INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES
IJPAES
VOLUME-2, ISSUE-2 APRIL-JUNE-2012 ISSN 2231-4490
Copy Rights @ 2012 Coden : IJPAES www.ijpaes.com

Received: 26th Mar-2012 *Revised: 29th Mar-2012* *Accepted: 02nd April-2012*
Research Article

LIANAS AS A FOOD RESOURCE FOR NILGIRI LANGUR (*TRACHYPITHECUS JOHNII* FISCHER 1829) IN FORESTS OF WAYANAD, WESTERN GHATS, INDIA

Sujana K. A., C. Sivaperuman[1*], & N. Anil Kumar[2]

Central Botanical Laboratory, Botanical Survey of India,
AJCB Indian Botanical Garden, Howrah – 711 103, West Bengal
[1]Zoological Survey of India, Port Blair – 744 102, Andaman and Nicobar Islands
[2]Community Agrobiodiversity Centre, M. S. Swaminathan Research Foundation
Puthoorvayal, P. O., Kalpetta – 673121, Wayanad, Kerala
* c_sivaperuman@yahoo.co.in

ABSTRACT: Lianas as a food resource for Nilgiri Langur *Trachypithecus johnii* in the forest of Wayanad districts of Nilgiri hills. Lianas, woody vines, are abundant and diverse in tropical forests, but their important as a source of food for herbivores has been ignored. It is observed that, 21 species of lianas were recorded during the study period. Highest number of food species of Nilgiri langur was recorded during the month January and lowest in August and September. The percentage composition of the diet observed were fruits (46.43 per cent), seeds (10.71 per cent), leaves and buds (28. 57 per cent) and flowers (14.29 per cent). The species *Salacia oblonga* provide food for a period of seven months, *Embelia ribes* and *Toddalia asiatica* for six months and *Ventilago maderspatana* for five months.
Key words: Lianas, Nilgiri Langur, *Trachypithecus johnii*, Western Ghats

INTRODUCTION

Lianas are woody climbing vines that rely on other plants for support [5]. They encompass 25 per cent of species diversity in tropical systems [19]. There is a growing body of evidence pointing to an increase in abundance of lianas in forests [21]. Lianas diversity and abundance has been shown to increase following disturbance in comparisons between forest edges and interiors and between secondary and old growth forests. By producing many rooting stems, lianas are able to rapidly colonize disturbed areas, thereby increasing their chances of survival [19].

Nilgiri langur (*Trachypithecus johnii* Fischer 1829) is endemic to the rainforests of the Western Ghats. It is vulnerable both at the national and global levels [25, 7]. These langurs are threatened due to severe pressure from poaching for supposedly medicinal properties of its meat and habitat destruction for timber and firewood extraction. These threats are common for both the upper and foothill populations and still continue to pose a problem both within and outside protected areas [20]. Even though many studies have been carried out on Nilgiri langur, most of them confined to status surveys [3, 9, 10], morphometry [11], seasonality in breeding [22], ecology and behavior [17, 6, 14]. The annual activity budget of Nilgiri langur, showed that 43.65 per cent of time was spent on feeding (N = 27,958). Monthly feeding varied from a maximum of 48.61 per cent to a minimum of 37.88 per cent, while no significant difference was observed in feeding across seasons [20].

The Nilgiri Langur has the tendency to exploit the maximum resources available within its home range for its food. A total of 102 plant species were identified as food plants used by the 2 groups (24 months observation), ca. 72 per cent of these plant species available within their home ranges. It is further evident, from the higher elevation study that, within 9 months a total of 115 plant species were documented as food plants [14].

