

Food item selection of Hanuman Langur (*Presbytis entellus*) in different season in Char-Koshe jungle of eastern Terai, Nepal

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Abstract

Common langur was found to be a mixed feeder. 33 species of plants were found to be consumed and 16 more species were said to be consumed in that locality. Most of the plants were consumed during fruiting and flowering seasons. Most preferred (frequently used) plants were *Terminalia belarica*, *Geruga pinnata*, *Spathalobus parviflora*, *Ficus bengalensis*, *Schlichera oleosa*, *Ficus glomerata*, *Diospyrus tomentosa*, *Terminalia tomentosa*, *Emblica officinalis* etc. On the basis of time spent to consume, fruit and seed comprised of about 56%, flower, leaf-bud, young leaves 29%, and mature leaves, bark and petiole 15% of annual budget of diet. Amount of different items in different seasons vary according to availability of first item (fruits and flower) and second items (new growths and leaf-bud). Fruits constitute more than 83% of diet during month of monsoon. Insectivory was not observed except during grooming. The langurs were not reported to raid the crops in vicinity.

Key words: *Presbytis entellus*, Langur, food selection, Nepal

Introduction

Common langur (*Presbytis entellus*) is locally known as “Dhendu”. It is most common in Charkose Jhadi. They are found in Nepal, India, Bhutan, Bangladesh and Sri-Lanka. It is quite a big creature, weighing 35-50 Lbs; head and body measure from 2-2.5 feet and its tail up to 3.5 feet long. Most of its fur is greyish white in contrast of its black face and palm soles and callosities on the buttocks. The juvenile colour changes in order from black, brown to light grey and slate grey. Langurs usually live in bisexual troops (Roonwal & Mohnot, 1977; Shrestha, 1997).

They begin feeding at dawn and after some hours of rest around mid day they start again in afternoon. Their diet consists of fruits, leaves, buds, flowers, pith and bark of tender branches. As they inhabit many different habitats from sea level to an altitude of 4000 m in the himalayan-region (Bosries *et al.*, 1993), the species and parts of plants chosen for food vary from area to area and season to season. Only, very little works have been done to study the food of sacred langur in forest habitat. Present study was carried out to study on the food item selection by common langur in the jungle (Char-Kose-Jhadi) of southeast Nepal.

Study area lies approximately at 10 km south of Dharan on the southern part of Charkose Jhadi near the crossing point of 87°15'E and 26°45'N on a north to south facing slop. Altitude of study area varies approximately from 120 m to 250 m above

sea level within approximate distance of 6 km. Gradient of inclination is higher at northern part of study area. Western, northern and eastern boundaries of study area are made up by Jhepre Khola (river), large fire-line and partly highway and partly Seuti Khola (river) respectively in jungle and villages Panchayan Jhoda and Kumar Khat lies on the southern border of the study area.

Materials and Methods

Identification

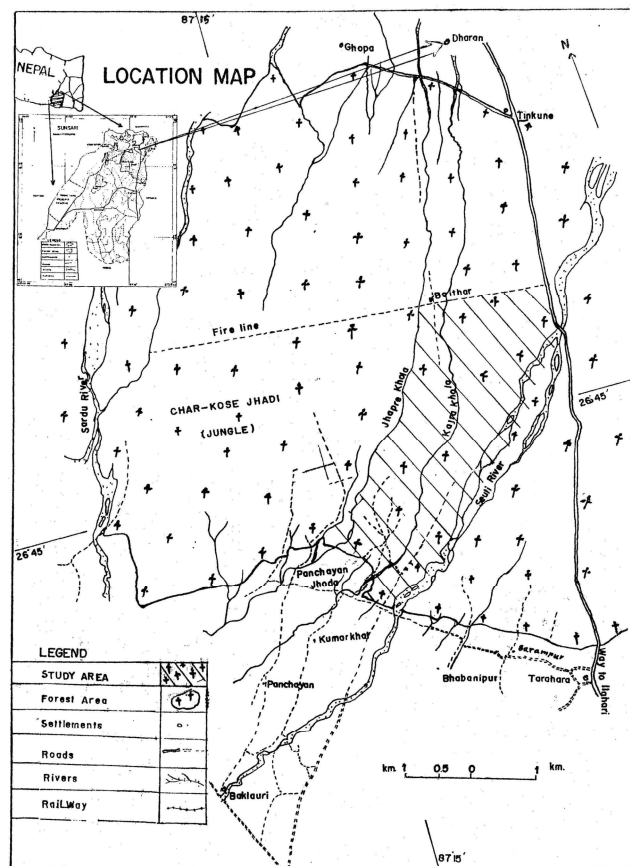
Photographs and samples of plants used as food by common langur were routinely collected and unidentified specimens were preserved for latter identification. Verbal informations about the food plants of langure were collected from local people. Routine observation of feeding habit for all 12 months of year starting from April, 1995 to March, 1996 was carried out.

