

Eco-ethology of the common langur *Semnopithecus entellus* (Dufresne) in Bangladesh

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Abstract: Eco-ethological aspects of the common langur (Hanuman) *Semnopithecus entellus* (Dufresne) were studied between July and September 1981 in the rural areas of Keshabpur Police Station, Jessore, Bangladesh. Three bisexual troops were monitored for 355 hrs for determining group-size and composition, age-sex relationship, and other ecological and behavioural features. The average group-size was 13.67 ± 0.00 in July and 14.67 ± 1.33 in September. Of the major diurnal activities *viz.*, rest, move, sit, social groom, self groom, play and feed, the Hanumans spent maximum time in sitting (44.32%). Dyad behaviour of the Hanumans and their relationships with other animals including man has been described. Hanumans used more than 60 species as food plants of which 43 were identified. They mostly ate vegetative plant parts (74.88%), thus indicating their folivorous nature. The welfare of the Hanumans has also been dealt with.

Key words: Common langur (Hanuman), *Semnopithecus entellus*, ecology, ethology, Bangladesh

Introduction

The common langur or Hanuman *Semnopithecus entellus* (Dufresne) (= *Presbytis entellus*) is a common roadside as well as forest dwelling primate in India but in Bangladesh it is found only in the open wooded villages and not in the forest (Khan & Ahsan, 1981a; Ahsan, 1984). Different authorities studied Hanumans abroad (Sugiyama, 1964, 1965a, b, 1966, 1967; Sugiyama *et al.*, 1965; Hladik, 1977; Oppenheimer, 1977; Roonwal & Mohnot, 1977). In Bangladesh, Akonda (1976) and Bhuiyan (1977) studied the activity pattern of the Rhesus macaque (*Macaca mulatta*). A few workers studied the activity patterns of other primate species in the country (capped langur: Islam, 1979; Islam & Husain, 1982; Stanford, 1989; Kabir, 1991; crab-eating macaque: Khan & Wahab, 1983; hoolock gibbon: Ahsan, 1994; pigtailed macaque: Feeroz, 1999). But work on Hanumans are scanty and mostly done on the status and distribution, and food and feeding habits (Khan, 1981, 1984, 1985; Khan & Ahsan, 1981a, b, 1986; Ahsan, 1984; Ahsan & Khan, 1984; Faizuddin, 1984). Due to rapid transformation of natural habitats into human settlements, agricultural plots and industrial complexes, the Hanumans have virtually disappeared from their former range in Bangladesh. Only a few troops are still left in small and isolated pockets of greater Jessore and Kushtia (Khan & Ahsan, 1981a; Ahsan, 1984). Here we report various aspects of the Hanumans including the group-size and composition, age-sex relationship, activity patterns, food plants used and attitude of the local people towards them.

Methods and Materials

Study Area: Keshabpur is a Police Station under Jessore District (22°54'N and 89°13'E) and a deltaic wide alluvial plain between the Hoogly and the Padma

ivers. It comprises an area of about 259 km² with about 570 people per km² (Bari, 1979), and there are about 25 villages or village clusters of which only five are inhabited by the Hanumans. The maximum summer temperature in June varies from 24° to 33° C. The mean lowest temperature was 11° C in January. The annual rainfall varies from 1,524 mm to 1,752 mm and the average RH is 78% (Bari, 1979). The coconut (*Cocos nucifera*), betel nut (*Areca catchu*), date palm (*Phoenix sylvestris*), mango (*Mangifera indica*), debderu (*Polyalthia longifolia*) and jackfruit (*Artocarpus heterophyllus*) are the important plants. The mangrove species ora (*Sonneratia acida*) mainly grows along the bank of the Harihar river that cuts across the Keshabpur market into two parts. The river receives tidal water from the Sundarbans mangrove forest, the southwest corner of Bangladesh. The chief agricultural crops of the area are paddy (*Oryza sativa*), jute (*Corchorus spp.*), wheat (*Triticum sp.*), sesamum (*sesamum indicum*), pulses (lentil [*Lens culinaria*], pea [*Pisum sativum*], gram [*Cicer aritinum*], chick pea [*Lathyrus sativus*]), tomato (*Lycopersicon aperculella*), potato (*Solanum tuberosum*) and betel-leaf (*Piper betel*).