The number of food plants used by Nilgiri langur varied, *i.e.* 39 species was reported [6], 52 species [17] and 29 species [20]. Feeding on diverse food plants by Nilgiri langur clearly indicates its high adaptability to the given habitat. It has been reported that Nilgiri langur easily accept new diets when their home ranges change [16]. In the riverine habitat, the major food resource of Nilgiri langur comes from trees (74 per cent; 76 species), with few climbers (17 per cent; 17 species) and shrubs (9 per cent; 9 species). It has been suggested that lianas are important to arboreal mammals because they provide food resources and pathways [4]. However, investigations reporting on the relative contribution of lianas as a food source in comparison to other life forms are lacking. The Neotropical arboreal species have undergone a broad adaptive radiation towards arboreal lifestyle and frugivorous habits [2], it would be expected that lianas would play a substantial role in their feeding preferences. As they rapidly colonize forest gaps, lianas might be more effective providers of young leaves with favorable protein, fiber ratio and lower concentration of digestion inhibitors when compared to trees. Also, since the production of foods offered by lianas fluctuates in a seasonal pattern [15, 13] and lianas reproduce during periods unfavorable to trees [13], it might be advantageous for arboreal species to rely on food items provided by woody climbers. The effect of liana abundance and diversity on population structure of arboreal mammals and its ecological significance is unresolved question. In this back ground this study was conducted in forests of Wayanad district in the Western Ghats to document the feeding and foraging of lianas by Nilgiri langur during May 2008 to May 2011.

Study area

Wayanad is the most biologically rich district of Kerala with an area of 2136 km^2 and perhaps the richest 'Agrobiodiversity Centre' of the State. It is a mountainous district, located in the northeastern region of the state at an altitude, ranges from 700 to 2100 m above main sea level, which is a part of the mountain chain of Nilgiri, Silent Valley and Kodagu region in the Western Ghats. This district lies between north 11º 27'and 15º 58' and east 75º 47' and 70º 27' bounded on the east by Nilgiris (Tamil Nadu) and Mysore district (Karnataka), on the south by Malapuram district and on the west by Kozhikode and Kannur districts of Kerala. The major forests types are wet evergreen forests, semi-evergreen forests, moist deciduous forests, montane forests (sholas) and grasslands. This area is rich in faunal diversity and abundance and almost all the large mammals of peninsular India are reported in the area. The area has a good population of Elephant (*Elephas maximus*), Gaur (*Bos gaurus*), Sambar (*Cervus unicolor*), Spotted deer (*Axis axis*), Barking deer (*Muntiacus muntjac*), Mouse deer (*Tragulus meminna*) and Wild boar (*Sus scrofa).* Other animals such as Bonnet macaque (*Macaca radiata*), Common langur (*Presbytis entellus*), Sloth bear (*Melursus ursinus*), Tiger (*Panthera tigris*), Wild dog (*Cuon alpinus*), Panther (*Panthera pardus*), Jungle cat (*Felis chaus*), Indian pangolin (*Manis crassicaudata*), Porcupine (*Hystrix indica*), Malabar giant squirrel (*Ratufa indica*, and Indian hare (*Lepus nigricollis nigricollis*) are also seen in this area. The Manikunnumala forests of Meppadi forest range, Chandhanathodu forests of Perya forest range, Wayanad Ghat forest of Thamarassery forest range and Mannimukku forest of Nilambur forest range were selected for intensive study.

METHODOLOGY

Two groups were habituated to the presence of observers before data collection. These groups were randomly selected in respect to the proportion of trees infested by lianas in their ranging areas. Direct observation of food plants, feeding pattern and feeding preference were made in the field between dawn and dusk with the help of binoculars and activities were recorded. As the primates were more active during the morning and evening hours, searches were concentrated in the morning and evenings hours to know the role of lianas as a food plant of Nilgiri langurs. To collect feeding data, an instantaneous scan sampling technique: scans lasted one minute followed by an interval of five minutes. The behavior animals that came into view was assigned to one of the following categories: moving, resting, eating, or interacting socially. Whenever individuals were eating, data recorded whether the food source was leaves, flowers, fruits or whatever. Utmost care was taken to record the food source obtained from a liana or a tree. If it was a liana or woody climber possible reproductive parts were collected for future reference and their food wastes are also collected for comparison with herbarium and confirming the identity and documentation of food plants. All liana species of the study sites were collected and specimens preserved as herbarium for identification of species. The periodicity of leaf flushing, leaf maturing, flowering and fruiting of all lianas were also noted.