Preference of different items

Estimates of preference of different items in the diet were based on numbers of individuals feeding on particular item and the relative length of feeding period. During the study period, 3 days of the each month were taken (by systematic random sampling) as the sampling days. Observation of feeding activities of different troops at different time was recorded. Foods were divided in 3 items viz., item A for fruits and seeds; item B for flower, young leaf, leaf bud and new growth; and item C for mature leaf, bark and petiole.

Length of feeding period in minute and number of individuals feeding on particular item of diet were noted and product was calculated. Preference on different food items in the diet in different seasons were calculated on the basis of time individuals. For this purpose a year was divided into three seasons viz., winter (November to February), summer (March to May) and monsoon (June to October).

Test of significance of preference of different items in different season was carried out by the chi-square (χ^2) test in 3×3 contingency table.



Results and Discussion

The langur is a leaf-eating monkey. Unlike Macaques, the stomach of langurs replace the work of check pouch (Prater, 1972). The stomach consists of three separate pouches or compartments like that of a ruminating animal, suited to their special feeding habit. The staple diet includes fruits, flowers, buds shoots and leaves (Prater, 1972; Jackson, 1990). They were known to consume items even avoided by insects with too high alkaloid levels (Jackson, 1990). In the mountains and hills, langurs were predicted to feed on the fruits, flowers and leaves of common species like *Rhododendron spp.*, *Quercus spp.*, *Castanopsis spp.*, *Mationia nepalensis* and *Primus spp.* (Gurung, 1993). His prediction was based on observation and interviews.

In the study area, langurs were observed to feed on 33 species of common plants (Table 1). Langurs were said to feed on 16 more plant species (Table 2) according to local information but not reported to destroy cultivation presumably because of afraid of dogs and it may be due to availability of foods elsewhere in the jungle. Fruits were the staple diet of common langur in the study area, which was estimated about 56% of annual budget.

Table 1. Plants used by Common Langur in different months. “*” indicates consumption.

