SOME FOOD PLANTS OF HANUMAN LANGUR *SEMNOPITHECUS ENTELLUS* (DUFRESNE) IN THE WESTERN GHATS OF MAHARASHTRA, INDIA

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Abstract

The present study reports 126 flowering plants used as food by Hanuman/Common Langur (*Semnopithecus entellus* Dufresne) from Western Ghats of Maharashtra. Out of 126 species 94 are reported as food plants for the langurs for the first time.

Key words

Hanuman Langur, Semnopithecus entellus, *food plant, plant part*

Introduction

Hanuman Langurs (*Semnopithecus entellus*) are distributed throughout India, from the Himalaya to the southern tip, except in the deserts, and including Sri Lanka. Within this area about depending on the taxonomist 14 more or less distinguishable races (Prater, 1965), nine species (Groves, 2001) or 11 subspecies (Brandon-Jones *et al*., in prep.) are recognized. Langurs mainly feed on leaves, flowers and fruits. However, sometimes they also consume insect pupae on leaves and eggs of nesting birds (Rahaman, 1973).

Some details on the observations on the diet of the Hanuman Langurs are provided in this study. Observations made by earlier workers on food plants are no doubt informative but are in fragments, incomplete and mostly restricted to small areas or localities. Present work supplements the data by further field studies in the area under consideration and presents a consolidated botanical checklist of the food plants of Hanuman Langurs from Western Ghats of Maharashtra.

Methodology

No specific group of Hanuman Langurs was studied for a long period due to academic limitations. As such, visit to any particular area for floristic study on Hanuman Langurs in the Western Ghats of Maharashtra was collateral and thus casual observations only.

The present work is based on visual observations on feeding and scat scanning in different vegetation types between January 1999 to February 2001. Fresh scats were collected and preserved in 10% formalin for further examination. Each scat mass was immersed in a plastic tray containing water and food materials such as seeds were sorted and identified. Direct observation of langurs feeding on plant parts like leaves, flowers, tender shoots etc. was made in the field.

During the study, attention was given to correct scientific names of food plants (Singh & Karthikeyan, 2000), family, local name, plant parts consumed, whether native or exotic plants, distribution, habit of food plants and species-specific feeding months of Hanuman Langurs.

Study Area

The area under study includes different parts of Western Ghats and its adjoining areas of Maharashtra. The study area (14^0 49' -$20^0$25'N and $73^0$01'-$75^0$10'E), constitutes about 20,000km^2, which is one-fifth of the gross total area of Maharashtra State.

The climate of western Maharashtra is typically monsoon. The total annual rainfall varies over a wide range with an average of about 200cm, along the sea face. It may reach to about 600cm or even more in the hilly region along the descending western slopes and plains. Rainfall abruptly decreases as one proceeds from the crest to the eastern terrain.

Vegetation

The vegetation shows a spectrum of variability from west to east. The study area comprises of five broad vegetation types: dry deciduous, moist deciduous, semi-evergreen, evergreen and scrub type of forests (Champion, 1936; Champion & Seth, 1968).

The dry deciduous type of forest have plant species like *Acacia* sp., *Anogeissus latifolia, Sterculia urens, Terminalia crenulata, Bombax ceiba, Cochlospermum religiosum, Boswellia serrata* etc.; the moist deciduous forest contain plant species like *Dillenia pentagyna, Careya arborea, Terminalia chebula, Terminalia bellerica, Firmiana colorata, Lagerstroemia*

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Table 1. Enumeration of food plants of Hanuman Langur (*Semnopithecus entellus*) in the Western Ghats of Maharashtra.