The group-size and composition, age-sex ratios and relationships have been determined on the basis of fieldwork conducted between July and September 1981, when three bisexual groups were monitored. The Hanumans were categorised into adult males, adult females, juveniles and infants (Southwick *et al.*, 1961a). The activity patterns of the troops were recorded through scan sampling methods (Altmann, 1974) on focal animals. Different activities performed by the Hanumans were noted at set time of 5 min intervals. Usually 4 to 10 individuals were recorded in each scan and 3 to 12 scans were made in each hr, and the maximum scans were 151 in a day. During July

1981, data were gathered from 0600 to 1800 hrs with almost no or little break. In August and September, data were collected from 0600 to 1800 hrs with an hour break generally between 1200 and 1400 hrs. All data were gathered through direct observations. A pair of 10×50 mm binoculars was used in this work when needed. The following activities were considered for the present study (Clutton-Brock, 1974).

Rest: Leaning or setting down its body against a branch or an object, or lying down or sleeping.

Move: Locomoting, it was sometimes difficult to decide whether a young (juvenile or infant) was moving or playing; when the movement was sporadic or non-directional it was recorded as playing.

Sit: Not moving, resting either on its arms or legs but observing its surroundings.

Social groom: Actively scratching, picking up parasites, debris or fur of another one or itself being groomed by another individual.

Self-groom: Doing active grooming or scratching itself.

Play: Chasing, wrestling, stalking, pulling, running or hanging from branch of a tree.

Feed: Active manipulation of a potential food source, ingesting or masticating food. As the Hanumans are normally static when feeding, the act was recorded as moving when the individual was simultaneously moving and masticating.

Results and Discussion

The studied troops (groups) were named as Saha Para Troop (SPT), Baliadanga-Brahmankathi Troop (BBT) and Madhyakul-Ramchandrapur Troop (MRT) after the name of the villages they occupied (Table 1). There were also other troops living in the neighbouring villages.

Table 1. Observation details on the Saha Para Troop (SPT), Baliadanga-Brahmankathi Troop (BBT) and Madhyakul-Ramchandrapur Troop (MRT) of Hanumans

Troops	Study period	Days	Hours	Scans	Observations*
SPT	20.7.'81 to 24.7.'81	5	46.35	555	3,817
	23.8.'81 to 27.8.'81	5	55.30	666	4,505
BBT	25.7.'81 to 29.7.'81	5	56.35	675	4,167
	9.8.'81 to 12.8.'81	4	43.35	505	2,680
MRT	31.8.'81 to 14.9.'81	14	125.00	1,427	8,063
	21.9.'81 to 24.9.81	4	26.35	319	2,233
BBT	(An isolated male near it) 12.8.'81		1.50	15	15
Total		37	355.00	4,152	25,480

* Number of Hanumans sighted in each scan

Size, composition and age-sex ratio of the troops: In July, the average group size of the troops was 13.67 ± 0.00 with 7.32% adult males, 60.68% adult females, 13.87% juveniles and 19.51% infants, whereas in September, it was 14.67 ± 0.00 with 9.09% adult males, 54.55% adult females, 9.09% juveniles and 27.27% infants (Table 2). The present findings varied appreciably from that of Khan & Ahsan (1981b). This variation was due to the fact that the two work were different in nature. The other reason being that a few Hanumans were lost when intermixing of members of two nearby groups occurred twice during the study period. On the other hand, in the last week of September, traditional trappers trapped two females from SPT that also changed group size and composition. On September 15, BBT came face to face with another non-studied Ramchandrapur troop. Finally through intermixing, the group size and structure were changed appreciably which in turn changed the composition and age-sex ratios. Similar phenomenon happened on the 17 September between the MRT and the Ramchandrapur troops. Though no clear explanation for the inequality in the sex ratios for the Hanumans is immediately available, Chi-square (χ^2) test was done to see whether variation of the observed result from the expected one (1:1 ratio) was large enough to be significant. All the dyad age-classes except infant-juvenile and adult female-young of July and adult female-young and adult-young of September were significantly different, that is, did not follow 1:1 ratio (Table 2). In unimale and male dominant societies such inequality is possibly used.