RESULTS AND DISCUSSION

The Nilgiri langur troops were randomly distributed in different forest types of Wayanad districts of Nilgiri hills. The troops mainly distributed in all the three forest types namely, semi-evergreen, evergreen and montane. The diet of Nilgiri langur observed was mainly of plant origin. It contained fruits, flowers, leaf buds and leaves of many species. During the study period 21 plant species were recorded in different months (Table 1). Highest number (15) of food species of Nilgiri Langur were recorded in the month January and lowest (1) in August and September. The percentage composition of the diet observed were fruits (46.43 per cent), seeds (10. 71 per cent), leaves and buds (28. 57 per cent) and flowers (14.29 per cent) are provided in detail in Table 2 and Fig 1. *Salacia oblonga* provide food for Nilgiri langur a period of 7 months, *Embelia ribes* and *Toddalia asiatica* for 6 months and *Ventilago maderspatana* for 5 months.

Table 1. Month wise utilization of lianas by Nilgiri langur

Species and vernacular name	J	F	M	A	M	J	J	A	S	O	N	D	Total food providing months
Acacia caesia (L.) Willd. Eangavalli	√	√										√	3
Acacia sinuata (Lour.) Merr. Cheevakka	√	√								√		√	4
Bauhinia phoenicea Wight & Arn. Vallimandaram										√			1
Briedelia stipularis (L.) Blume Nendravalli	√	√	√									√	4
Caesalpinia bonduc (L.) Roxb. Kazhanjikuru	√	√	√									√	4
Croton caudatus Geiseler Panjipoo								√	√				2
Derris brevipes (Benth.) Baker in Hook. f. Pannivalli				√	√								2
Embelia ribes Burm. f.Manivalli	√	√	√	√	√						√		6
Embelia tsjeriam-cottam (Roem. & Schult.) DC. Kuttivizhal		√	√										2
Entada redeye Spreng. Kakkumvalli	√	√											2
Erythropalum scandens Blume Chenthamarakodi			√	√									2
Gouania microcarpa DC. Pattamparathy	√	√										√	3
Salacia beddomei Gamble Koranti	√	√											2
Salacia oblonga Wall. ex Wight & Arn. Ponkoranti	√	√	√	√	√	√	√						7
Sarcostigma kleinii Wight & Arn. Odalvalli	√	√	√							√			4
Spatholobus purpureus Benth. ex Baker in Hook.f.Chamathavalli	√									√	√	√	4
Thunbergia mysorensis (Wight) T. And. Kakkapoo			√										1
Toddalia asiatica (L.) Lam. Kakkathodali	√	√			√	√	√					√	6
Ventilago maderaspatana Gaertn. Rakthavalli	√	√	√	√								√	5
Ziziphus oenopolia (L.) Mill. Mullanpazham	√	√	√									√	4
Ziziphus rugosa Lam. Thodalipazham	√	√										√	3

Table 2. Month wise variation in liana parts foraged by Nilgiri langur

Parts	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Fruits/Pods	52.63	52.94	53.85	80.00	100.00	100.00	100.00			75.00	50.00	50.00
Seeds	10.53	11.76	7.69	20.00								16.67
Flowers/buds	10.53	5.88	7.69							25.00		
Young Leaves/shoots	21.05	23.53	30.77							0.00	50.00	33.33
Mature Leaves	5.26	5.88						100.00	100.00			

