



FEEDING AND NESTING ECOLOGY OF INDIAN GIANT SQUIRREL *RATUFA INDICA* (ERXLEBEN, 1777) IN KULDIHA WILDLIFE SANCTUARY, BALASORE, ODISHA, INDIA AND ITS CONSERVATION

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Abstract: The Indian Giant Squirrel (IGS) *Ratufa indica*, an endemic species to India is widely distributed in the peninsular India from the ever green to mixed moist and dry deciduous forest of Western and Eastern Ghats and central Indian Hills. We studied its activity pattern, feeding and nesting behavior in the selected sites of Kuldiha Wildlife Sanctuary during 2008-2012. A total of 8640 minutes of observation spent using Focal Animal Sampling Method to study activity budget, feeding and nesting patterns of IGS reveals that the animal spends maximum time in feeding (58%) followed by resting (34%), movement (6.8%) and other activity (1.2%) of its daily activity. The diet of IGS constitutes seed, bark, petiole, leaf, flower and fruit from 23 species of plants belonging to 15 families with *Terminalia tomentosa* as the most significant contributor i.e. 20.04% to the diet of the animal followed by *Tamarindus indica* (17.1%) and *Mangifera indica* (13.1%). Seeds formed the highest bulk of the IGS diet i.e. 29.4% followed by leaf (18.2%), flower (12.8%), fruit (11.7%) and bark (11.3%). Nesting characteristics assessed through 44 nests shows that IGS uses 15 species of plant belonging to 14 families with highest preference to *Shorea robusta* (20%) followed by *Schleicheria oleosa* (17.5%) and *Terminalia tomentosa* (15.0%). Nest trees are taller in height, larger in GBH and canopy contiguity which are attributed to easy movement and better protection and escape from predators like Langur and Rhesus monkey. Habitat restoration, reduction in anthropogenic pressure and systematic scientific research are measures suggested for management and sustainable conservation of Indian Giant Squirrel in the study area.

Key Words: Canopy contiguity, Feeding, Girth at Breast Height (GBH), Indian Giant Squirrel, Kuldiha Wildlife Sanctuary, Nesting

INTRODUCTION

The Indian Giant Squirrel (IGS) *Ratufa indica* is a large, bright color and arboreal squirrel endemic to India. IGS is exclusively a forest animal. IGS is widely distributed in the peninsular India (Agarwal & Chakraborty, 1979; Corbet & Hill, 1992), south of Ganges (Prater, 1971) from the evergreen to mixed dry and moist deciduous forest of Western (Mehta et al., 2012) and Eastern Ghats and Central Indian Hills (Das et al., 1993 & Gurjar et al., 2013). IGS is a top canopy dweller, rarely comes to the ground (Baskaran et al., 2011). The IGS is usually a solitary and shy animal. The IGS is an active and agile animal, most active in the early hours of morning and in the evening. Mid-day is a time of rest for the animal. IGS shares with monkeys, the habit of scolding, barking and raising a general alarm, when any suspicious objective is sighted. The species mostly feeds on seeds, bark, leaves, flowers, and fruit and requires tall, profusely branched trees for construction of nest. The composition of tree species and structural attributes of the forest play a major role in the use of the habitat by IGS (Kumar & Singh, 2006). IGS constructs globular nests, usually multiple in numbers in a territory. They are good natural pollinators causing intermixing of characters from different species paves pathways for evolution in plant community. However, the population trend of IGS, an animal of ecological significance in Kuldiha Wildlife Sanctuary (KWS) is declining. Besides feeding and nesting are two vital aspects of animal ecology, thus have a direct bearing

upon long term management and sustainable conservation of the species. No intensive study has been conducted in Kuldiha Wildlife Sanctuary so far. In this present study we will document the food plants, feeding behavior, nesting habits and conservation of IGS.

Study area

The study area comprises of the three Hill ranges of Kuldiha Wildlife Sanctuary namely Kuldiha, Tenda, and Devgiri in the district of Balasore, Odisha. KWS came into existence in 1984 by Govt. of Odisha and was recognized in 1992 as an Elephant Reserve through "Project Elephant" by Govt. India. The sanctuary lies within 21° -45° to 21° - 30° N latitude and 80°-30° to 80°-45° E longitude encompassing an area of 272.75 sq k.m. The landscape is hilly with moderate to steep slopes having ranges of altitude between 169mts to 682mts. KWS is a tropical moist mixed deciduous forest (Champion & Seth, 1969). Biogeographically, KWS represents four Biotic Provinces i.e. Eastern plateau, Chhotnagpur, lower-Gangetic and coastline (Rodger and Panwer 1988). The temperature lies between 42°C during summer and goes below up to 8° c in winter. The maximum and minimum Relative Humidity are 88% and 62% respectively. The annual average precipitation in KWS is around 1460 mm. Three small rivers, Tangna, Kamala

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and Usatalnala are the main water sources of the sanctuary.