SN	Scientific Names	Vetnacular name	Months of consumption												Part consumed
			J	F	M	A	M	J	J	A	S	O	N	D	
1	<i>Anthocephalus cadamba</i>	Kadam						*	*	*	*	*			Flower & fruits
2	<i>Antidesma burn us</i>	Archal		*					*	*				*	Fruit leaf
3	<i>Bhduhenia purptirra</i>	Tanki	*	*			*			*	*				Flower & leaf
4	<i>Bhauhenia vhalii</i>	Bhorla			*	*	*								Buds, young seed
5	<i>Biscofia javanica</i>	Kainjal	*	*											Fruit
6	<i>Bridelia retura</i>	Gayo	*	*											Fruit
7	<i>Cicca acida</i>	Pateamala		*	*	*									Fruit
8	<i>Cochlospermum religiosum</i>	Kumbhi		*	*	*									Young leaves, flower
9	<i>DiIlenia pentagyna</i>	Tantari					*	*							Fruit
10	<i>Embllica officinalis</i>	Amala	*	*								*	*	*	Fruit & leaf
11	<i>Eugenia operculata</i>	Kyaimuna						*							Fruit
12	<i>Ficus bengalensis</i>	Bar				*	*	*							Fruit
13	<i>Ficus cunia</i>	Khaniu									*	*	*	*	Fruit & leaf
14	<i>Ficus glomerata</i>	Dumri				*			*	*	*				Fruit & leaf
15	<i>Ficus hispida</i>	Khashreto							*	*					Fruit
16	<i>Ficus lacor</i>	Kavro	*	*	*	*							*	*	Leaf-bud & leaf
17	<i>Geruga pinnata</i>	Dabdabe			*	*		*	*	*	*	*	*	*	Flower, fruit, leaf
18	<i>Loranthus faleons</i>	Ainjeru	*	*								*	*	*	Soft base of leaf
19	<i>Murraya koenigii</i>	Asare						*	*						Fruit
20	<i>Diospyrus tomentosa</i>	Kalikath					*	*	*						Fruit
21	<i>Qphioglossum volgatum</i>	Jibre-Sag						*							Whole plant
22	<i>Psidium guajava</i>	Ambak	*							*	*	*		*	Bark & fruit
23	<i>SchIcichera oleosa</i>	Kusiim							*	*	*				Fruit
24	<i>Shorea robusta</i>	Sal			*	*	*	*							Seed, young leaves
25	<i>SpathoJobus parvi flora</i>	Debre-lahare	*	*	*	*			*				*		Leaf, buds
26	<i>Spondias cyntherica</i>	Amaro									*	*	*	*	Fruit & petiole
27	<i>Stereospermum tetragonum</i>	Padari	*						*		*	*	*	*	Leaf & buds
28	<i>Syzygium cumini</i>	Jamun						*	*	*					Fruit
29	<i>Terminalia belarica</i>	Barro	*	*	*	*	*	*	*		*	*	*	*	Fuit & petiole
30	<i>Terminalia chebula</i>	Harro									*	*	*		Fruit
31	<i>Terminalia tomentosa</i>	Saj	*	*		*					*	*	*	*	Fruit & leaf
32	<i>Uvaria hamiltonii</i>	Banar-Jhilla							*	*					Fruit
33	<i>Artocarpus sp</i>	Lathar						*	*						Fruit

Table 2. Additional plants said to be consumed by Langur.

SN	Scientific name	Nepali name	Part consumed
1	<i>Alphonsia ventricosa</i>	Thekiphal	Fruit
2	<i>Anocarpus lakoocha</i>	Badahar	Leaf flower, fruit
3	<i>Bornbax malbaricwn</i>	Simal	Flower, young fruit, seed
4	<i>Ficus religiosa</i>	Pipal	Flower, young fruit, seed
5	<i>Gmelina arborea</i>	Khamari	Fruit
6	<i>Grewia elastica</i>	Syalphoshara	Fruit
7	<i>Lagostromia parviflora</i>	Botdhayenro	Fruit
8	<i>Lyonia ovalifolia</i>	Angeri	Fruit, flower
9	<i>Mangifera indica</i>	Aanp	Fruit
10	<i>M. sylvatica</i>	Ban Aanp	Fruit
11	<i>Melia azederach</i>	Bakaino	Fruit
12	<i>Sambucus hookeri</i>	Galen	Fruits & leaves
13	<i>Semecarpus anacardium</i>	Bhalayo	Fruit
14	<i>Zizyphus sp.</i>	Bayar	Fruit and leaves
15	<i>Clausena excavata</i>	Paineti	Fruit and leaves
16	-	Chyau	Whole plant (mushroom)

According to Roonwal and Mohnot (1977), *Presbytis entellus* was entirely vegetarian, eating mainly leaves, and also shoots, buds, flowers, bark, fruits and seeds of large number of plants. Only rarely does it eat insects. Cultivated crops and vegetables were also taken whenever available. In certain areas in the vicinity of cities and towns, people feed the langur uncooked and cooked food including *Chapaties* (flat cakes) of wheat, *Bajra* (a millet) and many other types of food (gram, groundnuts etc.) which the Hanuman langur eats with relish. More than one group may feed together. In entirely unforced forest settings, common langurs frequently feed amicably in large composite troops of several groups, in the tree tops and the ground.