Botanical name	Local name	Family	Plant part consumed	N / E	Habit type	Forest	Feeding months
Dillenia pentagyna	Karmal	Dilleniaceae	TL, RF	N	T	MD	Mar. - Jun.
Michelia champaka	Son-chafa	Magnoliaceae	FL, URF	N	T	C	Apr. - Sep.
Cocculus hirsutus	Vasanvel, Jaljamni	Menispermaceae	TL, ML	N	C	DD	All Months
Capparis moonii	Waghati	Capparidaceae	RF	N	C	MD, SCR	Feb. - May
Garcinia indica	Ratamba	Clusiaceae	LB, RF	N	T	E, SE	Feb. - Jun.
Garcinia talboti	Phansada, Limboi	Clusiaceae	RF	N	T	E	Jun. - Aug.
Calophyllum inophyllum	Undi	Clusiaceae	RF	E	T	E	Mar. - Jun.
Adansonia digitata	Gorakhchinch	Bombacaceae	URF	N	T	C	Aug. - Jan.
Bombax ceiba	Kate Sawar	Bombacaceae	URF	N	T	DD	Apr. - Jun.
Ceiba pentandra	Dol Kathi	Bombacaceae	URF	N	T	DD	Feb. - Mar.
Sterculia urens	Kandol, Pandruk	Sterculiaceae	S	N	T	DD	Apr. - Jun.
Sterculia guttata	Kukar, Golder	Sterculiaceae	S	N	T	MD	Mar. - Jun.
Firmiana colorata	Kausi, Supli	Sterculiaceae	S	N	T	MD	Apr. - Aug.
Grewia abutilifolia	Kirmith	Tiliaceae	FB, URF	N	S	MD	Jun. - Nov.
Grewia tilifolia	Dhaman	Tiliaceae	ML, RF	N	S	DD	Jun. - Nov.
Elaeocarpus glandulosus	Kasa	Elaeocarpaceae	URF	N	T	E, SE	May - Jun.
Aspidopterys cordata	Buryel, Bokadvel	Malpighiaceae	S	N	C	DD, MD	Aug. - Feb.
Glycosmis pentaphylla	Ambute, Kitmira	Rutaceae	FL, RF	N	ST	SE	Sep. - Jan.
Murraya koengii	Karrypatta	Rutaceae	ML, RF	N	ST	E, SE	Mar. - Jun.
Murraya paniculata	Kunti	Rutaceae	ML	N	ST	E	All Months
Atalantia racemosa	Makad Limbu	Rutaceae	URF, RF	N	S/ST	E	Dec. - Jun.
Garuga pinnata	Kakad	Burseraceae	RF, LG	N	T	DD, MD	Apr. - Jul.
Cipadessa baccifera	Gudmei	Meliaceae	RF	N	S	DD	Oct. - May
Aglaia lawii	Burumb, Kat	Meliaceae	RF	N	T	E	Mar. - Jun.
Chloroxylon swietenia	Bhirra, Halda	Meliaceae	TL, RF	N	T	DD, MD	Jun. - Aug.
Meytenus rothiana	Henkal	Celastraceae	URF	N	S	SE, SCR	Oct. - Jan.
Ziziphus mauritiana	Bor	Rhamnaceae	RF	N	T	DD	Aug. - Feb.
Ziziphus oenoplia	Burgi	Rhamnaceae	RF	N	STS	DD	Sep. - Mar.
Ziziphus rugosa	Toran	Rhamnaceae	RF	N	SS	SCR	Feb. - Jun.
Ampelocissus latifolia	*Nadena, Bendar*	Vitaceae	RF	N	CS	MD	Jul. - Nov.
Leea indica	*Pandhara Dinda*	Leeaceae	TL,RF	N	S	MD, SE	Jul. - Nov.
Schleichera oleosa	*Koshima*	Sapindaceae	RF	N	T	DD	Apr. - Aug.
Sapindus laurifolius	*Ritha*	Sapindaceae	RF	N	T	MD	Sep. - Feb.
Dimocarpus longan	*Umb, Vumb*	Sapindaceae	RF	N	T	E, SE	Apr.- Jul.
Anacardium occidentale	*Kaaju*	Anacardiaceae	RF	E	T	C	Mar. - Jun.
Rhus mysorensis	*Amani*	Anacardiaceae	RF	N	S	DD	Jul. - Aug.
Lannea coromandelica	*Shimti*	Anacardiaceae	TL, RF	N	T	DD	Apr. - Jun.
Semecarpus anacardium	*Bibba*	Anacardiaceae	RF	N	T	DD	Jun. - Sep.
Holigarna graphamii	*Hulgeri*	Anacardiaceae	RF	N	T	MD, SE	Apr. - Aug.
Spondias pinnata	*Ambada*	Anacardiaceae	RF	N	T	MD, SE	Jun. - Oct.
Buchanania cochinchinensis	*Charoli*	Anacardiaceae	RF	N	T	DD	Apr. - Jul.
Mangifera indica	*Aamba*	Anacardiaceae	URF, RF	N	T	E	Feb. - Sep.
Moringa oleifera	*Shevga*	Moringaceae	S	N	T	DD	Feb. - May
Connarus monocarpus	*Sundar*	Connaraceae	S	N	SS	SE, SCR	Jul. - Oct.
Mucuna pruriens	*Khaj-Kuilee*	Fabaceae	S	N	TW	DD	Apr. - Jul.
Mucuna monosperma	*Mothi Khaj-Kuilee*	Fabaceae	FL	N	TW	MD	Sep. - Jan.
Erythrina suberosa	*Pangara*	Fabaceae	FL	N	T	DD	Apr. - May
Erythina stricta	*Kate pangara*	Fabaceae	FL	N	T	MD	Feb. - May
Butea monosperma	*Palas*	Fabaceae	FL, URF	N	T	DD	Feb. - May
Butea superba	*Palasvel*	Fabaceae	FL	N	L	DD, MD	Feb. - Mar.
Dalbergia latifolia	*Shisham*	Fabaceae	TL, URF	N	T	DD	Aug. - Sep.
Dalbergia horrida var. *horrida*	Pendkul	Fabaceae	TL, URF	N	CS	MD, SCR	Jun. - Oct.
Pterocarpus marsupium	*Bija*	Fabaceae	ML	N	T	DD, MD	Jul. - Feb.
Pongamia pinnata	*Karanj*	Fabaceae	ML, URF	N	T	DD	Sep. - Jan.

