

NESTING AND FEEDING BEHAVIOUR OF INDIAN GIANT SQUIRREL (*RATUFA INDICA*) IN DALMA WILDLIFE SANCTUARY, JAMSHEDPUR (JHARKHAND)

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Introduction

There are about 121 species of tree squirrels (Moore, 1959). The Indian giant squirrel (*Ratufa indica*) is a forest dwelling species and arboreal spending most of its time in trees. It is a top canopy dwelling species and rarely moves on the ground (Ramchandran, 1988). It feeds in the upper canopy levels (Ramchandran, 1988). The giant squirrels are wary animals and usually keep themselves well hidden in vegetation. They are most active during the day (Nowak, 1999). It has a dark black-brown coat with buff coloured underparts. Giant squirrels also use their large tail as a counter weight, improving their balance (Nowak, 1999). There has been report of substantial decrease in the number of giant squirrel in the Dalma wildlife sanctuary in the past. There is no systematic study on the habitat and behaviour of Indian giant squirrel (*Ratufa indica*) in the sanctuary. Giant Indian squirrel has been a tremendous attraction for the tourists in the sanctuary. It is felt that study the nesting and feeding behavior of Indian giant squirrel may help to adopt better conservation strategy to save the beautiful creature.

Dalma wildlife sanctuary is in the state of Jharkhand. The forest types of Dalma Wildlife Sanctuary as per Champion and Seth (1968) classification come under the category Northern tropical dry peninsular sal (5B/C₁) and Tropical dry mixed deciduous forest (5B/C₂). Because of the nature of the forest there is diversity of flora and fauna in the Dalma Wildlife Sanctuary. Though the flagship species of the sanctuary is elephant but there are sizeable numbers of the other faunal species such as Indian giant squirrel, barking deer, mouse deer, porcupine, pangoline, sloth bear and wild boar.

Methodology

The Dalma wildlife sanctuary covers an area of about 192 Km². Because of the large tract, the study was conducted using random sampling method. The wildlife sanctuary forest was divided into homogenous tracts and the tracts were divided into beats keeping in mind the vegetation and topography. Efforts were made to cover all kind of vegetation and topography so that a generalized statement can be drawn. An area of about



2833.93 ha., 1.5% of the total area of the sanctuary was selected as study area covered through transects. All the information recorded was based on the ocular observations made while walking on the transects. The height of trees was ocularly estimated. Both direct sighting of giant squirrel and indirect evidences were recorded periodically by making observations on these trees.

Besides field data collection, information on these squirrels was also collected by talking to the front line staff and the villagers of Dalma wildlife sanctuary. Information in the records of the forest department was

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Table 1
Plant species and parts eaten by giant squirrel in Dalma wildlife sanctuary.

