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Food availability and dietary composition of sloth bear (*Melursus ursinus*) in Mukundra Hills Tiger Reserve Kota, Rajasthan.

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Abstract

The study was carried out in Darrah Wildlife Sanctuary, a region of Mukundara Hills Tiger Reserve. Darrah Wildlife Sanctuary (DWLS) lies in the Hadoti region of Kota district in Rajasthan. The sanctuary lies between 24º37' to 25º2' N Latitude and 75º39' to 76º12' E Longitude. Darrah Wildlife Sanctuary comprises of 250 sq km, the area is divided into two ranges, Kolipura range and Darrah range. The climate of the Sanctuary is subtropical, characterized by long and intense hot summer, with low rainfall and short but acute winter. During study 15 species of plants were identified on which the sloth bears were found feeding upon. In present study 90 scats of sloth bear were collected and were analyzed in the laboratory to identify the food item of bear in the area. The scat analysis revealed that bears in the area fed upon fleshy fruits, insects, honey hives and animal. Food composition of sloth bear shows 14.40% plant parts comprises of fruits, seeds, leaf, flowers, roots and shoots, 71.28% insects consist of red ants, black ants, honey bee and termites, 13.73% other matters such as garbage's, wax, aphids, spiders, cockroaches etc and 0.59% animal matters like hair of unclassified animals.

Key words- Sanctuary, fruits, seeds, leaf, flowers, roots.

Introduction

Most bears are opportunistic omnivores. As such, their activities are governed by the availability of food items and dietary components within their habitat. Nutrition plays an important role in the reproductive rate of female bears (Jonkel and Cowan 1971). Sloth bears are one of the largest termite-eaters (up to 175 kg) occurring in lowland India, Bangaladesh, Nepal, and Sri Lanka. A significant portion of their diet consists of ants and termites, whereas much of the remainder is fruit (Eisenberg and Lockhart, 1972; Laurie and Seidensticker, 1977; Schaller, 1967).

Sloth bear is the only ursid having myrmecophagous adaptations to feed on insects, especially termites and ants (Laurie and Seidensticker 1977, Joshi et al. 1997).

The quality of sloth bear habitat is determined by availability and seasonal variation in food, shelter, and vegetation cover. The availability of fruiting trees, shrub densities, water, and termites and ants directly influence habitat use. Despite myrmecophagous habits (Davidar 1983, Swenson et al. 1999), sloth bears are omnivorous and consume large amounts of vegetable matter, particularly fruits (Laurie and Seidensticker 1977; Gopal 1991; Gokula 1991, Gokula and Vardharajan 1995). Studies of movement patterns of sloth bears showed that home-range size mainly depended on food supply (Joshi et al. 1995, Desai et al. 1997).

Study Area: Darrah Wildlife Sanctuary (DWLS)

Mukundara Hills Tiger Reserve (MHTR) is located in Kota, South –Eastern Rajasthan in India with an area of 729 sq km. Core area of Mukundara Hills Tiger Reserve Comprises of Darrah Wildlife Sanctuary, Jawahar Sagar Wildlife Sanctuary and National Chambal Sanctuary, with an area of around 420 sq km (Table 1). Darrah Wildlife Sanctuary (DWLS) lies between 24º37' to 25º2' N Latitude and 75º39' to 76º12' E Longitude comprises of 250 sq km, in Mukundara Hills Tiger Reserve (MHTR), the area is divided into two ranges, Kolipura range and Darrah range. For intensive study the area is divided into three zones; zone I (Kolipura range), zone II (Darrah range up to Railway crossing and NH-12) and zone III (Mashalpura area).

Table: 1- MHTR CTH (Core area) Sanctuary wise

Sr. No.	Name of Sanctuary	Forest area (in Sq. Km.)	Revenue area (in Sq. Km.)	Total area (in Sq. Km.)
1	Darra Sanctuary	211.62	13.82	225.44
2	Jawahar Sagar Sanctuary	177.24	1.49	178.73
3	National Chambal (Gharial) Sanctuary	13.00	0.00	13.00
	Total	**401.86**	**15.31**	**417.17**

The Darrah Wildlife Sanctuary, which comprises of both protected and unprotected area, harbors a sizeable population of sloth bears. The habitat available for sloth bears is highly degraded and interspersed by villages and agricultural crop fields. The climate of the sanctuary is subtropical, characterized by long and intense hot summer, with low rainfall and short but acute winter. Darrah sanctuary is ecologically important as it forms a part of the largest viable tract among the fragmented forest belt of Rajasthan. The Sanctuary as name suggest ‘Darra’ means ‘passage’ is a vital part of a forest corridor that provides a link to the forests of Gandhi Sagar Sanctuary of Madhya Pradesh to the forests of Jawahar Sagar Sanctuary and Bhainsrodgarh Sanctuary of Rajasthan on one side while connecting it with Shivpuri forests of Madhya Pradesh through Shergarh Sanctuary of Baran Division, Rajasthan on the other side.

