed account of the problems faced by the lion-tailed macaques in Karnataka.

Among the five areas where vegetation sampling was done, the lion-tailed macaque is safest perhaps in Kudremukha National Park. Their survival potential is most threatened in the low land rainforests in the Someshwara Wildlife Sanctuary. The other three areas are intermediate between these two. Human settlements inside the Protected Areas are the main reason behind this.

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**Appendix 1:** Floristic composition, frequency, density and IVI of plant species sampled from all the five study areas (cumulative). The variety and sub-species names of the species are given as footnote. \* indicates food-trees of the lion-tailed macaques; § indicates major food-trees of the lion-tailed macaques.

S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
<b>Trees</b>					
1	<i>Poeciloneuron indicum</i> Bedd. (Clusiaceae)	143	38	11618931.04	36.56
2	<i>Myristica dactyloides</i> Gaertn. (Myristicaceae)*	120	72	6029656.89	26.24
3	<i>Dimocarpus longan</i> Lour. (Sapindaceae)*	83	40	4913661.16	18.88
4	<i>Olea dioica</i> Roxb. (Oleaceae)*	66	36	4475147.76	16.60
5	<i>Aglaia elaeagnoidea</i> (Juss.) Benth. (Meliaceae)*	77	48	2870513.21	14.86
6	<i>Syzygium gardneri</i> Thw. (Myrtaceae)* §	52	41	3763923.02	14.69
7	<i>Dipterocarpus indicus</i> Bedd. (Dipterocarpaceae)	45	24	1294969.06	7.51
8	<i>Garcinia morella</i> (Gaertn.) Desr. (Clusiaceae)*	60	28	706063.63	7.48
9	<i>Palaquium ellipticum</i> (Dalz.) Engl. (Sapotaceae)*	44	29	963216.55	7.18
10	<i>Lepisanthes tetraphylla</i> (Vahl.) Radlk. (Sapindaceae)	46	29	780494.41	6.91

S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
11	<i>Hopea ponga</i> (Dent.) Mabber. (Dipterocarpaceae)	40	24	926753.62	6.43
12	<i>Knema attenuata</i> (Wall. Ex Hk.f. & Thoms) Warb. (Myristicaceae)*	36	23	522735.52	5.25
13	<i>Cinnamomum malabathrum</i> (Burm.f.) Bl. (Lauraceae)*	30	24	477510.57	4.89
14	<i>Artocarpus hirsutus</i> Lamk. (Moraceae)* §	26	21	684335.56	4.83
15	<i>Semecarpus auriculata</i> Bedd. (Anacardiaceae)	34	16	411263.24	4.28
16	<i>Holigarna grahamii</i> (Wt.) Kurz (Anacardiaceae)* §	25	20	471681.64	4.23
17	<i>Holigarna arnottiana</i> Hk.f. (Anacardiaceae)	26	20	312070.54	3.95
18	<i>Myristica malabarica</i> Lamk. (Myristicaceae)*	29	16	330257.91	3.81
19	<i>Reinwardtiodendron anamalaiense</i> (Bedd.) Mabber. (Meliaceae)	29	13	216142.70	3.30
20	<i>Humboldtia brunonis</i> Wall. (Fabaceae)	26	14	95272.49	2.96
21	<i>Lophopetalum wightianum</i> Arn. (Celastraceae)	15	11	312448.79	2.51
22	<i>Mesua ferrea</i> L. (Clusiaceae)*	14	13	243134.89	2.48
23	<i>Elaeocarpus tuberculatus</i> Roxb. (Elaeocarpaceae)*	12	10	392314.41	2.42
24	<i>Litsea insignis</i> Gamble (Lauraceae)*	15	12	225204.54	2.41
25	<i>Ficus nervosa</i> Heyne ex Roth (Moraceae)* §	13	11	291741.55	2.35
26	<i>Bischofia javanica</i> Bl. (Euphorbiaceae)* §	11	11	340153.10	2.34
27	<i>Canthium dicoccum</i> (Gaertn.) Merr. <sup>A</sup> (Rubiaceae)*	20	10	101158.53	2.27
28	<i>Diospyros candolleana</i> Wt. (Ebenaceae)	16	12	116327.79	2.24
29	<i>Diospyros oocarpa</i> Thw. (Ebenaceae)	16	10	179359.29	2.20
30	<i>Lagerstreomia microcarpa</i> Wt. (Lythraceae)	10	10	326862.96	2.16
31	<i>Mastixia arborea</i> (Wt.) Bedd. <sup>B</sup> (Cornaceae)	17	11	92524.27	2.16
32	<i>Calophyllum polyanthum</i> Wall. Ex Choisy (Clusiaceae)*	11	11	185284.15	2.01
33	<i>Persea macrantha</i> (Nees) Kosterm. (Lauraceae)*	9	9	251975.19	1.86