Botanical name	Local name	Family	Plant part consumed	N / E	Habit type	Forest	Feeding months
Bauhinia vahlii	*Chambul*	Caesalpiniaceae	URF	N	L	DD, MD	May - Jun.
Cassia fistula	*Bahava*	Caesalpiniaceae	TL, URF	N	T	DD	Apr. - Jun.
Caesalpinia pulcherrima	*Shankasur*	Caesalpiniaceae	FL	E	S	C	All Months
Leucaena leucocephala	*Subhabhul*	Mimosaceae	TL, S	E	T	C	Aug. - Nov.
Acacia uriculiformis	*Austrelian Babhul*	Mimosaceae	ML, S	E	T	C	All Months
Acacia instia	*Chilhar*	Mimosaceae	ML, S	N	CS	MD, SCR	Jun. - Dec.
Albizzia lebbeck	*Siras*	Mimosaceae	S	N	T	DD	Jun. - Aug.
Albizzia odoratissima	*Chichva*	Mimosaceae	S	N	T	DD	Sep. - Dec.
Albizzia procera	*Kinhai*	Mimosaceae	S	N	T	DD	Jun. - Sep.
Pithecellobium dulce	*Vilayati chinch*	Mimosaceae	RF	E	T	C	Feb. - May
Terminalia bellirica	*Behda, Hela*	Combretaceae	URF	N	T	DD, MD	Apr. - Jun.
Terminalia chebula	*Hirds*	Combretaceae	URF	N	T	SE	Mar. - Jul.
Terminalia crenulata	*Ain*	Combretaceae	URF	N	T	DD, SCR	Jul. - Jan.
Syzygium cumini	*Jambhul*	Myrtaceae	ML, RF	N	T	E, SE	Feb. - Jun.
Syzygium hemisphgericum	-	Myrtaceae	ML, RF	N	T	E	Mar. - Jul.
Psidium guajava	*Peru*	Myrtaceae	URF, RF	E	T	C	All Months
Careya arborea	*Kumbha*	Lecythidaceae	RF	N	T	MD	Apr. - Aug.
Memecylon umbellatum	*Anjani*	Melastomataceae	RFN		T	E, SE	Apr. - Jul.
Lagerstroemia microcarpa	*Nana*	Lythraceae	TL, URF	N	T	MD	Mar. – Oct.
Woodfordia fruticosa	*Dhayati*	Lythraceae	FL		S	MD, SCR	Dec. - May
Momordica dioica	*Kartul*	Cucurbitaceae	URF, RF	N	C	DD, MD	Aug. - Feb.
Solena amplexicaulis	*Gometi*	Cucurbitaceae	URF,RF	N	TR	DD, MD	Jul. - Dec.
Meyna laxiflora	*Alu*	Rubiaceae	RF	N	S	DD, MD, SCR	Apr. - Jun.
Catunaregam spinosa	*Gela. Madanphal*	Rubiaceae	RF	N	S	MD, SCR	May - Jul.
Mitragyna parvifolia	*Kalamb*	Rubiaceae	TL, URF	N	T	DD, MD	Aug. - Mar
Morinda tinctoria	*Bartondi*	Rubiaceae	TL, FL	N	TC	DD	May - Jun.
Embelia basaal	*Ambat*	Myrsinaceae	RFN	CS	E, SE		Feb. - Jul.
Embelia tsjeriam-cottam	*Ambati*	Myrsinaceae	RF	N	SS	MD, SCR	Jul. - Nov.
Embelia ribes	*Vavding*	Myrsinaceae	ML	N	T	E	All Months
Madhuca indica	*Moha*	Sapotaceae	FB, FL, RF	N	T	DD	Jan. - May
Xantolis tomentosa	*Katekumbai*	Sapotaceae	RF	N	T	MD	Feb. - Jun.
Diospyros melanoxylon	*Tembhurni, Tendu*	Ebenaceae	RF	N	T	DD	Apr. - Jun.
Diospyros montana	*Goindu*	Ebenacaeae	RF	N	T	MD, SCR	Mar. - Jul.
Jasminum malabaricum	*Kusar*	Oleaceae	RF	N	CS	MD, SCR	May - Oct.
Olea dioica	*Parjambhul*	Oleaceae	RF	N	T	E	Jul. - Aug.
Carissa congesta	*Karvand*	Apocynaceae	RF	N	S	DD, SCR	Apr. - May
Hollarrhena pubescens	*Pandhra -kuda*	Apocynaceae	ML, TF	N	S	DD, MD	Jul. - Aug.
Cryptolepis buchanani	*Kawali*	Periplocaceae	ML, TS	N	CS	DD, MD	All Months
Cordi adichotoma	*Bhokar*	Cordiaceae	RF	N	T	DD	Apr. - Jul.
Cordia macleodii	*Dahivan*	Cordiaceae	RF	N	S	DD	May - Oct.
Ehretia aspera	*Datrang*	Ehretiaceae	RF	N	S	DD	Aug. - Feb.
Rivea hypocrateriformis	*Phanji*	Convolvulaceae	TL	N	CS	DD	Jun. - Oct.
Dolichandrone falcate	*Medshingi*	Bignoniaceae	URF, RF	N	T	DD	Jun. - Jan.
Heterophragma quadriloculare	*Varas*	Bignoniaceae	URF, FL	N	T	DD	Feb. - Jul.
Stereospermum personatum	*Padal*	Bignoniaceae	URF	N	T	DD	Aug. - Feb.
Gmelina arborea	*Shivan, Bharangi*	Verbenaceae	TL, RF	N	T	DD	Aug. - Feb.
Clerodendron serratum	*Shivan, Bharangi*	Verbenaceae	ML, FL	N	S	DD, MD	Aug. - Sep.
Knema attenuata	*Rukt-mara*	Myristicaceae	RF	N	T	E	Apr. - Oct.
Myristica malabarica	*Ran-jaiphal*	Myristicaceae	RF	N	T	E	Sep. - Dec.
Actinodaphae angustifolia	*Pisa, Malwa*	Lauraceae	FB	N	T	E, SE	Nov.
Litsea stocksii	-	Lauraceae	RF	N	T	E, SE	Nov. - Jan.
Elaeagnus conferta	*Ambguli*	Eleagnaceae	RF	N	CS	SCR	Feb. - May
Dendropthoe falcate	*Bandgul, Betungli*	Loranthaceae	RF	N	B(P)	DD, MD	Mar. - Jun.
Bridelia squamosa	*Aasana, Katak*	Euphorbiaceae	RF	N	T	DD	Oct. - Jan.
Phyllanthus emblica	*Aawala*	Euphorbiaceae	URF, RF	N	T	MD, SCR	Apr. - Sep.
Mallotus phillipinensis	*Shendari, Kapila*	Euphorbiaceae	URF	N	T	E, SE	Sep. - Mar.