Food availability

Availability of food reflects the possibility of good population of sloth bear in an area. During study 15 species of plants were identified on which the sloth bears were found feeding upon.

Table-1 Fruiting trees density (tree/ha) in different habitat types in Darrah Wildlife Sanctuary, Rajasthan, India, 2009-2012.

S.No	Species	Mixed forest	Crop land	Scrub land	Open land	Near water bodies
1	*Aegle marmelos*	.166	--	.057	.034	--
2	*Cassia fistula*	.045	--	--	.026	.030
3	*Diospyros melanoxylon*	.181	.106	.083	.022	.087
4	*Ficus racemosa*	.090	.030	.056	.015	.045
5	*Madhuca indica*	.113	.035	.059	.043	.076
6	*Mangifera indica*	.102	.094	.046	.031	.05
7	*Syzigium cumini*	.059	--	--	.034	.024
8	*Zyzypus jujuba*	.246	.147	.159	.094	.196
9	*Phoenix sylvestris*	.107	--	.058	.065	--
10	*Grewia hirsute*	.098	--	.062	.046	.065
11	*Millusa tomentosa*	.084	.031	.038	.018	.047
12	*Ficus religiosa*	.090	.054	.036	.011	.063
13	*Ficus bengalensis*	.091	.036	.046	.015	.057
14	*Zyzypus numularia*	.107	.038	.070	.020	.062
15	*Zyziphus mauritiana*	.090	.036	.0075	.0060	.005
	Total	**1.669**	**.0931**	**.7775**	**.4800**	**.807**

Plant diversity like *Zyziphus sp, Diospyros melanoxylon, Aegle marmelos, Madhuca indica, Phoenix sylvestris, Ficus sp,* were maximum in mixed forest (Table 1). Density of trees was highest in dense mixed forest habitat comprising the areas of Kolipura range (zone I). A key food plant for sloth bears, *Diospyrus melanoxylon* occurred at highest density in dense mixed forest habitat, followed by land near water bodies. Another key food plant *Zyziphus jujuba* occurred commonly in all types of habitat being highest in dense mixed forest. *L. camara* was most abundant in dense shrub habitat. Open scrub land had lower density of trees and food plants, and higher density of *L. camara* shrub, reflecting the degraded condition of that habitat. Factors like overgrazing, agriculture, cutting and lopping were found to impact the forest land. Kolipura range (Zone I), Zone II was most widely used by sloth bear, while zone III (Mashalpura area) had no signs of bear use.

Methodology

Scats were collected and analyzed to identify the types of food utilized by sloth bear and to determine whether agricultural crops composed a part of the diet of slothbears. Scats were collected from different habitats during the transect work and while surveying the forest for animal signs. Scats were also collected opportunistically from the feeding and resting sites and along trails. Scats were collected in polythene bags, sun dried, and then stored for further analysis. Efforts were made to collect scats every month; however, this was difficult during the monsoon period due to sudden and heavy bloom of the vegetation cover.

Feeding behavior of sloth-bear in DWLS

Sloth bear possess special adaptation for feeding on termites (Pocock 1933, Erdbrink 1953; Sacco and Van Valkenburgh 2004). Predictable, termites compose a large proportion of their diet in Sri Lanka but seasonally available food including fruit, honey and meat are also consumed (Ratnayeke., 2006). In present study 90 scats of sloth bear were collected and were analyzed in the laboratory to identify the food item of bear in the area. The scat analysis revealed that bears in the area fed upon fleshy fruits, insects, honey hives and animal (Plate 1). Broken mounds, left-over. bee-hives, claw marks on honey bearing trees indicated the feeding areas of sloth bear in the area. Rotten logs were sometimes found broken apart. Scat analysis revealed that 12 species/ type of plants were used by sloth bears in study area (Fig 1). Sloth bears in DWLS were found to be dependent more upon ants and termites.