Langur is frugivorous. When fruits were not available, it takes flowers of *Madhuca* (Mahua) and *Salmalia* (Semal), leaves of *Randalia* (Mayan), shoots and buds of *Ficus glomerata* (Gular), fruits of *Syzygium*, *Ficus religiosa*, *Myrica*, *Erythrina* and *Zizyphus sp.* (Bhatta & Shrestha, 1977). Fruits of *Ficus glomerata* were highly favoured by both ungulates and monkey in mixed riverine forest, where this species was dominant. Difference between the foraging strategies of langur and rhesus troop in Karnali-Bardia was evident. Langurs were almost exclusively arboreal feeders while rhesuses were more terrestrial as shown by the inclusion of ground insects and spiders in their diets (Dinerstein, 1979). While both species were highly frugivorous, the langur has become an important folivore through the evolution of a ruminant like digestive system (Bauchop & Martucci, 1968). According to Gurung (1983), their diet consists of shoot, leaves, buds, flowers, fruits and the pith of tender branches in Royal Chitwan National Park.

According to Borries *et al.* (1993), at Ramnagar, the ecological conditions cause a high fluctuation of food availability and quality in the course of a year. Food availability seems to be highest in spring, prior to the monsoon, when the trees blossom and fresh leaves appear every where. In the cold months mostly mature leaves and few fruits were left. That seems to be sufficient to cover the basic needs of the langur except females in late pregnancy and early lactation period though they also can digest even mature leaves.

In Peninsular India, Krishnan (1972) reported over 30 species of food plants of whose leaves, leaf buds, shoots, flowers and fruits were consumed by Langur. According to

Roonwal and Mohnot (1977), its diet consists of about 65% fruits and 35% leaves and flower buds. The species and parts of plants chosen for food vary from area to area and season to season. In the hills of Mount Abu in southern Rajasthan, it eats the leaves, buds and flowers of several plants including *Acacia arabica*, *Bombax malabaricum*, *Dalbergia sissoo* and *Ficus glomerata*. In eastern Rajasthan it prefers the leaves and fruit of *Zizyphus jujuba* and the leaves of *Anogeissus pendula*. At the eastern edge of Thar desert, western Rajasthan, it eats virtually all available plants with the notable exception of the abundant herb *Leptademia phyrotechnica*. Mohnot recorded 80 plants whose leaves, fruits, buds and flowers were eaten, leaves constituting the bulk. The plants most preferred were: *Prosopis juliflora*, *Ficus bangalensis*, *F. religiosa*, *Salvadera persica*, *Acacia senegal* and *Zizyphus nummularia*. In addition it attacks gardens, archards and vegetable fields in the vicinity of Jodhpur, where it feeds on a large number of trees, herbs, shrubs, vines, and cultivated vegetables (Roonwal & Mohnat, 1977).

In the Gir forest, Gujarat, 41 plants were recorded whose leaves and flowers the common langur feeds. In southern India important food plant includes *Zizyphus*, *Phyllanthus embilica* and *Cacia auriculata*. In the dry season when the leaves were dry or absent, it lives mainly on fruits, buds and bark. It occasionally eats caterpillars and indirectly the insects found inside plant galls. In Uttar Pradesh, it eats leaves, flowers and berries of Lantans (*Lantana camara*) as well as leaves of *Terminalia tomentosa* and many other species of trees. In the Himalayas it feeds on *Eugenia jambolana*, *Trewia nudiflora*, *Acacia concinna* and fruits of oak. In Ceylon, Ripley (1970) provisionally listed 57 species of food plants including large trees (both deciduous and evergreen) shrub, (climbing) vines and herbs. She also observed common langurs eating spider's webs and earth from termite mounds (Roonwal & Mohnat, 1977).

The feeding time data suggested that mature leaf constituted 34.9%, fruit 24.5%, leaf bud 10.7%, flower-bud 6.6% and young leaf 3.6% of the annual budget (Newton, 1985). One percent of feeding time was found to be spent on feeding gums. Out of 68 species of trees and climbers, the troop fed on 53 species. The most important in terms of percent time spent feeding, were *Pterocarpus marsupium*, *Shorea roxburghii*, *Bunhinia retusa* and *Anogeissus latifolia*. The undergrowth shrub *Flamengia semilata* was also seasonally important.