Sl. No.	Name of species	Parts used
1.	<i>Aegle marmelos</i> (L) Corr.(Bel)	Fruits, bark
2.	<i>Anthocephalus cadamba</i> Roxb.(Kadum)	Fruits
3.	<i>Artocarpus lakoocha</i> Roxb. (Dahu)	Flower, fruits, bark
4.	<i>Bauhinia vahlii</i> Wight&Arn. (Maholum)	Flower, leaves, young shoot
5.	<i>Bauhinia variegata</i> L. (Keonar)	Leaves, fruits, bark
6.	<i>Bombax ceiba</i> L. (Semal)	Flowers, fruits, bark
7.	<i>Bridelia squamosa</i> Gehrm. (kasi)	Fruits, bark
8.	<i>Buchanania lanzan</i> Spreng. (Piar)	Fruits
9.	<i>Careya arborea</i> Roxb (Astha)	Fruits
10.	<i>Cassia fistula</i> L. (Amaltas)	Fruits
11.	<i>Croton oblongifolius</i> Roxb. (Putla)	Fruits, bark
12.	<i>Dillenia pentagyna</i> Roxb. (Agai)	Fruits, bark
13.	<i>Diospyros embryopteris</i> Pers. (Kanakend)	Fruits
14.	<i>Diospyros melanoxylon</i> Roxb. (Kend)	Fruits
15.	<i>Eugenia heyneana</i> Wall. (kath-jamun)	Fruits
16.	<i>Ficus benghalensis</i> L. (Barh)	Fruits, young shoot
17.	<i>Ficus cunia</i> Buch.Ham ex. Roxb. (Podha)	Fruits
18.	<i>Ficus glomerata</i> Roxb. (Dumar)	Fruits, young shoot
19.	<i>Ficus infectoria</i> Roxb (Pakar)	Flower, young shoot
20.	<i>Ficus religiosa</i> L. (pipal)	Fruits, young shoot
21.	<i>Gardenia latifolia</i> Ait. (Popro)	Fruits
22.	<i>Gmelina arborea</i> L. (Gamhar)	Fruits, bark
23.	<i>Hibiscus rosa-sinensis</i> L. (Urhul)	Flowers (Ovary)
24.	<i>Holarrhena antidysenterica</i> (L) Wall. ex. DC. (Kurchi)	Fruits
25.	<i>Ixora arborea</i> Roxb. ex. Sm. (Iohajungi)	Flower, fruits
26.	<i>Litsea monopetala</i> (Behchi)	Fruits
27.	<i>Mallotus philippinensis</i> (Lamk) (Garisinduri)	Fruits, young shoot
28.	<i>Mangifera indica</i> L (Aam)	Fruits, bark
29.	<i>Pterocarpus marsupium</i> Roxb. (Biza sal)	Fruits, bark
30.	<i>Schleichera oleosa</i> (Lour) Oken. (Kusum)	Fruits, bark
31.	<i>Spatholobus rouxburghii</i> Benth. (Budhilata)	Fruits, young shoot
32.	<i>Spondias pinnata</i> (L.f.) Kurz. (Amra)	Fruits
33.	<i>Sterculia urens</i> Roxb. (Butkusum)	Fruits, bark
34.	<i>Syzygium cumini</i> (L) Skeels. (Jamun)	Fruits, bark
35.	<i>Tamarindus indica</i> L. (tetul, Imli)	Leaves, fruits, bark
36.	<i>Terminalia arjuna</i> Roxb. (Arjun)	Fruits, bark
37.	<i>Terminalia bellirica</i> (Gaertn.) Roxb. (Bahera)	Fruits, bark
38.	<i>Terminalia chebula</i> Retz (Haritaki)	Fruits
39.	<i>Terminalia tomentosa</i> Roxb. (Aasan)	Fruits, bark
40.	<i>Zizyphus mauritiana</i> Lamk. (Ber)	Fruits
41.	<i>Zizyphus xylopyra</i> Willd. (Ghont)	Fruits

also utilized.

Results and Discussions

In Dalma wildlife sanctuary, the giant Indian squirrels were found feeding on flower, fruit, young shoot, leaves and barks of different trees, shrubs and climbers. Table 1 shows the plant species and part(s) used by these squirrels.

From the above study, it was found that giant

squirrel preferred eating the flowers, leaves and young shoots of plants namely, *Artocarpus Lakoocha*, *Bauhinia variegata*, *Bauhinia vahlii*, *Ficus religiosa*, *Ficus glomerata* and *Tamarindus indica*. Besides these trees, the giant Indian squirrel also preferred eating the fruits of almost all trees listed in the table. As fruits were available only for certain period of the year, so the species whose leaves and young shoots were eaten by the Indian giant

Table 2
Tree species and number of trees with squirrel nests.