S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
34	<i>Garcinia indica</i> Choisy (Clusiaceae)*	12	11	83425.75	1.85
35	<i>Diospyros paniculata</i> Dalz. (Ebenaceae)	12	11	76333.10	1.83
36	<i>Diopsiros nilagirica</i> Bedd. (Ebenaceae)*	13	11	47678.40	1.83
37	<i>Ixora brachiata</i> Roxb. ex DC. (Rubiaceae)	14	10	52732.40	1.81
38	<i>Hopea parviflora</i> Bedd. (Dipterocarpaceae)	11	10	111454.77	1.76
39	<i>Litsea floribunda</i> (Bl.) Gamble (Lauraceae)* §	11	10	89833.17	1.71
40	<i>Nothopegia beddomei</i> Gamble (Anacardiaceae)*	11	11	30784.76	1.68
41	<i>Diospyros crumenata</i> Thw. (Ebenaceae)	12	10	41903.40	1.67
42	<i>Fahrenheitia zeylanica</i> (Thw.) Airy Shaw (Euphorbiaceae)*	10	10	51266.08	1.57
43	<i>Lagerstroemia parviflora</i> Roxb. (Lythraceae)	10	9	70810.75	1.53
44	Unidentified species 53	12	7	27972.08	1.38
45	<i>Garcinia spicata</i> (Wt. & Arn.) Hk.f. (Clusiaceae)	10	7	70930.88	1.35
46	<i>Polyalthia fragrans</i> (Dalz.) Bedd. (Annonaceae)	8	8	42134.66	1.26
47	<i>Mangifera indica</i> L. (Anacardiaceae)* §	8	8	32014.13	1.24
48	Unidentified species 41	11	6	29919.98	1.24
49	<i>Diospyros saldanhae</i> Kosterm. (Ebenaceae)	11	6	28923.44	1.23
50	<i>Arenga wightii</i> Griff. (Arecaceae)	9	7	21278.08	1.19
51	<i>Caryota urens</i> L. (Arecaceae)* §	8	7	31321.52	1.15
52	<i>Kingiodendron pinnatum</i> (Roxb. Ex DC.) Harms (Fabaceae)	11	5	18881.21	1.12
53	<i>Hydnocarpus pentandra</i> (Buch.-Ham.) Oken (Flacourtiaceae)*	7	7	7254.86	1.04
54	<i>Macaranga peltata</i> (Roxb.) M.-A. (Euphorbiaceae)* §	8	5	16671.20	0.94
55	<i>Elaeocarpus serratus</i> L. (Elaeocarpaceae)* §	7	5	42703.92	0.94
56	<i>Syzygium hemisphericum</i> (Walp.) Alston (Myrtaceae)*	6	6	27624.11	0.94
57	<i>Actinodaphne bourdillonii</i> Gamble (Lauraceae)	6	6	18121.67	0.92



S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
58	<i>Drypetes elata</i> Bedd. (Euphorbiaceae)*	7	5	22938.44	0.90
59	<i>Gordonia obtusa</i> Wall. (Ternstroemiaceae)*	6	4	90646.52	0.90
60	<i>Agrostistachys borneensis</i> Becc. (Euphorbiaceae)*	6	6	8125.10	0.90
61	<i>Pterospermum diversifolium</i> Bl. (Sterculiaceae)	6	6	7448.32	0.89
62	<i>Eugenia macrosepala</i> Duthie (Myrtaceae)	6	6	5402.12	0.89
63	<i>Litsea mysorensis</i> Gamble (Lauraceae)	7	5	12657.37	0.88
64	<i>Terminalia paniculata</i> Roth (Combretaceae)	5	4	81401.61	0.82
65	<i>Vitex altissima</i> L. (Verbenaceae)	5	5	20770.99	0.78
66	<i>Vateria indica</i> L. (Dipterocarpaceae)*	5	5	18212.91	0.77
67	<i>Canarium strictum</i> Roxb. (Burseraceae)*	5	5	10766.51	0.75
68	<i>Mallotus philippensis</i> (Lamk.) M.-A. (Euphorbiaceae)	5	5	6452.01	0.75
69	<i>Tabernaemontana heyneana</i> Wall. (Apocynaceae)	5	5	5307.18	0.74
70	<i>Hydnocarpus macrocarpa</i> (Bedd.) Warb. (Flacourtiaceae)*	5	4	11192.05	0.67
71	<i>Hopea canarensis</i> Hole (Dipterocarpaceae)	5	4	6474.69	0.66
72	<i>Garcinia gummi-gutta</i> (L.) Robs. (Clusiaceae)* §	4	4	25681.35	0.64
73	<i>Donella roxburghii</i> (G. Don) Pierre ex Lecomte (Sapotaceae)	5	3	32806.20	0.63
74	<i>Ficus callosa</i> Willd. (Moraceae)* §	4	4	15288.20	0.62
75	<i>Artocarpus heterophyllus</i> Lamk. (Moraceae)* §	4	4	14762.73	0.62
76	<i>Vepris bilocularis</i> (Wt. & Arn.) Engl. (Rutaceae)*	4	4	12963.82	0.61
77	<i>Syzygium rubicundam</i> Wt. & Arn. (Myrtaceae)	4	4	11275.75	0.61
78	<i>Syzygium zeylanicum</i> (L.) DC. (Myrtaceae)	4	4	3797.68	0.59
79	<i>Syzygium laetum</i> (Ham.) Gandhi (Myrtaceae)*	4	4	2517.49	0.59
80	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillw.) Mabber. (Bignoniaceae)	4	3	33898.12	0.57