Social behaviour: During the study period the following dyadic relationships were recorded:

Male-male: All the three studied troops were unimale bisexual, although during July a sub-adult male, a juvenile male and an infant male were present in the SPT, BBT and MRT, respectively. In the later part of September the SPT sub-adult almost acted as an adult male when there was a short intermixing. The troop leader later on took over the charge once the intermixing period of about an hour was over. The relationships between males ranged from peaceful, even cooperative association to slightly agonistic. When the older male attempted mating or was engaged in mating the emerging adult male sometimes disturbed him by chattering. At that time the older one either grinded teeth or chased the junior male. Similar phenomenon occurred in the case of the juvenile male also.

Male-female: The relationship between this dyad was normally peaceful and cooperative during daily activities. Generally females groomed males, but at the rare moment male also groomed female and rarely he

embraced her. The other strong bond was sexual. Usually estrous females approached male, but he denied such act more than 50% times. Copulation occurred infrequently during estrous period. One male copulated with one to three females a day, and if disturbed by other females, or others, the attempted copulation increased to

seven or more times a day. Each mating lasted for 5 to 15 seconds. Occasionally male attacked female(s) by teeth grinding or hand beating, which occurred mostly when they were on a common food source, possibly as a part of competition for food.

Table 2. Troop-size, structure, composition and age-sex class of three troops of Hanumans in July and September 1981. SPT= Saha Para Troop; BBT=Baliadanga-Brahmankathi Troop; MRT=Madhyakul-Ramchandrapur Troop

Troop names	Troop size	Adults				Young				
		Males	%	Females	%	Juveniles	%	Infants	%	
July										
SPT	19	1	5.26	11	57.89	1	5.27	6	31.58	
BBT	11	1	9.09	7	63.64	2	18.18	1	9.09	
MRT	11	1	9.09	7	63.64	2	18.18	1	9.09	
Mean	13.67	1	7.32	8.33	60.68	1.67	13.87	2.67	19.51	
±sd	±4.62	±0.00		±2.31		±0.58		±2.89		
September										
SPT	17	2	11.76	9	52.94	2	11.76	4	23.53	
BBT	13	1	7.69	6	46.15	2	15.38	4	30.77	
MRT	14	1	7.14	9	64.29	-	-	4	28.57	
Mean	14.67	1.33	9.09	8.00	54.55	1.33	9.09	4.00	27.27	
±sd	±2.08	±0.58		±1.73		±1.15		±0.00		
Age-sex class ratios										
Month		Ad.male:Ad.fem.		Ad.fem.:Infant		Infant:Juve		Ad.fem.:Young		Adult:Young
July		1:8.33 (17.286**)		1:0.32 (8.758**)		1:0.63 (0.692 ^{ns})		1:0.52 (3.789 ^{ns})		1:0.46 (5.489*)
September		1:6 (14.286**)		1:0.5 (4.00*)		1:0.33 (4.00*)		1:0.67 (1.6 ^{ns})		1:0.57 (3.273 ^{ns})

Figures in parentheses are χ^2 values; *= $P < 0.05$, **= $P < 0.01$, ns = not significant

Male-young: The relationship between adult male and young (infant or juvenile) was fairly neutral, but the former sometimes attacked the latter at feeding times. Playing between male-infant and male-juvenile, and sex-play in male-juvenile were each observed on one occasion. Sometimes, when one or more females were grooming the adult male, the juveniles also joined in the grooming cluster.

Female-female: Among the females the relationships were usually positive. Moving, feeding, and resting together, social grooming, embracing and greeting each other were common among them. They, however, did not share food, though most of them did so with infants of different mothers. Agonistic behaviour like teeth grinding or hand beating were also observed infrequently.