Figure IA

Figure IB

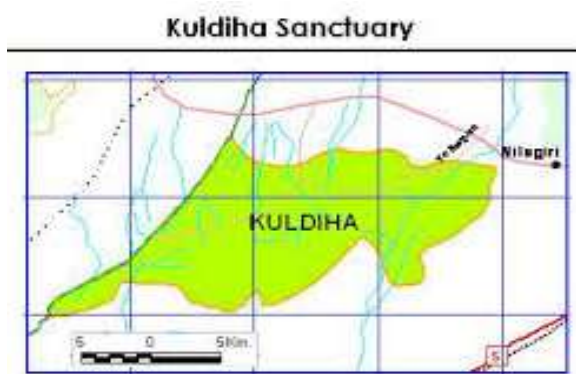


Figure IC



Figure ID

Figure IA: Map of India showing Odisha,

Figure-IB: Index map of wildlife Sanctuaries & National Parks of Orissa

Figure-IC: GIS map of KWS

Figure ID: Map of KWS

MATERIALS AND METHODS

The study on the activities of feeding and nesting of IGS was conducted through different field trips to the core areas of KWS i.e along Purunapani-Kuldiha, Gadasimulia Jodachua stretch in connection with various aspects of wildlife research during 2008-2012. Data on activity pattern, feeding and nesting were recorded by actual sighting of IGS with the help of a pair of BUSHNELL 10 x 40 binocular using Focal Animal Sampling Method (Altman, 1970). Focal animals were followed and observations were recorded by Cannon 500 D, Digital SLR with Cannon 75-300 mm lens. At every Focal Sampling IGS was continuously observed for a period of one minute and recorded its activity budget, feeding, resting, moving and other activities like inter and intra specific interactions, drinking, urination, defecation and nest construction at every minute interval for a period of 10 minutes. All the animals sighted or flushed were noted in the PROFORMA and DATA SHEET. Observation was made during daylight hours i.e 6000-1200hr or 1200-1800hr as the animal is diurnal in nature. Owing to the arboreal nature of IGS, any movement in the canopy could be easily noticed. The loud calls, the sound of the gnawing

fruits, movement in the arboreal pathways etc. proved their presence in the study area. Due to large body size and brilliant body color, IGS could easily be located by scanning the canopy. Feeding signs also included droppings of semi consumed or half broken parts of plants like leaves, flowers, fruits, seeds and bark found beneath the tree.

The nest trees were surveyed taking different parameters like nest tree species, tree height, girth at breast height (GBH), canopy height (the distance from the top of the tree to the lower branch), canopy contiguity (the maximum spread of the canopy in four directions) with the help of BUSHNELL LASER Range finder. The data on tree species composition, presence or absence of IGS nest in tree, height of the nest from the ground; the twigs used for nest building and inter& intra specific interactions were recorded.

Illustrations of IGS, the nests of IGS shown to the field staff and personnel employed in the sanctuary and interviews with local tribals were also accounted

for data collection. The vernacular names of the tree species were identified as per Saxena & Braham, 1989.

RESULTS AND DISCUSSIONS

Feeding

Activity Budget: A total of 8640 minutes of observation were made using Focal Animal Sampling Method to study activity budget of IGS. The squirrels were found to be active during early hours of morning and evening. IGS spent maximum time in feeding (58%), followed by resting (34%), movement (6.8%). Time spent by IGS on all other activities constituted of only 1.2% of its daily activity. Similarly, Giant Squirrels in deciduous forests of Parambikulam Wildlife Sanctuary spend major part of their day time on feeding (49.6%) and resting (28.2%) (Ramachandran, 1992). Borges (1992) also recorded feeding and resting as major activities accounted for over 75% of the squirrel's daily activity.