S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
81	<i>Antiaris toxicaria</i> (Pers.) Lesch. (Moraceae)*	3	3	40711.14	0.53
82	<i>Archidendron monadelphum</i> (Roxb.) Neilson (Fabaceae)	4	3	9012.47	0.52
83	<i>Mimusops elangi</i> L. (Sapotaceae)*	4	3	4755.25	0.51
84	<i>Diospyros malabarica</i> (Desr.) Kostel. (Ebenaceae)	4	3	3369.04	0.50
85	<i>Nothapodytes nimmoniana</i> (Grah.) Mabber. (Icacinaceae)	4	3	2364.23	0.50
86	<i>Baccaurea courtallensis</i> (Wt.) M.-A. (Euphorbiaceae)*	4	3	1773.11	0.50
87	<i>Madhuca neriifolia</i> (Moon) H.J. Lam. (Sapotaceae)	3	3	7907.94	0.46
88	<i>Bombax ceiba</i> L. (Bombacaceae)*	3	3	7356.11	0.45
89	<i>Beilschmeidia wightii</i> (Nees) Benth. (Lauraceae)	3	3	4070.06	0.45
90	<i>Clausena dentata</i> (Willd.) Roem. (Rutaceae)*	3	3	3300.63	0.45
91	<i>Memecylon umbellatum</i> Burm. f. (Melastomaceae)	3	3	2775.68	0.45
92	<i>Grewia serrulata</i> DC. (Tiliaceae)	3	3	2383.47	0.44
93	<i>Nothopegia racemosa</i> (Dalz.) Ramam. (Anacardiaceae)	3	3	1338.12	0.44
94	<i>Ficus virens</i> Ait. (Moraceae) *	2	2	54798.86	0.41
95	<i>Chionanthus mala-elengi</i> (Dennst.) P.S.Green (Oleaceae)	3	2	10585.83	0.37
96	<i>Otonophelium stipulaceum</i> (Bedd.) Radlk. (Sapindaceae)	3	2	4381.69	0.36
97	<i>Blepharistemma membranifolia</i> (Miq.) Ding Hou (Rhizophoraceae)	3	2	2640.66	0.36
98	<i>Blachia denudata</i> Benth. (Euphorbiaceae)	3	2	888.72	0.35
99	<i>Acrocarpus fraxinifolius</i> Wt. & Arn. (Fabaceae)	2	2	25428.87	0.35
100	<i>Terminalia bellirica</i> (Gaertn.) Roxb. (Combretaceae)	2	2	14803.88	0.32
101	<i>Alstonia scholaris</i> (L.) R. Br. (Apocynaceae)	3	1	26943.95	0.32
102	<i>Sterculia guttata</i> Roxb. (Sterculiaceae)*	2	2	8360.68	0.31
103	<i>Schefflera racemosa</i> Harms (Araliaceae)	2	2	7016.63	0.31

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S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
104	<i>Holoptelea integrifolia</i> (Roxb.) Planch. (Ulmaceae)	2	2	3629.26	0.30
105	<i>Syzygium cumini</i> (L.) Skeels (Myrtaceae)*	2	2	3548.16	0.30
106	<i>Maytenus rothiana</i> (Walp.) Ramam. (Celastraceae)	2	2	2898.86	0.30
107	<i>Aporosa lindleyana</i> (Wt.) Baill. (Euphorbiaceae)*	2	2	2880.67	0.30
108	<i>Diospyros buxifolia</i> (Bl.) Hiern (Ebenaceae)*	2	2	2213.13	0.30
109	<i>Trewia polycarpa</i> Benth. (Euphorbiaceae)	2	2	1523.66	0.30
110	<i>Cynometra travancorica</i> Bedd. (Fabaceae)	2	2	1434.72	0.30
111	<i>Xantolis tomentosa</i> (Roxb.) Raf. (Sapotaceae)	2	2	1042.86	0.29
112	<i>Holigarna beddomei</i> Hk.f. (Anacardiaceae)	2	2	1039.22	0.29
113	<i>Litsea laevigata</i> (Nees) Gamble (Lauraceae)*	2	2	1022.92	0.29
114	<i>Antidesma menasu</i> Miq. Ex Tul. (Euphorbiaceae)*	2	2	757.73	0.29
115	<i>Callicarpa tomentosa</i> (L.) Murray (Verbenaceae)	2	2	676.20	0.29
116	Unidentified species 27	2	2	610.41	0.29
117	Unidentified species 85	2	2	574.72	0.29
118	Unidentified species 57	2	2	547.99	0.29
119	<i>Carallia brachiata</i> (Lour.) Poir. (Rhizophoraceae)*	2	1	17007.91	0.24
120	<i>Ormosia travancorica</i> Bedd. (Fabaceae)*	1	1	2829.43	0.15
121	Unidentified species 38	1	1	2731.28	0.15
122	<i>Homalium zeylanicum</i> (Gard.) Benth. (Flacourtiaceae)	1	1	2634.86	0.15
123	<i>Symplocos cochinchinensis</i> (Lour.) S. Morre Nooteb <sup>c</sup> (Symplocaceae)*	1	1	1250.87	0.15
124	<i>Celtis philippensis</i> Blanco (Ulmaceae)	1	1	1242.90	0.15
125	<i>Haldina cordifolia</i> (Roxb.) Ridsd. (Rubiaceae)	1	1	1174.27	0.15
126	<i>Drypetes confertiflora</i> (Hk.f.) Pax & Hoffm. (Euphorbiaceae)	1	1	973.03	0.15