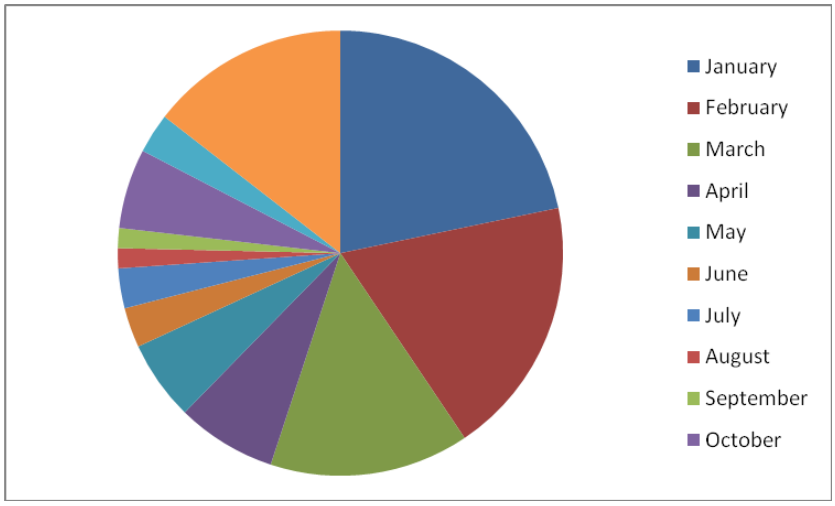

Fig. 1. Month wise foraging of lianas by Nilgiri langur

On a monthly basis, liana resources were present in the diets of Nilgir Langur. It is known that atelines are flexible in terms of food choice [1] and high dietary suppleness of selected species was evident in this study, illustrated by the consumption of resources from plants with different growth habits. Food choices also showed a temporal pattern of flexibility. The monthly fluctuation of flower and fruit availability favored the shift from one resource to another in consecutive months. Fleshy fruits supply non–structural, easily digested carbohydrates, the major components of the pulp [23]. Flowers provide protein and minerals [18]. By shifting between these foods, they can fulfill their requirements at any time of the year. Flowering trees are perhaps distributed further apart from each other than lianas, and this would limit the consumption of their flowers was observed in this study too. Many researchers have unsuccessful to find correlations between consumption by primates and availability of food resources [1, 8, 12]. It seems that whenever the pool of surveyed plants harbors few individuals of the species consumed, the temporal variability in the abundance of these species' resources remains hidden within the overall pattern. It is clear that lianas play an important role in the feeding patterns of Nilgiri langurs in the present study areas. This may be the result of two environmental factors, high rainfall and forest disturbance, either alone or in combination. Forest disturbance leads to a high abundance of lianas and foresters are practicing blanket wise cutting of liana stems. The study site receives more than 4000 mm of rainfall annually which supplements more re-sprouting vigor to lianas and they colonized all gaps in surrounding area of a single plant. The young shoots and leaves provide food for primates and most of the lianas flowering fruiting period starts in October to April. During the period Nilgiri langurs depends on lianas than other life form. The Nilgiri langurs take advantage of continuously renewable and ephemeral liana resources. This plant group may be contributing to the growth of populations, because both species present moderate population density at the study site. Whether food items from liana have been continuously increasing in the diet of Nilgiri langurs at the study site as a response to liana abundance is difficult to know, given the lack of long-term monitoring of their feeding choices. Above all the most important thing is both the Nilgiri langurs and their food resource in lean fruiting period, lianas are under severe threat. Nilgiri langurs are illegally poaching for the preparation of *Karikurangu rasayanam* 'widely known or called medicine' for rejuvenating strength of human body. As per above mentioned, it is clear that lianas providing good food for Nilgiri langurs yearly but they are more notorious in forest biodiversity by destroying or killing their host trees. Forest managers are advising cutting of liana stems which results adversely, some liana species grows profoundly after cutting (eg. *Entada rheedii*, *Spathalobus parviflorus*) and certain species are totally destroys (eg. *Salacia beddomei, Embelia ribes, Celastru paniculatus*). Therefore, it is necessary to conduct long-term investigation on lianas and dependant animals for developing better conservation strategies.

REFERENCES

[1] Chapman, C.A. 1987. Flexibility in the diets of three species of Costa Rica primates. *Folia Primatologica*, 49: 90–105.

[2] Cowlishaw, G. and Dunbar, R.I.M., 2000. Primate Conservation Biology. Univ. of Chicago Press, Chicago.

[3] Danial, J.C. and Kannan, P. 1967. The status of the Nilgiri langur (Presbytis johnii Fischer) and Lion-tailed macaque (Macaca silenus Linnaeus) in South India. Unpub. Report, Bombay Natural History Society, Bombay, pp. 1–9.