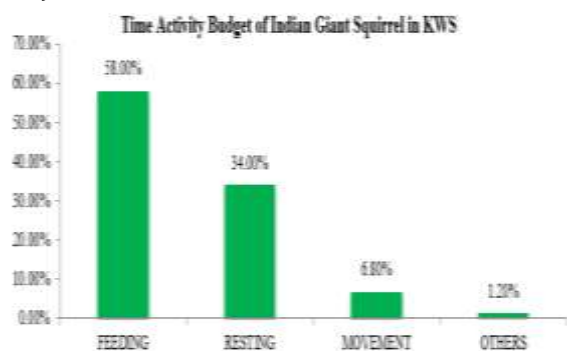


Figure 2:

Diet species composition

Data on feeding on various food plants and their parts eaten were arrived from 8640 focal sampling observations. IGS in KWS was observed to feed on a total number of 23 species belonging to 15 families (Table-1). The contribution of various plant species to the diet of IGS varied from more than 20.04% to less than 2.42%. Despite feeding 23 species, the bulk of the diet of IGS 64.47% came from five species, while another eight species contributed 19.25%. The remaining ten species contributed only marginally i.e 5.18% to the overall diet of the IGS. *Terminalia tomentosa* was the most significant contributor to the overall diet of IGS constituting 20.04% followed by *Tamarindus indica*, *Mangifera indica* and *Terminalia bellerica* accounted for 17.1%, 13.1% and 7.82% of IGS diet respectively.

Plant part selection

Indian Giant Squirrel feeds on petiole, leaf, flower, fruit, seed and bark from different plants (Table 2). Study revealed that seeds formed the highest

component of IGS diet, accounted for 29.4% followed by leaves (18.20%), petiole (16.50%), flowers (12.80%), fruits (11.70%) and bark (11.30%). The reason of seeds forming the bulk of IGS diet could be due to its availability round the year and its high calorific value. In the present context, as the study area is a habitat of deciduous in nature, the leaves, flowers and fruits are however very seasonal and consumed intensively when available. Similar to the present results seed formed the major part of the IGS diet reported elsewhere earlier in southern India (Ramachandran, 1992). Ramachandran states that IGS is basically a seed feeder, switches over to leaves and barks when seeds are not available. Our result also corresponds to the findings in Similipal, (Rout & Swain, 2005), that IGS depends majority of time on seeds of *Carya arborea*, *Tamarindus indica*, *Terminalia bellerica* and *Terminalia tomentosa*. During the study IGS was observed to eat newly flushed leaves of *Tamarindus indica* and ripe fruit pulp of *Mangifera indica* frequently for gnawing. In contrast, Borges et al., (1998) reported that leaves (mature and immature) formed over 62% of the diet of IGS in an evergreen forest. The more dependence of IGS on bark i.e 11.30% indicates that the squirrel is adapted to survive in a habitat that doesn't provide the most preferred resources throughout the year. About 47.83% (11 species out of 23 species) of food plants species served as nesting trees of IGS.



Figure 3A: Feeding of IGS



Figure 3B: Resting of IGS



Figure 3C: Movement of IGS



Figure 3D: Nest of IGS

Table 1: Food Plants and nest trees of Indian Giant Squirrel (*Ratufa indica*) in Kuldiha Wildlife Sanctuary

S. No.	Family	Species	Local name (Odia)	Habitat	Plant parts eaten	No. of trees with nest
1	Anacardiaceae	<i>Mangifera indica</i>	Amba	E	L, P, Fl, Fr.	3
2	Boraginaceae	<i>Cordia obliqua</i>	Bhuanla	D	Fl, Fr.	-
3	Burseraceae	<i>Protium serratum</i>	Rimili	D	L, P, Fr.	2
4	Caesalpiniaceae	<i>Cassia fistula</i>	Sunari	D	L, Fr.	-
		<i>Tamarindus indica</i>	Tentuli	E	L, P, Fl, Fr., B, S	1
		<i>Annogeissus latifolia</i>	Dhaa	D	L, B	-
		<i>Terminalia arjuna</i>	Arjuna	D	Fr.	2
5	Combretaceae	<i>Terminalia bellerica</i>	Bahada	D	L, P, Fl, Fr., B	-
		<i>Terminalia chebula</i>	Harida	D	L, P, Fl, Fr., B, S	-
		<i>Terminalia tomentosa</i>	Asana	D	L, P, Fl, Fr., B, S	6
6	Dipterocarpaceae	<i>Shorea robusta</i>	Sala	D	L, P	8
7	Ebanaceae	<i>Diospyros melanoxylon</i>	Kendu	D	Fr., S	1
8	Euphorbiaceae	<i>Embllica officinalis</i>	Amla	D	Fr.	-
9	Fabaceae	<i>Pterocarpus marsupium</i>	Piasal	D		2
10	Lecythidaceae	<i>Carya arborea</i>	Kumbhi	D	L, Fr., S	-
11	Lythraceae	<i>Lagerstroemia parviflora</i>	Sidha	D		1
12	Magnoliaceae	<i>Michalia champaca</i>	Champa	D		1
		<i>Bombax ceiba</i>	Simili	D	Fl.	-
13	Malvaceae	<i>Kydia calycina</i>	Kapasia	D		1
		<i>Artocarpus heterophyllus</i>	Panasa	D	Fl, Fr.	-
14	Moraceae	<i>Ficus recemosa</i>	Dimbiri	D	Fr.	1
		<i>Syzygium cumini</i>	Jamu	E	L, P, Fr.	3
15	Myrtaceae	<i>Adina cordifolia</i>	Kuruma	D	L, P	1
		<i>Anthocephalus chinensis</i>	Kadamba	D	Fl, Fr.	-
16	Rubiaceae	<i>Schleicheria oleosa</i>	Kusuma	D	L, P, Fr., S	7
		<i>Grewia tilifolia</i>	Dhamana	D	L, Fl, B.	-
17	Tiliaceae	<i>Grewia tilifolia</i>	Dhamana	D	L, Fl, B.	-
18	Verbenaceae	<i>Gmelina arborea</i>	Gambhari	D	L, Fl.	-