S.No.	Botanical name (Local name)	No of trees	No of nests
1	<i>Adina cordifolia</i> (karam)	18	20
2	<i>Aegle marmelos</i> (Bel)	13	15
3	<i>Albizia lebbek</i> (Kathsirisi)	3	3
4	<i>Anogeissus latifolia</i> (Dholi)	109	136
5	<i>Anthocephalus cadamba</i> (Kadam)	1	1
6	<i>Artocarpus lakoocha</i> (Dahu)	14	19
7	<i>Bauhinia retusa</i> (Chekakurul)	6	33
8	<i>Bombax ceiba</i> (Semal)	10	14
9	<i>Boswellia serata</i> (sala)	2	2
10	<i>Bradellia squamosa</i> (Kasai)	15	16
11	<i>Buchanania lanzen</i> (Piar)	7	7
12	<i>Careya arborea</i> (Asta)	4	4
13	<i>Casearea tomentosa</i> (Chunchun)	5	5
14	<i>Cassia fistula</i> (Amaltas)	1	1
15	<i>Cleistanthus collinus</i> (Kari)	1	1
16	<i>Croton oblongifolius</i> (Putol/Putla)	25	26
17	<i>Dalbergia lanceolaria</i> (Chapati)	8	8
18	<i>Dalbergia sissoo</i> (Shisham)	3	3
19	<i>Dillenia aurea</i> (Roinruin)	1	1
20	<i>Dillenia indica</i> (Korkotta)	33	128
21	<i>Dillenia pentagyna</i> (Aagoi)	81	101
22	<i>Diospyros embryopteris</i> (Kanakend)	28	30
23	<i>Emblica officinalis</i> (Amla)	1	1
24	<i>Ficus cunia</i> (Podho)	4	7
25	<i>Ficus glomerata</i> (Gular)	3	5
26	<i>Ficus infectoria</i> (Pakar)	4	1
27	<i>Ficus religiosa</i> (Peepal)	3	4
28	<i>Gardenia latifolia</i> (Popro)	1	1
29	<i>Holarrhena antidysenterica</i> (Kurchi)	14	14
30	<i>Ixora arborea</i> (Lohajungi)	14	15
31	<i>Lagerstroemia parviflora</i> (Sida)	13	17
32	<i>Lannea grandis</i> (Doka)	38	47
33	<i>Laportea crenulata</i> (Lakramuta)	3	3
34	<i>Litsea monopellata</i> (Behachi)	2	2
35	<i>Mallotus philippinensis</i> (Garisindhuri)	33	34
36	<i>Mangifera indica</i> (Aam)	11	12
37	<i>Melia azedarach</i> (Gar neem)	1	1
38	<i>Micromelum pubescens</i> (Eksira)	6	6
39	<i>Ougeinia dalbergioides</i> (Panjan)	2	1
40	<i>Polyalthia cerasinoides</i> (Pamkuroi)	3	1
41	<i>Pterocarpus marsupium</i> (Bijasal)	2	2
42	<i>Radermachera xylocarpa</i> (Pondor)	12	13
43	<i>Randia uliginosa</i> (Lepsi)	9	12
44	<i>Saccopatalum tomentosum</i> (Hookeri champa)	5	8
45	<i>Schleichera oleosa</i> (Kusum)	19	21
46	<i>Shorea robusta</i> (Sal)	63	65
47	<i>Soymida febrifuga</i> (Rajni)	1	1
48	<i>Spondias pinnata</i> (Amra)	4	4
49	<i>Sterculia urens</i> (Bootkusum)	65	76
50	<i>Sterculia villosa</i> Kapsa (nijra)	17	17
51	<i>Stereospermum suaveolens</i> Sam Kathal (Lodh)	54	54
52	<i>Symplocos racemosa</i>	1	1
53	<i>Syzygium cumini</i> (Jamun)	40	48
54	<i>Terminalia arjuna</i> (Arjun)	1	1
55	<i>Terminalia bellerica</i> (Bahera)	49	62
56	<i>Terminalia chebula</i> (Haritaki)	40	48
57	<i>Terminalia tomentosa</i> (Asan)	285	348
58	<i>Trewia nudiflora</i> (Bamu Gamhar)	5	6
59	<i>Wendlandia exserta</i> (Tilai)	2	2

Table 3
Species wise height of tree and height of nest.