[4] Emmons, L.H., and Gentry, A.H. 1983. Tropical forest structure and the distribution of gliding and prehensile-tailed vertebrates. American Naturalist 121: 513-524.

[5] Gentry, A.H. 1991. The distribution and evolution of climbing plants. In: Putz FE and Mooney HA (eds) The Biology of Vines, pp 3-52. Cambridge University Press, Cambridge.

[6] Horwich, R.H. 1972. Home range and food habits of the Nilgiri langur (Presbytis johnii). J. Bombay nat. Hist. Soc., 69: 255–267.

[7] IUCN. 2000. Red List of Threatened Species. Species Survival Commission (SSC), IUCN, Gland, Switzerland.

[8] Kaplin, B.A., Munyaligoga, V. and Moermond, T.C. 1998. The influence of temporal changes in fruit availability on diet composition and seed handling in blue monkeys (Cercopithecus mitis doggetti). Biotropica, 30(1): 56–71.

[9] Krishnan, M. 1972. An ecological survey of the larger mammals of peninsular India, Part I. J. Bombay nat. Hist. Soc., 68: 503–555.

[10] Kurup, G.U. 1975. Status of Nilgiri langur (Presbytis johnii) in the Anamalai, Cardamon and Nilgiri Hills of the Western Ghats, India. J. Bombay nat. Hist. Soc., 65: 283–292.

[11] Leigh, C. 1926. Weights and measurements of the Nilgiri langur (Presbytis johnii) J. Bombay nat. Hist. Soc., 30: 223.

[13] Martins, M.M. 2009. Lianas as a food resource for brown howlers (Alouatta guariba) and southern muriquis Brachyteles arachnoides) in a forest fragment. Animal biodiversity and Conservation, 32.1.

[14] Morellato, P.C. and Leitao-Filho, H.F. 1996. Reproductive phenology of climbers in a Southeastern Brazilian Forests. Biotropica 28(2): 180-191.

[15] Oates, J.F. 1979. Comments on the geographical distribution and status of the south Indian leaf monkey (Presbytis johnii). Mammalia, 43: 485–473.

[16] Opler, P.A., Baker, H.G. and Frankie, G.W. 1991. Seasonality of climber communities: a review and example from Costa Rica dry forest. In: The biology of vines: 377–392 (F. E. Putz & H. A. Mooney, Eds.). Cambridge Univ. Press, Cambridge.

[17] Poirier, F.E. 1969. Behaviour flexibility and intertroop variability among Nilgiri langur (Presbytis johnii) of South India. Folia Primatol. 11: 119–133.

[18] Poirier, F.E. 1970. The Nilgiri langur (Presbytis johnii) of South India, pp. 251–388. In: Primate Behaviour. L.A. Rosenblum (ed.). Academic Press, New York.

[19] Ramachandran, K.K. and Joseph, G.K. 2001. Feeding ecology of Nilgiri langur (Trachypithecusjohnii) in Silent Valley National Park,Kerala, India. pp. 1155–1164.

[20] Schnitzer, S.A. and F. Bongers 2002. The ecology of lianas and their role in forests. Trends in Ecology & Evolution 17:223–230.

[21] Sunderraj, S.F.W. 1998. The ecology of the endangered Nilgiri langur (Presbytis johnii) on Mundanthurai plateau, Kalakad- Mundanthurai Tiger Reserve, Tamil Nadu, South India. Unpublished Ph.D thesis. Saurashtra University, Rajkot. Gujarat. 255 pp.

[22] Swaine, M. D. and Grace, J. 2007. Lianas may be favoured by low rainfall: evidence from Ghana. Plant Ecology, 192(2): 271–276.

[23] Tanaka, J. 1965. Social structure of Nilgiri langur (Presbytis johnii). Primates, 6: 107– 122.

[24] Waterman, P. G., 1984. Food acquisition and processing as a function of plant chemistry. In: Food Acquisition and Processing in Primates: 177–211 (D. Chivers, B. A. Wood & A. Bilsborough, Eds.). Plenum Press, New York.

[25] ZSI. 1994. The Red Data Book on Indian Animals Part 1. Zoological Survey of India, Kolkata.