S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
127	<i>Madhuca longifolia</i> (Koenig) Macbride <sup>D</sup> (Sapotaceae)	1	1	919.25	0.15
128	<i>Ficus exasperata</i> Vahl. (Moraceae)	1	1	917.54	0.15
129	Unidentified species 37	1	1	843.90	0.15
130	<i>Pajanelia longifolia</i> (Willd.) K. Schum. (Bignoniaceae)	1	1	591.06	0.15
131	<i>Cryptocarya bourdillonii</i> Gamble (Lauraceae)*	1	1	509.09	0.15
132	<i>Symplocos macrophylla</i> Wall. ex DC. <sup>E</sup> (Symplocaceae)	1	1	418.11	0.15
133	Unidentified species 51	1	1	336.08	0.15
134	<i>Artocarpus gomezianus</i> Wall. Ex Trec. <sup>F</sup> (Moraceae)*	1	1	328.88	0.15
135	<i>Neolitsea scrobiculata</i> (Meissn.) Gamble (Lauraceae)*	1	1	319.74	0.15
136	<i>Aglaia perviridis</i> Hiern (Meliaceae)	1	1	299.88	0.15
137	<i>Litsea deccanensis</i> Gamble (Lauraceae)*	1	1	295.99	0.15
138	<i>Schefflera rostrata</i> (Wt.) Harms (Araliaceae)	1	1	258.44	0.15
139	<i>Toona ciliata</i> Roem. (Meliaceae)	1	1	249.45	0.15
140	Unidentified species 114	1	1	177.97	0.15
141	<i>Symplocos racemosa</i> Roxb. <sup>G</sup> (Symplocaceae)	1	1	172.00	0.15
142	<i>Tetrameles nudiflora</i> R. Br. (Datisceae)*	1	1	156.11	0.15
143	<i>Drypetes roxburghii</i> (Wall.) Hurusawa (Euphoebiaceae)	1	1	152.60	0.15
144	<i>Eurya nitida</i> Korth. (Ternstroemiaceae)	1	1	135.02	0.15
145	<i>Canthium</i> sp. (Rubiaceae)	1	1	133.72	0.15
146	<i>Holigarna nigra</i> Bourd. (Anacardiaceae)*	1	1	122.86	0.15
147	Unidentified species 22	1	1	117.91	0.15
148	<i>Cinnamomum sulphuratum</i> Nees (Lauraceae)*	1	1	98.56	0.15
149	<i>Flacourtia montana</i> Grah. (Flacourtiaceae)*	1	1	97.44	0.15
150	<i>Casearia bourdillonii</i> Mukherjee (Flacourtiaceae)	1	1	86.63	0.15
151	<i>Meiogyne pannosa</i> (Dalz.) Sinclair (Annonaceae)*	1	1	81.45	0.15

S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
152	<i>Atalantia racemosa</i> Wt. & Arn. (Rutaceae)	1	1	77.43	0.15
153	<i>Saraca asoca</i> (Roxb.) de Willd. (Fabaceae)	1	1	72.55	0.15
154	<i>Ardisia pauciflora</i> Heyne ex Wall. (Myrsinaceae)*	1	1	71.59	0.15
155	<i>Ficus hispida</i> L.f. (Moraceae)*	1	1	71.59	0.15
156	Unidentified species 69	1	1	71.59	0.15
	Total	1707	1139	46765247.97	300
<b>Lianas</b>					
1	<i>Ventilago maderaspatana</i> Gaertn. (Rhamnaceae)	21	19	25088.20	2.95
2	<i>Strychnos colubrina</i> L. (Loganiaceae)	9	7	3220.11	1.15
3	<i>Calycopteris floribunda</i> (Roxb.) Poir. (Combretaceae)	9	7	2165.63	1.15
4	<i>Grewia umbellifera</i> Bedd. (Tiliaceae)	8	5	5687.72	0.92
5	Unidentified species 3	5	5	1718.90	0.74
6	<i>Ancistrocladus heyneanus</i> Wall. Ex Arn. (Ancistrocladaceae)	5	5	1164.63	0.73
7	<i>Tetrastigma muricatum</i> Gamble (Vitaceae)	5	4	647.19	0.65
8	<i>Moullava spicata</i> (Dalz.) Nicolson (Fabaceae)	6	3	946.81	0.62
9	<i>Loeseneriella arnottiana</i> (Gamble) Ramam. (Hippocrateaceae)	5	3	978.31	0.56
10	<i>Ventilago bombaiensis</i> Dalz. (Rhamnaceae)	4	3	827.59	0.50
11	<i>Randia rugulosa</i> Thw. (Rubiaceae)*	4	3	793.86	0.50
12	<i>Gnetum ula</i> Brogn. (Gnetaceae)*	3	3	418.11	0.44
13	<i>Schefflera venulosa</i> Harms (Araliaceae)	3	3	412.36	0.44
14	<i>Bauhinia phoenicea</i> Heyne ex Wt. & Arn. (Fabaceae)	3	2	682.08	0.35
15	<i>Gardneria ovata</i> Wall. (Loganiaceae)	2	2	258.44	0.29
16	<i>Kuntsleria keralensis</i> Mohanan & N.C.Nair	2	2	155.40	0.29
17	<i>Luvunga sarmentosa</i> (Bl.) Kurz (Rutaceae)	2	2	141.66	0.29
18	<i>Combretum latifolium</i> Bl. (Combretaceae)	2	2	84.02	0.29

S. No.	Species	Density	Frequency	Basal Area (cm <sup>2</sup> )	IVI
19	<i>Desmos lawii</i> (Hk. F. & Thoms.) Safford (Annonaceae)	2	2	51.72	0.29
20	<i>Leptadenia reticulata</i> Wt. & Arn. (Asclepiadaceae)	2	1	198.86	0.21
21	<i>Jasminum malabaricum</i> Wt. (Oleaceae)	2	1	126.00	0.21
22	<i>Artabotrys zeylanicus</i> Hk.f. (Annonaceae) *	2	1	122.23	0.21
23	<i>Entada pursaetha</i> DC. (Fabaceae)	2	1	35.75	0.21
24	Unidentified species 116	1	1	202.86	0.15
25	<i>Erycibe paniculata</i> Roxb. (Convolvulaceae) *	1	1	200.46	0.15
26	<i>Rourea minor</i> (Gaertn.) Merr. (Connaraceae)	1	1	84.02	0.15
27	Unidentified species 36	1	1	51.32	0.15
28	<i>Sarcostigma kleinii</i> Wt. & Arn. (Icacinaeae) *	1	1	42.08	0.15
29	<i>Carssa ineris</i> Vahl. (Apocynaceae)	1	1	35.75	0.15
30	Unidentified species 92	1	1	27.82	0.15
31	<i>Derris</i> sp. (Fabaceae)	1	1	14.50	0.15
32	<i>Canhium angustifolium</i> Roxb. (Rubiaceae)	1	1	9.63	0.15
33	<i>Calamus thwaitseii</i> Becc. (Arecaceae)	1	1	8.44	0.15
34	<i>Premna coriacea</i> Cl. (Verbenaceae)	1	1	8.28	0.15