Botanical name	Local name	Family	Plant part consumed	N / E	Habit type	Forest	Feeding months
Cleidion spiciflorum	*Radkure*	Euphorbiaceae	URF, RF	N	T	E	Oct. - Jan.
Holoptelea integrifolia	*Waula, Papadi*	Ulmaceae	MF	N	T	DD	Mar. - May
Trema orientalis	*Ghol*	Ulmaceae	RF	N	T	DD	All Months
Morus alba	*Tuti*	Moraceae	RF	E	T	C	All Months
Ficus bengalensis	*Wad*	Moraceae	URF, RF	N	T	C	Apr. - Jun.
Ficus nervosa	*Lothdra*	Moraceae	URF, RF	N	T	E, SE	Feb.
Ficus arnottiana	*Pair, Ashta*	Moraceae	URF, RF	N	T	DD, SCR	Feb. - Apr.
Ficus hispida	*Kala Umbar*	Moraceae	URF, RF	N	T	MD. SE	Apr. - Jul.
Ficus religiosa	*Pipal*	Moraceae	URF, RF	N	T	DD, MD	May - Jul.
Ficus racemosa	*Umbar*	Moraceae	URF, RF	N	T	DD, MD, SE	All Months
Artocarpus heterophyllus	*Phanas*	Moraceae	URF, RF	N	T	E	Feb. - Jul.
Gnetum ula	*Ombal*	Gnetaceae	S	N	L	E, SE	Mar. - Nov.
Ensete superbum	*Rankel, Chowani*	Musaceae	URF, RF	N	S	MD, SE	Jun. - Dec.
Dioscrorea pentaphylla	*Shendvel*	Dioscoreaceae	FL	N	TW	DD, SCR	Sep. - Oct.
Dioscorea oppositifolia	*Paspoli*	Dioscoreaceae	FL	N	TW	DD	Sep. - Oct.
Asparagus racemosus var. *javanicus*	*Shatawari, Aaswali*	Liliaceae	TS	N	C	DD, MD	Jun. - Sep.