Sl.No	Botanical name(Local name)	Average nest height(ft)	Average tree height(ft)
1.	<i>Adina cordifolia</i> (karam)	50.44	53.89
2.	<i>Aegle marmelos</i> (Bel)	43.08	46.92
3.	<i>Albizia lebbek</i> (Kathsirisi)	60.00	63.33
4.	<i>Anogeissus latifolia</i> (Dholi)	52.83	57.80
5.	<i>Anthocephalus cadamba</i> (Kadam)	54.00	65.00
6.	<i>Artocarpus lakoocha</i> (Dahu)	52.93	58.93
7.	<i>Bauhinia retusa</i> (Chekakurul)	47.33	53.10
8.	<i>Bombax ceiba</i> (Semal)	54.50	59.00
9.	<i>Boswellia serata</i> (salai)	51.50	55.00
10.	<i>Bradellia squamosa</i> (Kasai)	40.87	46.00
11.	<i>Buchanania lanzen</i> (Piar)	45.71	50.71
12.	<i>Careya arborea</i> (Asta)	56.75	60.00
13.	<i>Casearea tomentosa</i> (Chunchun)	47.20	52.00
14.	<i>Cassia fistula</i> (Amaltas)	25.00	30.00
15.	<i>Cleistanthus collinus</i> (Kari)	50.00	55.00
16.	<i>Croton oblongifolius</i> (Putol/Putla)	43.92	50.40
17.	<i>Dalbergia lanceolaria</i> (Chapati)	40.25	46.25
18.	<i>Dalbergia sissoo</i> (Shisham)	52.33	56.67
19.	<i>Dillenia aurea</i> (Roinruin)	20.00	20.00
20.	<i>Dillenia indica</i> (Korkotta)	46.33	51.06
21.	<i>Dillenia pentagyna</i> (Aagoi)	48.90	54.81
22.	<i>Diospyros embryopteris</i> (Kanakend)	49.00	55.36
23.	<i>Emblica officinalis</i> (Amla)	40.00	45.00
24.	<i>Ficus cunia</i> (Podho)	50.75	57.50
25.	<i>Ficus glomerata</i> (Gular)	60.33	65.00
26.	<i>Ficus infectoria</i> (Pakar)	75.00	83.33
27.	<i>Ficus religiosa</i> (Peepal)	61.33	66.67
28.	<i>Gardenia latifolia</i> (Popro)	45.00	50.00
29.	<i>Holarrhena antidysenterica</i> (Kurchi)	41.21	47.86
30.	<i>Ixora arborea</i> (Lohajungi)	49.21	54.64
31.	<i>Lagerstroemia parviflora</i> (Sida)	52.38	56.54
32.	<i>Lannea grandis</i> (Doka)	51.82	56.71
33.	<i>Laportea crenulata</i> (Lakramuta)	33.00	37.67
34.	<i>Litsea monopellata</i> (Behachi)	22.50	30.00
35.	<i>Mallotus philippinensis</i> (Garisindhuri)	46.52	51.97
36.	<i>Mangifera indica</i> (Aam)	58.18	63.64
37.	<i>Melia azedarach</i> (Gar neem)	45.00	50.00
38.	<i>Micromelum pubescens</i> (Eksira)	45.00	51.67
39.	<i>Ougeinia dalbergioides</i> (Panjan)	46.00	50.00
40.	<i>Polyalthia cerasinoides</i> (Pamkuroi)	36.67	43.33
41.	<i>Pterocarpus marsupium</i> (Bijasal)	56.50	62.50
42.	<i>Radermachera xylocarpa</i> (Pondor)	54.33	59.17
43.	<i>Randia uliginosa</i> (Lepsi)	55.33	61.67
44.	<i>Saccopatalum tomentosum</i> (Hookeri champa)	47.80	52.00
45.	<i>Schleichera oleosa</i> (Kusum)	51.16	56.84
46.	<i>Shorea robusta</i> (Sal)	51.19	56.03
47.	<i>Soyimida febrifuga</i> (Rajni)	45.00	50.00
48.	<i>Spondias pinnata</i> (Amra)	50.50	57.50
49.	<i>Sterculia urens</i> (Bootkusum)	49.00	54.54
50.	<i>Sterculia villosa</i> Kapsa (nijra)	44.12	49.12
51.	<i>Stereospermum suaveolens</i> Sam (Kathal)	49.44	54.35
52.	<i>Symplocos racemosa</i> (Lodh)	60.00	65.00
53.	<i>Syzygium cumini</i> (Jamun)	48.35	54.50
54.	<i>Terminalia arjuna</i> (Arjun)	42.00	50.00
55.	<i>Terminalia bellerica</i> (Bahera)	51.49	57.55
56.	<i>Terminalia chebula</i> (Haritaki)	53.93	59.75
57.	<i>Terminalia tomentosa</i> (Asan)	54.48	59.91
58.	<i>Trewia nudiflora</i> (Bamu Gamhar)	13.20	14.00
59.	<i>Wendlandia exserta</i> (Tilai)	47.50	52.50

squirrel were very important for the survival of the animal as these trees provide food to the giant squirrel throughout the year.

The results of nesting preference by the giant squirrel showed presence of old and new nests on trees along the transects. There were many plant species having squirrel nests (Table 2).