<sup>A</sup> var. dicoccum ; <sup>B</sup> ssp. meziana (Wang.) Matthew; <sup>C</sup> ssp. laurina (Retz.) ; <sup>D</sup> var. longifolia; <sup>E</sup> ssp. macrophylla ; <sup>F</sup> ssp. zeylanicus Jarett; <sup>G</sup> var. racemosa

**Appendix 2:** A list of trees used by lion-tailed macaques as food-trees.

Plant Species	Part Eaten	Source
<b>Anacardiaceae</b>		
<i>Holigarna nigra</i> Bourd.		2, 6
<i>H. grahamii</i> (Wt.) Kurz	F	4
<i>Mangifera indica</i> L.	F	1, 3, 4, 6
<i>Nothopegia beddomei</i> Gamble	F	1
<i>N. heyneana</i> (Hook.f.) Gamble		3
<i>Semecarpus travancorica</i> Bedd.	F	1, 3, 5

Plant Species	Part Eaten	Source
<b>Annonaceae</b>		
<i>Annona cherimola</i> Miller ‡	F	1
<i>Artabotrys zeylanicus</i> Hk. f. †	F	1
<i>Cyathocalyx zeylanicus</i> Champ ex Hook.f. & Thoms.	F	1
<i>Meiogyne viridiflora</i> ?	F	1
<i>M. pannosa</i> (Dalz.) Sinclair	F	1
<i>Miliusa wightiana</i> J. Hk. & Thw.	x	2
<i>M. tomentosa</i> (Roxb.) Sinclair (= <i>Saccopetalum tomentosum</i> Hook.f. & Thoms.)	F	1
<i>Polyalthia coffeoides</i> (Thw.) Benth. Ex Hook.f. & Thoms.	F	1
<b>Apocynaceae</b>		
<i>Aganosma cymosa</i> (Roxb.) Don (L)	F	1
<i>Carissa spinarum</i> L.**	S	1
<i>Chilocarpus denudatus</i> Bl. † (= <i>Chilocarpus atro-viridis</i> Bl.)	S	1
<i>Cryptostegia grandiflora</i> R. Br. †	F	1
<b>Areaceae</b>		
<i>Arenga wightii</i> Griff.	F	4
<i>Bentinckia condapanna</i> Bl.		2
<i>Calamus pseudo-tenuis</i> Becc. †	S	1, 4
<i>C. rotang</i> L. †	S	1, 3
<i>C. travancoricus</i> Bedd. †		2
<i>Calamus</i> sp.		6
<i>Caryota urens</i> L.	F	4, 6
<b>Aristolochiaceae</b>		
<i>Aristolochia tagala</i> Cham. †		2, 6
<b>Bignoniaceae</b>		
<i>Oroxylum indicum</i> (L.)Vent.	F	5
<b>Bombacaceae</b>		
<i>Bombax ceiba</i> L. (= <i>B. malabaricum</i> DC.) (= <i>Salmalia malabarica</i> )	N	3, 4
<i>Cullenia exarillata</i> A. Robyns	S N	1, 2, 5, 6
<b>Boraginaceae</b>		
<i>Cordia dichotama</i> Forst.f. (= <i>Cordia myxa</i> auct. Non L.)	F	1
<b>Burseraceae</b>		
<i>Canarium strictum</i> Roxb.		6
<b>Celestraceae</b>		
<i>Cassine kedarnathii</i> Sasi. & Swarup.		6
<b>Chloranthaceae</b>		
<i>Sarcandra chloranthoides</i> Gard. (= <i>Chloranthus brachystachys</i> Bl.)		2

Plant Species	Part Eaten	Source
<b>Clusiaceae</b>		
<i>Calophyllum polyanthum</i> Wall. ex Choisy (= <i>C. elatum</i> Bedd.)		6
<i>Garcinia gummi-gutta</i> (L.) Robson (= <i>G. cambogia</i> Roxb.)	F	1, 4, 6
<i>G. indica</i> (Thouras) Choisy	F	4
<i>G. morella</i> (Gaertn.) Desr.		6
<i>Mesua ferrea</i> L. (= <i>Mesua nagassarium</i> (Burm.f.) Kosterm.)	F	1, 3, 5, 6
<b>Convolvulaceae</b>		
<i>Erycibe paniculata</i> Roxb. † (= <i>E. wightiana</i> Grah.)	F	1
<b>Cyperaceae</b>		
<i>Scleria terrestris</i> (L.) Fassett*** (= <i>S. cochinchinensis</i> (Lour.) Druce)		2
<b>Datiaceae</b>		
<i>Tetrameles nudiflora</i> R. Br.	N	1
<b>Dilleniaceae</b>		
<i>Dillenia pentagyna</i> Roxb.	F	1, 4
<b>Dioscoreaceae</b>		
<i>Dioscorea pentaphylla</i> L. † (= <i>D. belophylla</i> Voight)		2
<i>Dioscorea</i> sp.		6
<b>Dipterocarpaceae</b>		
<i>Hopea glabra</i> Wt. & Arn.		6
<i>Vateria indica</i> L.	S	1
<b>Ebenaceae</b>		
<i>Diospyros buxifolia</i> (Bl.) Hiern (= <i>D. microphylla</i> Bedd.)	S	1, 4
<i>D. montana</i> Roxb.	S	1
<i>D. nilagirica</i> Bedd.		2
<i>D. malabarica</i> (Desr.) Kostel. (= <i>D. peregrina</i> auct. non Gurke)		2
<i>D. sylvatica</i> Roxb.	S	1, 3, 5
<b>Elaeagnaceae</b>		
<i>Elaeagnus conferta</i> Roxb. †	F	1, 3
<i>E. kologa</i> D. F. K. Schldl. †	F	3
<i>Elaeagnus</i> sp. †	F	1
<b>Elaeocarpaceae</b>		
<i>Elaeocarpus glandulosus</i> Wall. ex Merr.		6
<i>E. munronii</i> (Wt.) Masters	S	2, 3, 5, 6
<i>E. recurvatus</i> Corner (= <i>E. ferrugineus</i> (Wt.) Bedd.)	N F	1, 3
<i>E. serratus</i> L.	F	4
<i>E. tuberculatus</i> Roxb.	F	2, 4, 6
<i>E. venustus</i> Bedd.		2