Food composition of sloth bear shows 14.40% plant parts comprises of fruits, seeds, leaf, flowers, roots and shoots, 71.28% insects consist of red ants, black ants, honey bee and termites, 13.73% other matters such as garbage's, wax, aphids, spiders, cockroaches etc and 0.59% animal matters like hair of unclassified animals.

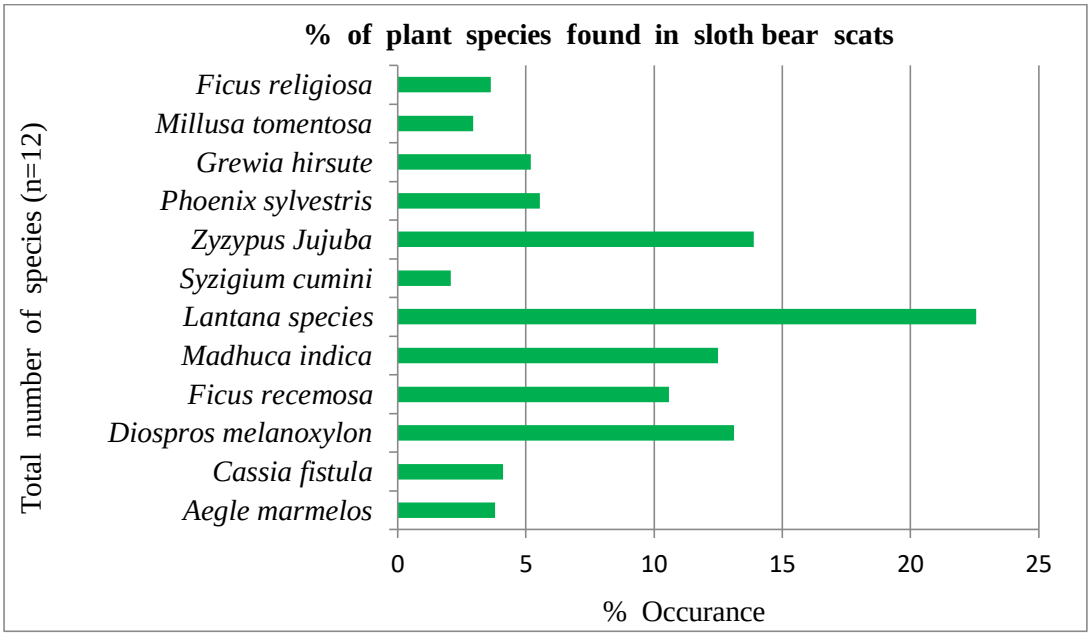

Fig 1: Plant species in the scats of sloth bear

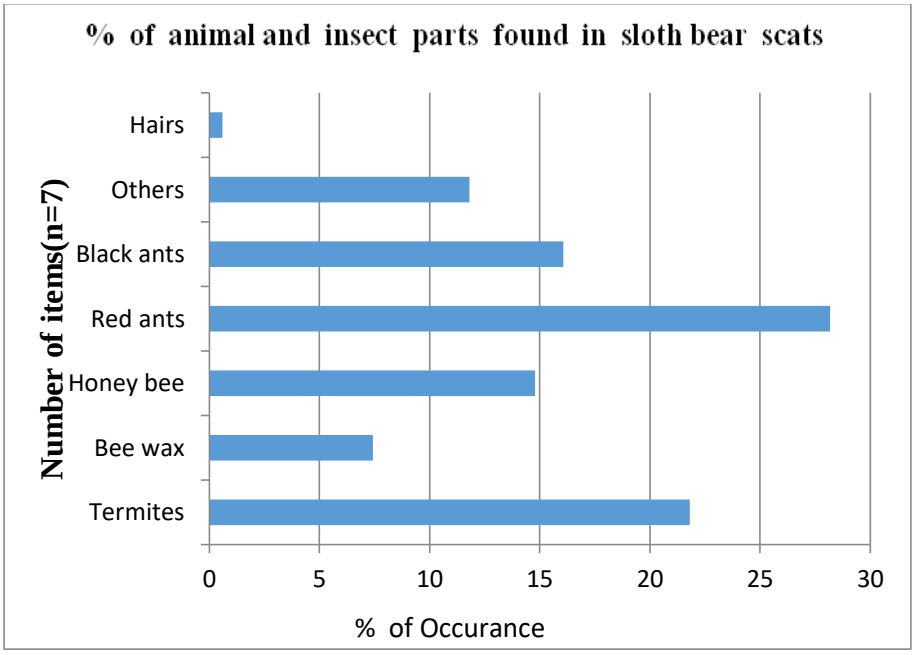

Fig 2: Animal and insect parts in scat of sloth bear

Although sloth bears were never observed eating wild roots or tubers, but bear digs were found in large number on the sides of unused road sides. Signs like claw marks, pugmarks and scats in vicinity of the digs further confirmed bear presence. Signs of bear climbing on to fruit trees were commonly found. At times, pieces of honey combs with broken cellular cavities were seen littered on the forest floor by the sloth bear after feeding.

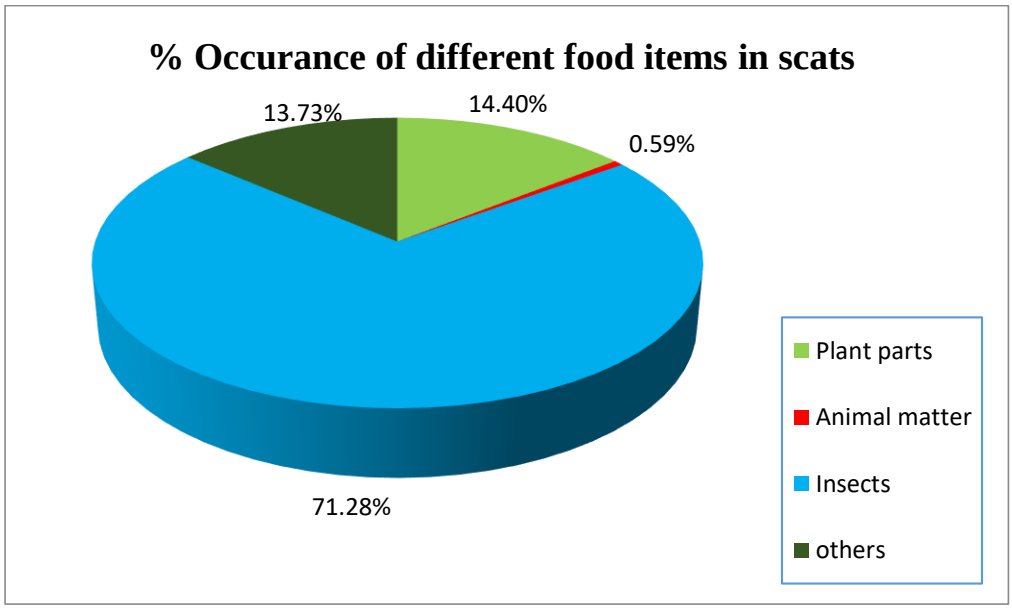

Fig 3: % occurrence of food items examined in scats of sloth bear in DWLS

Result and Discussion

In Wilpattu National Park, Sri Lanka, Eisenber and Lockhart (1972) found that sloth bears fed heavily on termites and fruits, when in season. Schaller (1967) examined 92 sloth bear droppings in Kanha National Park, Central India, and found that termites were the year-round staple, with fruits important primarily from April to June (Laurie and Seidensticker, 1977) animal material which contain hair 22% and insect part 58% while meat and bee wax clumps is 20% found in the 136 scat. In Chitwan insects formed most of the diet (95%) in the non-fruiting seasons and a relatively minor, but substantial portion during fruiting seasons (Gokula et al 1995, Baskaran et al, 1997, Desai et al, 1997). In Darrah Wildlife Sanctuary, scat analysis revealed that major part of the diet consisted

of ants followed by plant consumption. 12 plant species were identified in the scats, of all *Lantana camara* was present in all scats. Among other plant species *Zjziphus jujuba, D. melanoxylon, Ficus racemosa and Madhuca indica* were consumed in higher portion. Insect diet was consumed in large proportionate and were available easily in large number in the study area. Only 14.32% of the scats sample contained unidentified animal matter (hairs) and the most revealing thing was presence of human garbage (paper and polythene). Honey comb and bee wax was also found. The study indicates that anthropogenic pressures are very high; the disposal of plastic is causing environmental damage to the park and altering feeding habits of sloth bears. If appropriate measures to reduce human pressures are not initiated, the situation may result in serious health hazard for bears. This study calls for periodic monitoring and appropriate policy interventions.

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