Mathur and Manohara (1987) presented list of 25 trees (both mature leaves and young leaves of 23 species, fruits of 6, petiole of 4, flower of 3 and bark of one species) exploited by common langur of Galta area in Jaipur, India. Some groups were seldom fed by human beings. They considered some of them as pests. Chaudhari and Roy (1989) have studied the survival status of humpback langur in some villages of Nadia district, West Bengal. They observed different plants and parts of nine plants were being consumed as major food.

Common langur also regularly licks stones and hard earth from termite mounds or even breaks pieces of earth with the hand and eats them. Evidently this is done to obtain its' requirements of salts and minerals such as calcium, magnesium and trace elements (for example copper). For this purpose, Vogel (1971) noted the special licking places. Roonwal and Mohnot (1977) observed common langurs eating earth and ashes and bones from cremation ground; Ripley (Roonwal & Mohnot, 1977) reported that mortar from old buildings and earth from termite mounds were eaten. Newton (1985) also noted earth eating especially of termite-reworked soil.

Davies and Baillie (1988) observed geophagy in *Presbytis rubicunda*. Soil was always collected by breaking lumps of termitaria and never from the forest floor. Termitaria mount soil was of highest pH and had higher level of the main cationic nutrients and lower level of the labile aluminum. Similarly, Moe (1993) found that common langur (*Presbytis entellus*) was one of the most common species on the soil lick during the dry season in low land. Most common langur used to lick intensively in March after flushing of browse species. Only sodium concentration and pH were significantly higher than control soil sample. Insect eating habit in different habitat seems to support the "Energy/nutrient maximization" hypothesis. Newton (1985) observed 2.8% of feeding time as insectivore. Common langur can eat the fruit including seeds of *Strychnos non-vomica*, the plant from which the poison strychnine is made. It was observed that dose of strychnine that kill rhesus macaques had no effect on Hanuman langur. It also eats apparently without ill effects, such repulsive and evil smelling latex-bearing plant as the ank *Calotropis procera* in the Indian desert and *C. gigantea* in Ceylon which were avoided by most animals and even insects (Roonwal & Mohnot, 1977).

Langur occasionally fed on ticks, lice and grass hoppers (Mathur *et al.*, 1990). Srivasthava (1992) observed insectivore in open scrub forest of Jodhpur. His observations reveal that scale insects may constitute a regular part of their diet and that insectivory was particularly prevalent in the monsoon months July-September. But, Insectivory was not observed except during grooming in the study area. The langurs were not reported to raid the crops in vicinity of the study area.

Common langur at the study area utilized a wide range of trees, shrubs, climbers and herbs. Out of 33 utilised species, most preferred plants were *Terminatia belarica*, *I. tomentosa*, *Geruga pinnata*, *Stereospermum tetragonum*, *Ficus bengalensis* and *Spatholobus parviflora* (Table 1). Plant species utilized by common langur in different place varied according to availability. Other plants said to be consumed were rare (Table 2) and some of them e.g., fruits of *Mangifera spp.* were utilized by man and not left for wild animals. Most preferred food item was wild fruits. Second preference of langur was new growths like leaf-buds, young leaves, and soft parts like flowers and petioles. Lastly, they take mature leaves, bark and resin. Their preference towards fleshy and soft part is presumably because of high content of water and low content of fibers.

Table 3. Preference of Common Langur on different food items.

Food Items	Winter: Oct-Feb (5 months)		Summer: March- May (3 months)		Monsoon: Jun-Sep. (4 months)		Total (12 months)	
	T	P	T	P	T	P	T	P
Item A	16156	40.1	11680	46.28	27625	83.42	55461	56.23
Item B	12828	31.9	11343	44.94	4279	12.92	28450	28.85
Item C	11291	28	2216	8.78	1210	3.65	14717	14.92
Total	40275	100	25239	100	33114	100	98628	100

Item A = Fruits & seeds, Item B = Flowers, new growths, leaf -buds & young leaves, Item C = Mature leaves, bark & petioles, T = Time individual, P = Preference (%)

Seasonal variation in proportion of food items or degree of dependency on different food items was distinct. Dependency on food item A varies from 40% in winter to 83% in monsoon. Item B was important during summer and winter. Dependency on it was approximately 45% in summer, nearly 32% in winter and only 12.9% in monsoon. Dependency on item C varies from 28% in winter to 3.65% in monsoon. In

other words, Langur about equally depends on all 3 food items in winter, mainly depends upon item A and B in summer and heavily depends upon fruits during monsoon (Table 3, Fig. 1). Chi-square test of seasonal variation of time-individuals feeding on particular food items shows highly significant ($p < .01$).