Plant Species	Part Eaten	Source
<b>Euphorbiaceae</b>		
<i>Agrostistachys borneensis</i> Becc. (= <i>A. meeboldii</i> Pax & Hoffm.)		6
<i>Antidesma menasu</i> Miq.	F B	1, 2, 3, 6
<i>Aporusa lindleyana</i> Baill.	F	1, 4
<i>Baccaurea courtallensis</i> (Wt.) Muell. -Arg.	F	1
<i>Bischofia javanica</i> Bl.	F	1, 3, 4, 6
<i>Croton</i> sp.	R	1
<i>Drypetes elata</i> (Bedd.) Pax & Hoffm. (= <i>Hemicyclia elata</i> Bedd.)		2, 6
<i>D. oblongifolia</i> (Bedd.) A. Shaw		2
<i>Fahrenheitia zeylanica</i> (thw.) Airy Shaw		6
<i>Glochidion arboreum</i> Wt.		6
<i>Glochidion bourdillonii</i> Gamble		3
<i>Macaranga indica</i> Wt.		6
<i>M. peltata</i> (Roxb.) Muell. -Arg. (= <i>M. roxburghii</i> Wt.)	F B	1, 2, 3, 4, 5
<i>Mallotus tetracoccus</i> (Roxb.) Kurz		3, 5
<b>Fabaceae</b>		
<i>Cassia</i> sp.	F	3
<i>Caesalpinia bonduc</i> (L.) Roxb. ‡	S	1
<i>Dalbergia sissooides</i> Grah. ‡	S	1
<i>Erythrina subumbrans</i> (Hassk.) Merr. ‡ (= <i>E. lithosperma</i> Bl. ex Miq.)	N	3, 5
<i>Flemingia macrophylla</i> ?		6
<i>Mucuna prurita</i> Hk. †		6
<i>Ormosia travancorica</i> Bedd.		2
<b>Flacourtiaceae</b>		
<i>Casearia ovata</i> (Lam.) Willd. (= <i>C. esculenta</i> Roxb.)	S	1, 6
<i>Flacourtia montana</i> Graham	F N	1, 4, 5
<i>Hydnocarpus alpina</i> Wt.		6
<i>H. pentandra</i> (Buch.- Ham.) Oken (= <i>H. laurifolia</i> (Dennst.) Sleumer)	F	4
<i>H. macrocarpa</i> (Bedd.) Warb. (= <i>Taraktogenos macrocarpa</i> (Bedd.) Balak.)	F	4
<i>Scolopia crenata</i> (Wight & Arn.) D. Clos		2
<b>Gnetaceae</b>		
<i>Gnetum ula</i> Brogn. †	F R	1, 4
<b>Hippocrataceae</b>		
<i>Salacia fruticosa</i> Lawson †		6

Plant Species	Part Eaten	Source
<b>Icacinaceae</b>		
<i>Apodytes dimidiata</i> E.Meyer ex Arn.		6
<i>Gomphandra coriacea</i> Wt.		2, 6
<i>G. polymorpha</i> Wt.		5
<i>Sarcostigma kleinii</i> Wt. & Arn. †	F	1, 4
<b>Lauraceae</b>		
<i>Actinodaphne tadulingami</i> Gamble	F	1, 2
<i>Apollonias arnottii</i> Nees		6
<i>Cinnamomum sulphuratum</i> Nees		2, 4
<i>C. malabathrum</i> (Burm.f.) Bl.		6
<i>Cryptocarya bourdillonii</i> Gamble		6
<i>Litsea beddomei</i> Hk. f.		2
<i>L. coriacea</i> J. Hk.	F	1
<i>L. deccanensis</i> Gamble	F	3, 5
<i>L. floribunda</i> (Bl.) Gamble	F	1, 6
<i>L. insignis</i> Gamble	F	2, 3, 5
<i>L. laevigata</i> (nees) Gamble		6
<i>L. oleoides</i> J. Hk.	F	2, 3, 5, 6
<i>L. wightiana</i> Hk. f.		2
<i>Neolitsea scrobiculata</i> (Meissn.) Gamble		6
<i>N. cassia</i> (L.) Kosterm. (= <i>N. zeylanica</i> (Nees) Merr.)		5
<i>Persea macrantha</i> (Nees) Kosterm. (= <i>Machilus macrantha</i> Nees)	F	1, 4, 6
<b>Liliaceae</b>		
<i>Smilax zeylanica</i> L. †	F	1
<b>Loranthaceae</b>		
<i>Dendrophthoe falcata</i> (L.f.) Ettingsh. (= <i>Loranthus longiflorus</i> Desr. var <i>falcata</i> (L.f.) Kurz)	F	1, 4
<i>Helicanthus elastica</i> (Desr.) Danser (= <i>Loranthus elasticus</i> Desr.)		2
<i>Loranthus tomentosus</i> Heyne	F	3, 5
<b>Meliaceae</b>		
<i>Aglaia bourdillonii</i> Gamble		2
<i>A. elaeagnoidea</i> (Juss.) Benth. (= <i>A. roxburghiana</i> Hiern)	F	1, 4
<i>A. lawii</i> (Wt.) Sald.		6
<i>Dysoxylum malabaricum</i> Bedd. ex Hiern	A	1
<i>Dysoxylum</i> sp.		6
<b>Moraceae</b>		
<i>Antiaris toxicaria</i> Lesch.	F	4
<i>Artocarpus gomezianus</i> Wall. ex Trecul ssp. <i>zeylanicus</i> Jarrete (= <i>A. lakoocha</i> auct. non Roxb.)	F S	1, 4