Abbreviations: L- Leaf, P-Petiole, Fl-Flower, Fr.-Fruit, B-Bark, S-Seed, D- Deciduous, E- Evergreen

Table 2: Percent contribution of various plant species and their parts to be diet of Indian Giant Squirrel in Kuldiha Wildlife Sanctuary

Species	Seed	Leaf	Petiole	Flower	Fruit	Bark	Total
<i>Terminalia tomentosa</i>	12.10	1.80	2.34	1.00	0.80	2.00	20.04
<i>Tamarindus indica</i>	10.3	1.2	0.3	1.4	1.8		17.1
<i>Mangifera indica</i>	-	3.8	3.7	3.4	2.2	-	13.1
<i>Terminalia bellerica</i>	3.2	1.4	1.22	-	1	1	7.82
<i>Terminalia chebula</i>	2.1	1.2	1.01	-	1.1	1	6.41
<i>Grewia tilifolia</i>	-	0.6	-	1.4	0	3.3	5.3
<i>Carya arborea</i>	1.4	1.6	0.03	-	1.3	-	4.33
<i>Schleicheria oleosa</i>	-	0.6	2.5	-	1.1	-	4.2
<i>Protium serratum</i>	-	1.12	1.7	-	1.1	-	3.92
<i>Shorea robusta</i>	-	1.71	1.8	-	-	-	3.51
<i>Bombax ceiba</i>	-	-	-	3.32	-	-	3.32
<i>Syzygium cumini</i>	-	1.25	0.7	0.3	1	-	3.25
<i>Annogeissus latifolia</i>	-	1.72	-	-	-	0.7	2.42
Others	0.3	0.2	1.2	1.98	0.3	1.2	5.18
Total	29.40	18.20	16.50	12.80	11.70	11.30	99.90

Nesting

Nesting habits: Indian Giant Squirrel constructed globular nests or drays using leaves and twigs. Nest construction was mostly a peculiar type. It was constructed by depositing a large no of twigs with leaves, mainly forked twigs. The leaves were arranged in three to four layers between the twigs. Nest building process of IGS included gathering of materials (cutting twigs, peeling barks), carrying materials by mouth to the nest and placing materials in the nest. At the building site the twigs were forced into the place with the forwarding thrusting movement of the snout and alternate tromping motion of the forefeet (Kumbhar et

al., 2012) An IGS very often constructed and used more than one nest within a territory at a given time during a season. Nest was monitored daily in morning and evening by the species. Nest was not used by IGS on the very day of completion, but from the next day, it was used by the animal. The total time spent for nest building was approximately 2.5 hours. The occurrence of multiple nest phenomenon might be either to escape from predators like Langur and Rhesus monkey or to provide protection from climatic factors like temperature, cold and rain. Freshly constructed nests were observed during the months of September to December. The multiple nest phenomenon requires further investigation.

Nest Number

A total number of forty four nests of IGS were located on forty nest bearing trees belonging to thirteen families. There were more than one or two nests in a single tree (Srinivas et al., 2008). The tree species with multiple number of nests were *Pterocarpus marsupium*, *Schleicheria oleosa*, and *Shorea robusta*.