Female-infant: The strongest and most persistent bond existed between female and infant. Generally females carried the infants during group progression. Infants also moved behind or followed mother's movement, ate with mother and took rest at mother's lap or chest. Before sleeping, the infants sucked mother or they were

groomed and nursed by the mothers. They were playful too. The females rarely punished the infants like pulling the infant by tail or gave hand-beating if disobeyed. Once in a while, the infant tried sex-playing with mother.

Female-juvenile: Juvenile is independent from the mother, but the relationship among them is cordial and cooperative. Occasional greeting and embracing indicated that a filial relationship (kinship) persisted between mother and juvenile for a long time. Sometimes unsuccessful or brief mating was observed between adult females and juvenile males.

Infant-infant: This relationship was rather a playful, which is a time spending task for infants. The common forms of playing were chasing, jumping, wrestling and mounting, running, climbing, grasping, etc. Sex-play and copulation were also infrequently observed.

Juvenile-juvenile: Within juveniles playing through chasing, wrestling, sex-playing and copulation were observed. Mounting, embracing and greeting were also common phenomena among them.

Juvenile-infant: This relationship was generally playing through chasing and wrestling. Juveniles gave more opportunities to the infants for playing. Sex-play rarely occurred.

Relationship between groups: Though the home ranges of the three studied troops did not overlap, they were not peaceful. When a fourth troop, the Ramchandrapur one, crossed into the home ranges of BBT and MRT, on two separate occasions, they fought each other. Usually fight occurred between the leader males of the troops. These fights consisted of display jumps, shaking of the branches and vocalisation. Such a threat worked and the intruding male withdrew himself first, followed by the other troop members.

Relationship with other animals

Birds: Most of the time one ignored the other. Once a black-capped kingfisher (*Halcyon pileata*) attacked a juvenile Hanuman when it climbed on an ora tree (*Sonneratia acida*) where the bird was resting. On another occasion three pariah kites (*Milvus migrans*) attacked an adult male while he was sitting on top of a shimul tree (*Salmalia malabaricum*). These attacks were not very determined ones. Usually when a bird came nearer to a Hanuman, the latter chased it.

Mammals other than man: Just on sight the pariah dog usually chased the Hanumans when they were on ground. They climbed on tree at once. Other mammals like cats and cattle showed an apathetic attitude. The Hanumans were seen to avoid the banyan trees (*Ficus benghalensis*) supporting roosts of flying fox (*Pteropus giganteus*) numbering several hundreds to a thousand per tree, but they showed a liking for not such occupied banyan trees.

Man: The Hanumans usually ignored the village folks inattentive to them, but they feared the strangers. At the beginning of the present study they avoided the authors and their helper. Later on, they allowed close observations. When the Hanumans raided crop fields, vegetable gardens, betel-leaf vines and fruit orchards the villagers chased them away from crop raiding. The point to be noted here is that the survival of the Hanumans of Keshabpur almost entirely depends on the Hindu population of the area. They worship the Hanumans and hence more tolerant to their presence. It may also be mentioned here that the Hindu population of Dhaka City has given similar supports to the Rhesus macaque population of the city. Social, cultural, and religious attitudes of humans influence primates' populations in India (Southwick *et al.* 1961a, b; Southwick and Siddiqi, 1968), and also in Bangladesh (Green, 1978; pers. obs.).

Activity patterns

Time spent in different activities: A total of 25,480 observations in 4,152 scans were spread over 355 hrs in 37 days (Table 1). The proportion of time spent in different activities by the three studied groups is presented in Fig. 1. It varied significantly between the groups (χ^2 -tests, $P < 0.001$). Despite inter-group variations, the three troops, on an average, spent 6.16% (rest), 16% (move), 44.32% (sit), 7.1% (social grooming), 1.19% (self grooming) 11.23% (play) and 14% (feed) of their active time in different activities (Fig. 1).