Plant Species	Part Eaten	Source
<b>Moraceae</b>		
<i>A. heterophyllus</i> Lam.	F S	1, 2, 3, 4, 5, 6
<i>A. hirsutus</i> Lam.	F S	1, 3, 4, 5
<i>Ficus amplissima</i> J.E. Sm. (= <i>F. tsiela</i> Roxb.)	F	1, 2
<i>F. beddomei</i> King		6
<i>F. callosa</i> Willd.	F	4
<i>F. drupaceae</i> Thunb. var. <i>pubescens</i> (Roth) Corner (= <i>F. mysorensis</i> Heyne ex Roth.)	F	4
<i>F. hispida</i> L.f.	F	3, 5
<i>F. integrifolia</i> ?	F	3
<i>F. jerdonif</i> ?	F	1
<i>F. macrocarpa</i> Wight	F	3, 5
<i>F. microcarpa</i> L.f.(= <i>F. retusa</i> L.)	F	3, 5, 6
<i>F. nervosa</i> Roth.	F	1, 3, 4, 5, 6
<i>F. racemosa</i> L. (= <i>F. glomerata</i> Roxb.)	F	3, 4, 5
<i>F. rigida</i> Jack. var. <i>bracteata</i> (Corner) Bennet (= <i>F. glaberrima</i> var. <i>bracteata</i> Corner) (= <i>F. travancorica</i> King)		3, 5
<i>F. tsjahela</i> N. Burman	F	1, 4, 5, 6
<i>F. talbotii</i> King.	F	2, 4
<i>F. virens</i> Aiton (= <i>F. infectoria</i> Roxb.)	F	1, 3, 4
<b>Myristicaceae</b>		
<i>Knema attenuata</i> (J. Hk. & Thw.) Warb.	F	1, 3, 5, 6
<i>Myristica dactyloides</i> Gaertn. (= <i>M. beddomei</i> King)	A	1, 2, 3, 4, 6
<i>M. malabarica</i> Lam.	A	4
<b>Myrsinaceae</b>		
<i>Ardisia pauciflora</i> Heyne		2
<i>A. rhomboidea</i> Wt.		1
<i>A. stonii</i> ?		6
<i>Embelia adnata</i> Bedd.		2
<i>E. ribes</i> Burm.		6
<i>Maesa indica</i> (Roxb.) A. DC.	F	3, 6
<i>M. perottetiana</i> A. DC.		5
<i>Rapanea daphnoides</i> Mez.**		2
<b>Myrtaceae</b>		
<i>Eugenia</i> sp.		2
<i>Psidium guajava</i> L. ‡	F	3
<i>Syzygium cumini</i> (L.) Skeels	F	1, 6
<i>S. gardneri</i> Thw.	F	4, 6
<i>S. hemisphericum</i> (Walp.) Alston	F	4

Plant Species	Part Eaten	Source
<b>Myrtaceae</b>		
<i>S. laetum</i> (Buch.-Ham.) Gandhi (= <i>Eugenia laeta</i> Ham.)	F	1, 3, 5, 6
<i>S. lanceolatum</i> (Lam.) Wt. & Arn.(= <i>S. wightianum</i> Wall. Ex Wt. & Arn.)	F	1, 3
<i>S. mundagam</i> (Bourd.) Chithra	F	2, 6
<i>Syzygium</i> sp.	F	3
<b>Oleaceae</b>		
<i>Chionanthus</i> sp.		6
<i>Ligustrum perrottetii</i> A. DC. ex DC.		6
<i>Olea dioica</i> Roxb.		6
<b>Orchidaceae</b>		
<i>Luisia birchea</i> Blume (= <i>L. tenuifolia</i> auct. Non (L.) Blume)		2
<b>Pandanaceae</b>		
<i>Pandanus thwaitesii</i> Mart.	F	3
<b>Piperaceae</b>		
<i>Piper hymenophyllum</i> Miq. †	Shoot	1
<i>P. pseudotenuis</i> ? †	S	3
<b>Poaceae</b>		
<i>Arthraxon</i> sp.	L	1
<i>Bambusa bambos</i> (L.) Voss (= <i>Bambusa arundinacea</i> (Retz.) Willd.)	S	1
<i>Isachne gardneri</i> Benth.		2
<i>Ochlandra scriptoria</i> C. Fisch.		2
<i>Oplismenus compositus</i> (L.) P. Beauv.		2
<b>Polygonaceae</b>		
<i>Polygonum chinense</i> L. †		6
<b>Rhamanaceae</b>		
<i>Maesopsis eminii</i> Engl. ‡	F	3
<i>Zizyphus oenoplia</i> Mill. †	F	4
<i>Z. rugosa</i> Lam. †		6
<b>Rhizophoraceae</b>		
<i>Carallia brachiata</i> (Lour.) Merr. (= <i>C. integerrima</i> DC.)	F	1
<b>Rosaceae</b>		
<i>Prunus ceylanica</i> (Wt.) Miq. (= <i>Pygeum acuminatum</i> Coleb.)	F	4
<b>Rubiaceae</b>		
<i>Canthium diococcum</i> (Gaertn.) Merr.		2, 6
<i>C. umbellatum</i> W. S		1, 2
<i>Coffea arabica</i> L. <sup>1</sup>	F	3, 5
<i>Lasianthus cinereus</i> Gamble		2