Nest tree selection

Among twenty seven tree species recorded along stretch of study area IGS preferred to use only fifteen tree species for nesting. The study revealed that some species were selected more while others were selected less indicating preference for a few ones (Kanoje, 2008) *Shorea robusta* (8 numbers of trees) was the most preferred tree species for nesting followed by *Schleicheria oleosa* (7 numbers of trees) and *Terminalia tomentosa* (6 numbers of trees). The percentage contribution for nesting of *Shorea robusta*, *Schleicheria oleosa* and *Terminalia tomentosa* were 20.0%, 17.5% and 15.0% respectively. The remaining 12 species contributed 47.5% for nesting of IGS. About 12 species of nesting trees (80%) were deciduous while only three species of nesting trees (20%) were evergreen in nature. About 73.33% (11 species out of 15 species) of the nesting trees served as food plants of IGS. Nesting tree species without feeding signs of IGS were *Kydia calycina*, *Michalia champaca*, *Lagerstroemia parviflora* and *Pterocarpus marsupium*. Similarly the food plant species without nest were *Cordia oblique*, *Cassia fistula*, *Annogeissus latifolia*, *Emblica officinalis*, *Bombax ceiba*, *Artocarpus heterophyllus*, *Anthocephalus chinensis*, *Grewia tilifolia* and *Gmelina arborea*.

Nest tree features

Indian Giant Squirrel preferred to trees with greater GBH, canopy height and canopy contiguity. This could help for easy movement from the nest in all directions, the major advantage to escape from predators and to move to other parts of the home range for foraging and other activities.

Nest characteristics

The nest of IGS was distinct from bird's nest in having leaves of nesting trees interwoven in the middle of the trees. The nest was either round or oval. The entry of the nest was placed horizontal to the ground. The entrance was around 10 cm in diameter. All nests sighted in the study area were observed east facing that might be for sunlight. One new nest of IGS was observed in *Terminalia arjuna* occupying an area 64cm x 34 cm. The depth of the nest was 48 cm and the inner diameter was 24 cm. Only a few hairs and food particles were found in the nest chamber but no fecal matter. One old nest of IGS was located in *Diospyros melanoxylon* where 113 twigs were used for nesting.

Nests were very often found at the highest point on the tree that offered a maximum security and protection to the animal (Pradhan et al., 2012).

CONCLUSION

Indian Giant Squirrel is listed as Least Concern in Red List of IUCN (Rajamani et al., 2009), in Appendix-II of CITES and in Schedule-II of Wildlife (Protection) Act, 1972. Locally the trend of incidence of sighting of IGS in KWS is declining. This is due to the paucity of suitable food and nest plant species both in terms of diversity and richness arising out of loss of habitat and excess anthropogenic pressure (Anon, 2003). As feeding and nesting are two important aspects of animal ecology, the variables influencing these activities should be given more attention. IGS in fact requires a diverse range of habitats with good forest quality comprising of trees with larger GBH and greater canopy height & contiguity which are important not only for feeding but also for nesting and movement. Soil erosion is another factor which arises due to lack of plantation in place of felling of old and mature trees due to natural wear and tear. Besides restoration of riverine habitats and similar micro habits associated with streams is another conservation concern as IGS requires sufficient moisture for its growth and survival (Datta and Goyal, 1996). The anthropogenic factors include selective felling of matured trees for timber, forest fires in summer and illicit felling of trees by the local tribals while collecting honey, wax and resin. The smuggling and killing of IGS for the purpose of pets and medicinal preparations is also a part of wildlife trade in KWS (Farve, 1989). Therefore provision of adequate Forest staff to monitor the animal and a systematic scientific research focusing on an inclusive conservation strategy are matter of urgent need which can not only restore the habitat and control the anthropogenic pressure but also can become helpful for long term conservation and management of the species.