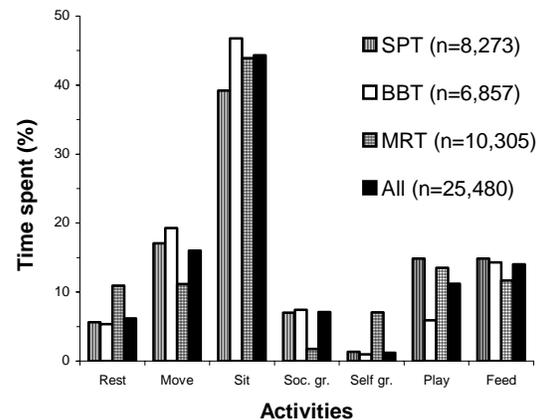


Fig. 1. Proportion of time spent in each major activity by three groups of common langur.

Age/sex variation in activity pattern: The differences in the activity budgets of the male, female and juvenile classes were highly significant both in intra-group and inter-group comparisons (χ^2 -tests, $P < 0.001$; Table 3). All the comparisons, *e.g.*, the rest activity of males of the three groups, the move activity of the females of the three groups, etc., were significantly different ($P < 0.05 - 0.001$, $df=2$) except for the cases: rest of juveniles, and self grooming of males and juveniles, and play of females.

On average all group members spent maximum time in sitting, then moving and feeding are very close to each other in each age/sex classes of the remaining activities, the male spent more time in resting and the female in grooming. Infant spent major time in playing (almost same period as in sitting); juvenile also spent a substantial amount of time in playing, while this time for male and female is negligible. These sorts of variations in-group members are probably due to multiple interrelated reasons. The possible important ones are: male has to keep control over the group, defend harem and territory, so he has to be on top of a tree to keep eyes around. On the other hand he used to eat faster and also enter into a food source first than other members. So he gets better quality food for his nutritional requirements within a short time. Infant

spent less time in feeding, grooming and resting because it used to suck mother frequently and take rest on mother's lap, which are not included in feeding and it also used to receive grooming from other members. So, it spent major time in playing as time spending task for refreshment and social development. Juveniles also spent substantial amount of time in playing, as the partner of the infants, mostly initiated by the latter.

Daily activity pattern: The hour-wise activity pattern in a day was calculated from total data and the results have been presented in Fig. 2 as a proportion of time in each activity. Overall time spent in different activities in each hour of the day varied significantly (χ^2 -tests, $df=6$, $P<0.001$) and for each group each activity differed significantly between different hours of the day (χ^2 -tests, $df=12$, $P<0.001$). It also varied significantly between different activities for each group in each hour of the active period (χ^2 -tests, $P<0.001$). The Hanumans spent maximum time in a diurnal

activity was sitting (44.32%) and minimum time in resting (6.16%) (Fig. 1), and their activity patterns also varied in different hours of the day (Fig. 2).

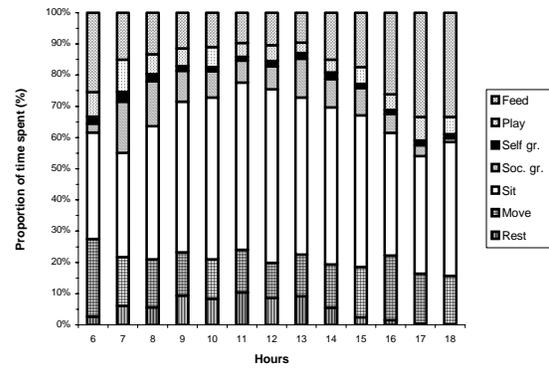


Fig. 2. Daily activity pattern of three groups of common langur

Table 3. Differences in the activity budgets of different age-sex classes.