Plant Species	Part Eaten	Source
<b>Rubiaceae</b>		
<i>L. jackianus</i> Wt.		6
<i>Octotropis travancorica</i> Bedd.		2
<i>Psychotria congesta</i> Hk. f.		2
<i>P. flavida</i> Talb.	S	1
<i>P. octosulcata</i> Talb.		2
<i>Randia rugulosa</i> (Thw.) J. Hk. †		2
<i>Saprosma corymbosum</i> Bedd. **		2
<b>Rutaceae</b>		
<i>Acronychia pedunculata</i> (L.) Miq. M (= <i>A. barberi</i> Gamble)	F	1, 4, 6
<i>Clausena dentata</i> (Willd.) Roem.		6
<i>Glycosmis mauritiana</i> (Lam.) Tanaka	F	1
<i>Glycosmis</i> sp.		3
<i>Toddalia asiatica</i> Lamk. var <i>floribunda</i> Gamble † (= <i>T. aculeata</i> Pers.)	F	1, 2, 3, 6
<i>Vepris bilocularis</i> (Wt. & Arn.) Engler	F	1, 2, 3, 4, 5
<b>Sabiaceae</b>		
<i>Meliosma pinnata</i> (Roxb.) Maxim.		6
<b>Sapindaceae</b>		
<i>Allophylus rheedii</i> Radlk.		6
<i>Filicium decipiens</i> (Wt. & Arn.) Thw.	F	1
<i>Dimocarpus longan</i> Lour. (= <i>Nephalium longana</i> (Lam.) Camb.)	F N	1, 6
<i>Schleichera oleosa</i> (Lour.) Oken (= <i>S. trijuga</i> Willd.)	F	1, 3
<b>Sapotaceae</b>		
<i>Mimusops elangi</i> L.	F	3, 5
<i>Palaquium ellipticum</i> (Dalz.) Baillon	F	2, 3, 4, 5, 6
<b>Solanaceae</b>		
<i>Solanum</i> sp.		6
<b>Staphyleaceae</b>		
<i>Turpinia malabarica</i> Gamble		6
<b>Sterculiaceae</b>		
<i>Sterculia guttata</i> Roxb.	S	3, 5
<b>Symplocaceae</b>		
<i>Symplocos cochinchinensis</i> (Lour.) Moore ssp. <i>laurina</i> (Retz.) Noot.	F	3, 6
<i>Symplocos sessilis</i> Cl.		2
<b>Ternstroemiaceae</b>		
<i>Gordonia obtusa</i> Wall.		2

Plant Species	Part Eaten	Source
<b>Tiliaceae</b>		
<i>Grewia tiliifolia</i> Vahl.	F S	1, 3
<i>G. disperma</i> Rottler ex Sprengel	F	1
<i>Grewia</i> sp.	R	1
<b>Ulmaceae</b>		
<i>Aphananthe cuspidata</i> (Bl.) Planchon (= <i>Gironniera reticulata</i> Thw.)	S	1
<b>Verbenaceae</b>		
<i>Lantana camara</i> L. †	F	3, 5, 6
<b>VISCACEAE</b>		
<i>Viscum angulatum</i> Heyne ex DC.		6
<i>V. ramosissimum</i> Wall. ex Wt. & Arn.		2
<b>Vitaceae</b>		
<i>Cayratia pedata</i> (Lour.) A.L. Juss. ex Gagnepain	F	3
<i>Tetrastigma sulcatum</i> (M. Lawson) Gamble		2, 6
<b>Xanthophyllaceae</b>		
<i>Xanthophyllum arnottianum</i> Wt. (= <i>X. flavescens</i> Roxb.)	B	1, 6
<b>Zingiberaceae</b>		
<i>Elettaria cardamomum</i> (L.) Maton***	Pith	3, 5, 6
<b>Bryophytes</b>		
<i>Asplinium nidus avis</i>	L	1
<i>Microsporium punctatum</i>	L	1
F = Fruits; S = Seeds; B = Blossoms/Flowers; N = Nectar; L = Leaves; R = Resin/Gum; A = Aril; x = Information not available		
<sup>1</sup> denotes Plant Species not native to these forests; † = Liana/Vines; ** = Shrub; *** = Herbs.		
Source: 1 = KUMAR, 1987; 2 = GREEN and MINKOWSKI, 1977; 3 = UMAPATHY, 1998; 4 = KRISHNAMANI, in preparation.; 5 = MENON, 1993; 6 = JOSEPH, 1998		

Authors' address:

Division of Conservation Biology, Salim Ali Centre for Ornithology and Natural History, Anaikatti PO, Coimbatore 641 108, India.

Email: liontailmac@hotmail.com or kuma66@hotmail.com