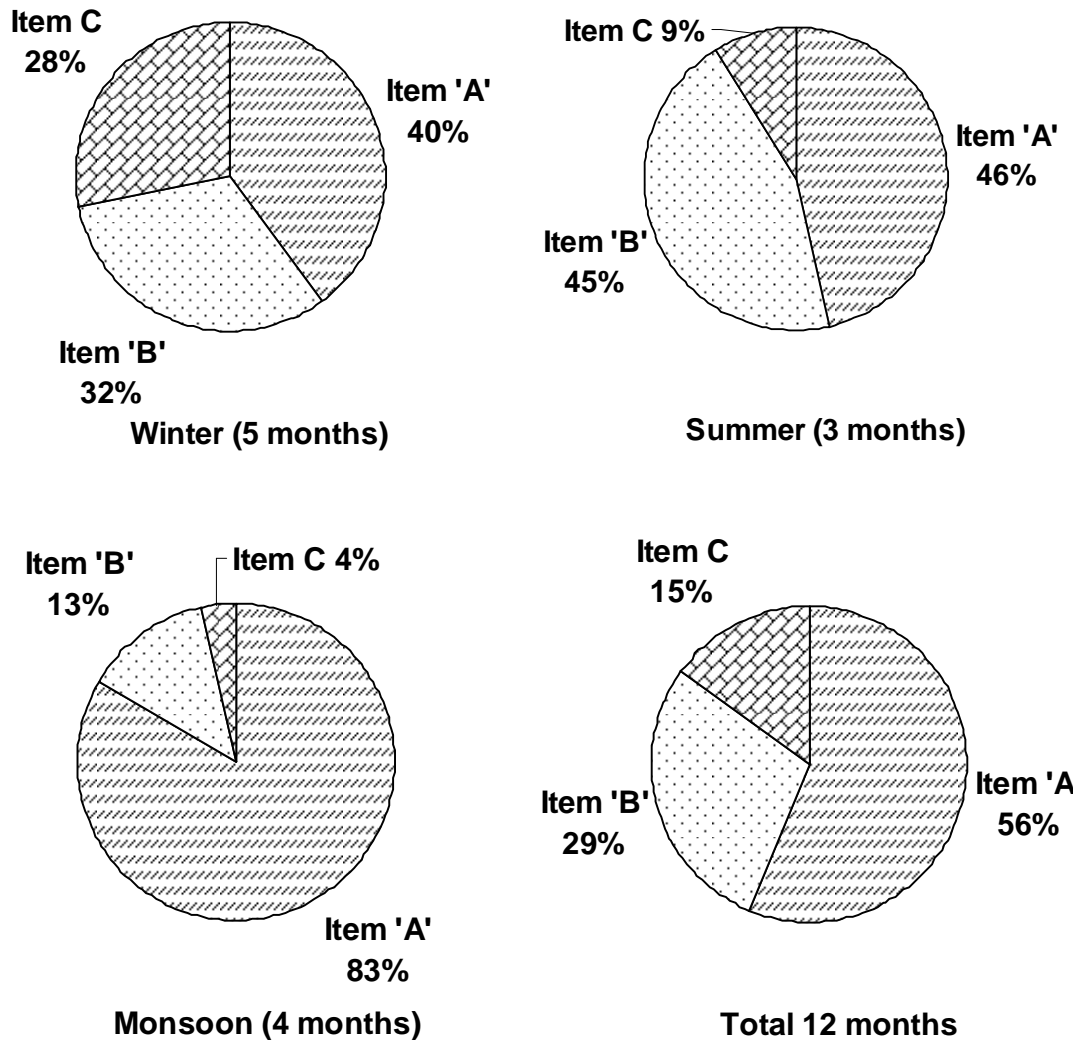


Figure 1. Preferences of Common Langur among different food items.

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