Group	Age/Sex classes	Time spent in different activities (%)							(n)
		Rest	Move	Sit	Social groom	Self groom	Play	Feed	
SPT	M	9.91	19.16	49.56	5.73	0.66	0.44	14.54	454
	F	4.41	16.19	44.02	13.07	2.32	0.12	19.87	5,079
	J	6.30	18.63	28.22	4.93	1.92	21.10	18.90	365
	I	1.94	14.27	35.03	4.38	0.55	37.77	6.06	2,375
	Mean	5.64	17.06	39.21	7.03	1.36	14.86	14.84	8,273
	χ^2 -value	311.07	1124.12	3380.39	1418.11	260.45	2319.74	97.18	
BBT	M	6.95	23.85	45.35	8.91	0.52	0.00	14.42	763
	F	5.35	19.42	44.86	10.49	2.05	0.09	17.75	4,434
	J	3.27	17.14	52.38	4.08	0.95	5.44	16.74	735
	I	5.84	16.76	44.54	6.16	0.32	18.05	8.32	925
	Mean	5.35	19.29	46.78	7.41	0.96	5.90	14.31	6,857
	χ^2 -value	311.02	1136.26	2479.5	831.6	213.29	348.34	1282.32	
MRT	M	12.58	12.21	47.60	0.62	10.36	0.00	16.65	811
	F	8.30	11.09	55.19	2.11	8.59	0.00	14.73	8,956
	J	20.51	15.39	52.56	2.56	2.56	1.28	5.13	78
	I	2.39	5.87	20.22	1.74	6.74	52.83	10.22	460
	Mean	10.95	11.14	43.89	1.76	7.06	13.53	11.68	10,305
	χ^2 -value	1709.79	2394.1	12543.6	498.24	1820.01	724.03	3173.3	
All	M	9.86	18.15	47.19	8.78	0.59	0.10	15.34	2,028
	F	6.52	14.49	49.64	10.28	2.15	0.05	16.87	18,469
	J	5.35	17.49	44.91	4.24	1.36	10.02	16.64	1,178
	I	2.95	13.86	35.56	5.11	0.64	34.76	7.13	3,760
	Mean	6.16	16.00	44.32	7.10	1.19	11.23	14.00	25,435
	χ^2 -value	2239.25	4301.43	17032.6	4021.0	966.93	3357.09	6300.42	

All χ^2 -values are highly significant ($P<0.01$); SPT=Saha Para Troop; BBT=Baliadanga-Brahmankathi Troop; MRT=Madhyakul-Ramchandrapur Troop; M= Males, F= Females, J= Juveniles, I= Infants

Overall, the Hanumans spent maximum time in sitting during the active hours. It is even more than 50% of their activity time during 1000 to 1400 hrs. The reason for this is the intensity of sunshine resulting warm weather, when langurs take a siesta. Resting time is less during the first activity hour (*i.e.*, 0600) and lowest in the last three hours (1600 to 1800 hrs) of the day. Moving activity is highest during the first hour of the day, possibly for searching food day after a overnight

fasting. Social grooming is highest at 0700 h after having the first meal in the morning, during leisure time (1300 h) and lowest at the end of the day (1800 h). The variation of self-grooming in different hours is not much high, but the langurs spend highest time in this activity after having the first meal in the morning (0700 h). The infants and juveniles mostly perform playing. They showed bimodal peak, one in the morning (0600 to 0700 hrs) and the other in the last but

one hour of the day (1700 h). Two feeding peaks were found, one in the morning (0600 h) and the other in the evening (1700 to 1800 hrs). This obviously was related with feeding after an overnight fasting and storing energy for the coming night.

In addition to the major activities mentioned above, drinking and shaking of the branches of trees by them were also observed frequently. Sugiyama (1964) reported from South India that when all sources of water dry up in summer, the Hanumans live without water for 4-5 months. This is also true for the Hanumans of Sri Lanka (Ripley, 1970; Roonwal & Mohnot, 1977 pers. comm. with Ripley). Roonwal & Mohnot (1977) mentioned that the Hanumans drank directly either with the lips or through licking, crouching low with the belly closed to the ground never with the help of the hands. There were plenty of water sources at Keshabpur round the year and usually the Hanumans drank in a manner described by Roonwal & Mohnot (op. cit.). But in one case, an infant-II used hands in drinking, after dipping palm in water it licked the same. The shaking of the branches was associated with play, mock charge by the young ones or for the agonistic display by the adults.