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REFERENCES

1. Agarwal VC and Chakraborty S. Catalogue of mammals in the Zoological Survey of India, Rodentia, Part I - Sciuridae. Records of Zoological Survey of India, 1979, 74: 333-481.
2. Altmann J. Observational study of behaviour sampling method. Behaviour, 1974, 49: 227-265

3. Anon. Wildlife conservation of Orissa. Wildlife organization, Forest Department. Govt. of Orissa. pp, 2003, 1-64
4. Baskaran N, Venkatesan S, Mani J, Srivastav S.K and Desai AA. Some aspects of ecology of Indian Giant Squirrel *Ratufa indica* (Erxleben, 1777) in tropical forests of Mudumalai Wildlife sanctuary, Southen India and their conservation implications. *Journal of threatened Taxa*, 2011, 3 (7)-1899-1908.
5. Borges RM. A nutritional analysis of foraging in the Malabar Giant Squirrel (*Ratufa indica*), *Biological Journal of the Linnean Society*, 1992, 47:1-21
6. Borges R, Mali RS and Somanathan H. The status, ecology and conservation of the Malabar Giant Squirrel *Ratufa indica*. Final report, Wildlife Institute of India. Indo-US Project, 1998.
7. Champion HG and Seth SK. A Revised Survey Forest types of India, The Govt. of India Press, New Delhi, 1969.
8. Corbet GB and Hill J. The mammals of the Indo Malayan region. Natural History Museum Publications, Oxford University Press, Oxford, England, 1992, 488pp.
9. Datta A and Goyal SP. Comparison of forest structure and use by the Indian Giant Squirrel (*Ratufa indica*) in two riverine forests of Central India. *Biotropica*, 1996, 28 (3): 394– 399.
10. Das PK, Lal JP and Agarawal VC. Mammalia, Zoological Survey of India, State Fauna Series I: Fauna of Orissa, Part, 1993, 4: 143-180.
11. Farve DS. International Trade in endangered species: Guide to CITES. Martinus Nijhoff publishers, The Hague, 1989.
12. Gurjar Raju Lal, Kumbhar AS, Jena J, Yogesh JK, Dave C, Singh RP and Mishra A. Population Density of Indian Giant Squirrel *Ratufa indica centralis* (Ryley, 1913) in Satpura National Park, MadhyaPradesh, India. *Journal of Research in Biology*, 2013, 3 (7):1086-1092
13. Kanoje RS. Nesting sites of Indian Giant Squirrel in Sitanadi Wildlife sanctuary, India, *Current Science*, 2008, 95 (7): 882-884.
14. Kumara HN and Singh M. Distribution and relative abundance of giant squirrels and flying squirrels in Karnataka, India. *Mammalia*, 2006, 70: 40–47.
15. Kumbhar A, Pradhan A and Patwardhan G. 2012. Some observation on dray building and jumping behavior of Indian Giant Squirrel *Ratufa indica* (Erxleben, 1777). *Universal Journal of Environmental Research and Technology*, 2 (4): 366 -368.
16. Mehta P, Kulkarni J, Pawar T, Sahoo RK, Arulmalar E and Punjabi G. Status and Distribution of Malabar Giant Squirrel *Ratufa Indica* in Westen Ghat of Maharashtra, India. Wild Life Research Conservation Society, Pune. Final Technical Report submitted to WWF New Delhi and Ruffords small Grants Programme, United Kingdom, 2012, 74.
17. Pradhan AK, Shrotriya S and Rout SD. Observation on Nest- Site Selection by Indian Giant Squirrel in Karlapat Wildlife Sanctuary, Odisha, *Small Mammal*, 2012, 4 (2). 12-13.
18. Prater SH. The Book of Indian Animals. Bombay Natural History Society and Oxford University Press, Mumbai, 1971, 197
19. Rajamani N, Molur S & Nameer OP, *Ratufa indica*. IUCN 2011. IUCN Red List of Threatened Species. 2009. Version 2011.1. . Downloaded on 12 July 2011.
20. Ramachandran KK. Certain aspects of ecology and behaviour of Malabar Giant Squirrel *Ratufa indica* (Schreber). PhD Thesis. Department of Zoology, University of Kerala, 1992, 191.
21. Rout SD and Swain D. Status of Giant Squirrel (*Ratufa indica*) in Similipal Tiger Reserve, Orissa, India. *Indian Forester*, 2005, 131 (10): 1363–1372.
22. Rodger WA and Panwar HS. Planning a Wildlife Protected Area Network in India (vol.1) Dehra Dun: Wildlife Institute of India. 1988, pp341
23. Srinivas V, Venugopal PD and Ram S. Site occupancy of the Indian Giant Squirrel *Ratufa indica* (Erxleben) in Kalakad-Mundanthurai Tiger Reserve, Tamil Nadu, India. Special editing: Arboreal squirrel. *Current Science*, 2008, 95 (7): 889–894.
24. Saxena HO and Brahmam MC. The flora of Similipal. Orissa with particular reference to the potential economic plants. Regional Research Laboratory, (CSIR), Bhubaneswar, 1989, 231.

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