TL - tender leaf; ML - mature leaf; LG - leaf gall; LB - leaf bud; FL - flower; FB - flower bud; TS - tender shoot; IF - inflorescence gall; URF - unripe fruit; RF - ripe fruit; S - seed; N - native; E - exotic; T - tree; ST - small tree; S - shrub; B(P) - bushy parasite; C - climber; L - liana; SS - scandent shrub; STS - strangling shrub; CS - climbing shrub; TR - trailor; TW - twiner; DD - dry deciduous; MD - moist deciduous; SE - semi evergreen; E - evergreen; SCR - scrub; C - cultivated

Syzygium cumini, Litsea stocksii, Holigarna grahami etc.; the evergreen type of vegetation is characterized by species like *Cleidion spiciflorum, Ficus nervosa, Elaeocarpus glandulosus, Carallia brachiata, Knema attenuata, Myristica malabarica;* and the scrub forest vegetation by *Capparis moonii, Meytenus rothiana, Connarus monocarpus, Elaeagnus conferta, Terminalia crenulata* etc.

Results

During the present study 126 food plants of Hanuman Langur were reported of which 94 plants are new additions to the existing data of known food plants (Table 1). The diet of the Hanuman Langurs varied from tender leaves to ripe fruits. Hanuman Langurs being an arboreal animal feed mostly on tree species and rarely ground vegetation. It was interesting to note that they also fed on galls *of Garuga pinnata,* whose leaf galls are epiphyllous, induced by *Phacopteron lentiginosum* Buckton (Homoptera) (Mani, 1973). Amongst the tree species they mostly fed on the fruits of *Ficus, Terminalia, Cordia, Syzygium and Ziziphus* species. Amongst plant parts, ripe and unripe fruits were mostly consumed followed by tender leaves, mature leaves, seeds and flowers. Fabaceae, Mimosaceae, Anacardiaceae and Moraceae were the dominant plant families that served as food to the Langurs. Habit-wise food preference are mentioned in Table 2.

Discussion

The Hanuman Langurs are mainly herbivorous eating plant material such as fruits, seeds, leaves and flowers, with fruits constituting a major part of their diet throughout the year (Prater, 1965).

Among plants, *Ficus racemosa, Phyllanthus emblica, Syzygium cumini, Albizia lebbeck, Diospyros melanoxylon, Carissa congesta, Dimocarpus longan, Myristica malabarica, Cleiodion spiciflorum, Eleagnus conferta* and *Ziziphus* species were the major components of their diet.

There is a significant relationship between fruit availability and utilization. Seasonal diet is influenced by fruiting phenology, but it needs further survey in the study area.

Earlier workers like Rahaman and Kankane have enlisted food plants of Hanuman Langur mostly from dry and moist deciduous forests. Rahaman (1973) had listed 41 food plants while Kankane (1978) had listed 35 food plants. In the present study 126 food plants were recognised as food plants of Hanuman Langurs in Maharashtra of which 94 plants are new records (Table 1). They were recorded from different forest types such as dry deciduous, moist deciduous, semi-evergreen, evergreen and scrub forests.

There are direct and indirect benefits of Hanuman Langurs to plants and other animals. They help in seed dispersal of forest trees. The germination percentage of *Aglaia lawii seeds* present

Table 2. Habit - wise food preference of Hanuman Langur

Habit of the plant	No. of species
Tree	79
Small tree	3
Shrub	17
Scandent shrub	3
Climbing shrub	8
Liana	3
Climber	6
Twiner	4
Trailer	1
Bushy parasite	1
Strangling shrub	1

in the scat of the Hanuman Langur was high compared to the fallen seeds which were collected from the field. The process of digestion and enzymes secreted soften the seeds. Hanuman Langurs consume shoot apices, thus suppressing the apical dominance and facilitating the growth of lateral leaf buds which increase the total biomass of the plant. Deer and wild cattle gather under trees utlized by Hanuman Langurs to eat the fruits and leaves dropped by the langurs.

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