Food and feeding habits: The Hanumans eat mainly leaves, fruits, buds, flowers, shoots, and seeds of a large number of plants (Table 4). During 3,889 observations, the langurs were found to spend maximum amount of time (46.59%) feeding leaves (matured and young) and minimum time (0.13%) feeding root. The langurs were found to spend maximum of their feeding time (74.88%) consuming the vegetative food parts (leaves, petiole and epiphytes). Therefore, the present species is mainly a folivorous one like other langur species (e.g., capped langur: Stanford, 1989).

The Hanumans picked up, held and then ate the food from the hands or picked and put straight into the mouth, or ate directly from trees. The feeding techniques were more or less same for the similar type of foods, but varied with different categories. For instance, the matured leaves of mango (*Mangifera indica*) and black berry [jam] (*Syzygium cumini*) were plucked and then they ate only the petiole, but they ate young leaves directly from trees or they detached shoots with young leaves either with hands or mouth from the branch and then ate. In case of fruits of sweet hog-plum [misty amra] (*Spondias dulcis*) and mango they picked these with one or both hands and then ate. The larger fruits, like those of jackfruit (*Artocarpus heterophyllus*) and dewa (*A. lakucha*), were eaten directly from trees. The Hanumans (typologically arranged following Clutton-Brock, 1974) ate the following parts of different species of plants: Buds= all

recognisable floral buds; flowers= all recognisable flowers; fresh/young leaves= all newly grown leaves; fruit= both ripe and unripe fruits; petioles= leaf petioles; seeds= all recognisable seeds except coating; and shoots= leaf shoots unless reached the sign of matured leaves.

The Hanumans of Keshabpur consumed food from over 60 species of natural and cultivated plants, in addition to the food either offered by humans or stolen from them by the Hanumans. In all, 43 species were identified (Table 4), of which 17 species provided the main bulk of the food to the Hanumans. It was also reported by the local people that the Hanumans eat a lot of winter crops such as pulses, cabbage (*Brassica oleracea* var. *capitata*), cauliflower (*B. oleracea* var. *botrytis*), raddish (*Raphanus sativus*), wheat (*Triticum aestivum*), and cotton (*Gossypium herbaceum*) shoots, pods and flowers. It is apparent from the work of Mohnot (1971), Krishnan (1972), Hladik (1977), Oppenheimer (1977), and Roonwal & Mohnot (1977) that the Hanumans of India and Sri Lanka ate parts of some 23 to 80 plant species, and they are more dependent on leaves than other parts of a plant. The studied Hanumans were mostly dependent on the fresh/young leaves; in addition they had eaten flowers, fruits, and seeds of wild and cultivated plant species.

Welfare of the Hanumans: The Hanuman is in Schedule III of Bangladesh Wildlife (Preservation) (Amendment) Act, 1974. This means it is a protected species. The Act prohibits harassing, trapping and killing, possession of Hanuman, and in that matter of all primates and other species of wildlife of Bangladesh included in the Act (Schedule I, part-I and Schedule III). Unfortunately, there is literally no impact of the Act on the members of the public residing outside the state-owned forests. Also there is no proper and functional machinery to implement the Act all over the country. The Hanumans of Keshabpur are under constant harassment either because of the cowboys or the tourists pouring into the area every weekend. These persons shout, throw stones and chase the Hanumans. Often they use catapult to hit them with the earthen pellets. Occasionally, some are also trapped and transported out of Keshabpur for pet trade and circus parties. The unprecedented over-exploitation of the village wood lots, especially species of *Ficus*, *Phoenix*, *Areca*, *Mangifera*, and *Polialthia*, as fuel-wood for the brickfield and tobacco curing, threatens the Hanumans' survival in the area. The crop-raiding habit of the Hanumans is also detrimental for their own survival. It appears that situations may arise in the near future to tranquilise and transport the Hanumans out of Keshabpur with a view to rehabilitate them in some forested areas of the country currently devoid of any non-human primates.