The results also revealed that the tree species *Terminalia tomentosa*, *Dillenia indica*, *Dillenia pentagyna*, *Shorea robusta*, *Stearculia urens*, *Sterospermum*, *Syzygium cumini*, *Terminalia beleric* and *Terminalia chebula* were found to have more than 90 % of the nests. The most preferred species for nesting were *Terminalia tomentosa* followed by *Dillenia indica* and *Dillenia pentagyna*. It was evident from the results that in

forest with good number of trees like *Terminalia tomentosa*, *Dillenia indica*, *D. pentagyna*, *Shorea robusta*, *Sterculia urens*, *Syzygium cumini*, *Terminalia bellerica* and *Terminalia chebula* provided a good habitat for the Indian giant squirrels.

Efforts were made to record the height of the nests on different tree species (Table 3).

The data of tree and nest height showed that Indian giant squirrel preferred tall trees and almost top of the trees for building nests. This habit might be simply to avoid and escape from predators. This endorses the observation made that *Ratufa indica* is a top canopy dwelling species and rarely visit on the ground. (Ramchandran, 1988; Borges, 1989).

SUMMARY

Indian giant squirrel (*Ratufa indica*) has been found as an indicator of good health of forest as it feeds on most of the parts of trees like flower, fruits, leaf, bark and young shoots of a variety of species. Although it nests on diverse variety of plant species but mostly prefers tall trees like *Terminalia tomentosa*, *Dillenia indica*, *D. pentagyna*, etc. It prefers to nest on the top of the trees. Though Indian giant squirrel feeds on parts of many plants but plant like ilml, mahulan, pakur, pipal, pant, barhgaad are very important as the leaves and young shoots are eaten more and more by these animals. Forest with presence of a mixed deciduous forest where it could get diversity of trees to nest and feed on. Such trees provide an ideal habitat for this squirrel. Indian giant squirrel preferred a mixed deciduous forest, where it could get diversity of trees to nest and feed on.

The discontinuity of tree cover, due to illegal felling, cutting of branches to feed the domestic animals by local villagers and illegal hunting (bishu shikar, poaching) have been the major threats for the survival of the Indian giant squirrel.

Key words: Indian giant squirrel (*Ratufa indica*), Nesting behavior, Feeding behavior, tall trees, Top canopy dwelling.

डाल्मा वन्यप्राणी अभ्यारण्य जमशेदपुर में भारतीय महा गिलहरी (टाटुका इण्डिका) की नीड़-निर्माण और भोजन व्यवहार

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सारांश

भारतीय महा-गिलहरी (*टाटुका इण्डिका*) को वनों की अच्छी हालत बनी रहने का सूचक पाया गया है क्योंकि यह अपना भोजन वृक्षों के अधिकांश भागों जैसे- फूल, फल, पत्तियों, छाल और अनेक प्रकार की पादप-जातियों की कोमल टहनियों से लिया करती है। हालांकि यह अपना बसेरा या नीड़ तरह-तरह की पादप जातियों पर बना लेती है फिर भी इसे ज्यादा ऊंचे वृक्ष जैसे *टर्मिनेलिया टोमेनटोसा*, *डिलेनिया इण्डिका*, *डि. पेंटागायता* आदि ज्यादा पसन्द आते हैं। अपना नीड़ इसे वृक्षों के शिखरों पर बनाना ज्यादा अच्छा लगता है। हालांकि भारतीय महा गिलहरी अपना भोजन बहुत सारे पादपों से प्राप्त करती है किन्तु कुछ पादप जैसे इमली, महुआ, पाकड़, पीपल, बरगद ज्यादा महत्वपूर्ण है क्योंकि इनकी पत्तियाँ और कोमल पतली टहनियाँ इन प्राणियों द्वारा ज्यादा से ज्यादा खाई जाती है। मिश्र पर्णपाती वन जहाँ इन्हें नीड़ और भोजन करने को ऐसे वृक्षों की विविधता मिलती है। ऐसे वृक्ष इस गिलहरी के लिए आदर्श प्राकृतावास रहते हैं। भारतीय महागिलहरी को भी मिश्र पर्णपाती वन ही पसन्द आते हैं जहाँ इसे नीडन और भोजन पाने के लिए वृक्षों की विविधता मिल जाती है।

अवैध कटान, स्थानीय ग्रामवासियों द्वारा अपने पालतू पशुओं को खिलाने के लिए डाल कटाई, गैरकानूनी आखेट (चोर शिकार) किया जाना इस भारतीय महागिलहरी के बचे रहने में भारी संकट खड़ा करने वाले कार्य रहे हैं।

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