Table 4. Food plants and their parts eaten by the Hanumans of Keshabpur (Family arranged alphabetically) Abbreviations used: bd=bud, lv=leaf, fl=flower, fr=fruit, ju=juice, pt=petiole, sd=seed, st=shoot

Sl. no.	Family	Scientific names	Sl. no.	Local names	Food parts eaten
1.	Anacardiaceae	<i>Lannea coromandelica</i> <i>Mangifera indica</i> <i>Spondias dulcis</i> <i>Spondias pinnata</i>	1.	Jiol	pt, ju/gm
2.	Anonaceae	<i>Annona reticulata</i> <i>Annona squamosa</i>	2.	Aam	lv, fr, pt, sd, st
3.	Averrhoaceae	<i>Averrhoa carambola</i>	3.	Misti amra	fr, ju/gm
4.	Bombacaceae	<i>Salmaal malabaricum</i>	4.	Tok amra	lv, fr, ju/gm
5.	Caricaceae	<i>Carica papaya</i>	5.	Noonaphal	fr, fl
6.	Ebenaceae	<i>Diospyros peregrina</i>	6.	Ataphal	fr, fl
7.	Gramineae	<i>Bambusa</i> spp. <i>Oryza sativa</i>	7.	Kamranga	lv, fl, fr
8.	Leguminosae	<i>Acacia nilotica</i> <i>Albizia</i> spp. <i>Cassia fistula</i> <i>Pongamia pinnata</i> <i>Tamarindus indicus</i>	8.	Shimul	lv
9.	Loranthaceae	<i>Loranthus</i> spp.	9.	Pepey	lv, fr
10.	Malvaceae	<i>Hibiscus</i> spp.	10.	Gab	fr
11.	Meliaceae	<i>Azadirachta indica</i>	11.	Bansh	bd (rarely)
12.	Moraceae	<i>Artocarpus heterophyllus</i> <i>Artocarpus lacucha</i> <i>Ficus benghalensis</i> <i>F. glomerata</i> <i>F. hispida</i> <i>F. religiosa</i> <i>F. retusa</i>	12.	Dhan	lv
13.	Moringaceae	<i>Moringa oleifera</i>	13.	Babla	fl, lv
14.	Musaceae	<i>Musa</i> spp.	14.	Koroi	fl, pt, st
15.	Myrtaceae	<i>Psidium guajava</i> <i>Syzygium cumini</i>	15.	Sonalu	fl
16.	Orchidaceae	<i>Vanda tessellata</i>	16.	Kanaja	bd, fl, lv
17.	Palmae	<i>Cocos nucifera</i> <i>Phoenix sylvestris</i>	17.	Tentul	fr, lv
18.	Rhamnaceae	<i>Zizyphus mauritiana</i>	18.	Pargacha	bd, fl, lv
19.	Rubiaceae	<i>Anthocephalus chinensis</i>	19.	Jaba phool	bd, fl, lv
20.	Rutaceae	<i>Aegle marmelosa</i>	20.	Neem	lv
21.	Sapindaceae	<i>Litchi chinensis</i>	21.	Kanthal	bd, fr, rarely lv
22.	Sapotaceae	<i>Manilkara achras</i>	22.	Dewa	fr, lv
23.	Solanaceae	<i>Solanum melongena</i>	23.	Bot	lv, fr
24.	Sonneratiaceae	<i>Sonneratia caseolaris</i>	24.	Jagadumur	fr
25.	Tiliaceae	<i>Corchorus capsularis</i>	25.	Khoksha	fr
26.	Unidentified	Unidentified	26.	Pekur	fr, rarely lv
			27.	Dumur	fr
			28.	Sajna	fl, lv, ju/gm
			29.	Kola	fr
			30.	Peyara	fr
			31.	Jam	bd, lv, fl, pt
			32.	Rashana	fl
			33.	Dab	bd, fl (rarely both)
			34.	Khejur	fr, ju
			35.	Kul/Boroi	lv, fr
			36.	Kadamba	fr
			37.	Bel	lv, fr
			38.	Litchu	fr
			39.	Sofeda	bd, lv, fl
			40.	Begun	fr, fl
			41.	Ora	fl, lv, fr
			42.	Pat	bd, lv
			43.	Potka	bd, lv, fl, fr

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