Data on Dietary Composition and Foraging Habitats of The Indian Pangolin (*Manis crassicaudata*) in A Tropical Lowland Forest-Associated Landscape in Southwest Sri Lanka

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Abstract: Indian pangolins are insectivorous mammals with less-known ecology. Due to the lack of sufficient literature on their dietary ecology, captive raring of this species has become problematic. This article describes data on dietary composition and foraging habitats of the Indian Pangolin (*Manis crassicaudata*) in a tropical lowland forest-associated landscape in Southwest Sri Lanka. Five different types of habitats were investigated in this study: Forest, rubber plantation, cinnamon cultivation, oil palm plantation, and tea-dominated home gardens. Foraging preference of the Indian pangolin for each habitat was assessed using signs of foraging activities. To further observe the foraging habitat utilization of pangolins, photographic evidences were collected using Infrared (IR) active camera traps located in all the studied habitats. Faecal samples collected from same habitats were further examined to identify the dietary composition of Indian Pangolins. As termites and ants are major prey organisms of Indian pangolins, the digestibility of different body parts – heads, mouthparts, abdomens, and legs of termites and ants was also scrutinized. The findings of the study with regard to dietary ecology will be important for both captive feed preparation and future conservation planning of the species [1].

Keywords: Indian pangolin; dietary; habitats; foraging intensity; faecal

Specifications Table

Subject	Ecology
Specific subject area	Study of Dietary Ecology
Type of data	Descriptive,Tables and Figures
How data were acquired	Foraging preference in five different habitats was investigated by recording the foraging events found in randomly located transects in each habitat. Data on dietary composition was obtained by laboratory analysis of faecal samples collected from same set of transects established in each habitat. The foraging habitat utilization was further observed by locating Infrared (IR) active cameras in the investigated habitats.
Data format	Raw and Analysed
Parameters for data collection	Sampling was done for a period of 16 months from September 2017 to December 2018.
Description of data collection	Feeding or attempted feeding event on a single specified food source termitarium, termite infested log, arboreal ant nest or terrestrial ant nest was counted as a foraging event. All the five selected habitats – forest, rubber plantation, cinnamon cultivation, oil palm plantation, and tea-dominated home gardens/cultivated areas – were surveyed to measure foraging event abundance using randomly located transects. The values of abundance of foraging events were used to calculate the

	Foraging Preference Index (FPI) for each of the habitat. Same transects were repeatedly sampled in all the five selected habitats to collect faecal samples of Indian Pangolins. Collected faecal samples were analysed to find the dietary composition. In order to study the foraging habitat utilization further, Infra Red (IR) active camera tarps were located in each habitat and the captured photographs were collected during the period of study.
Data source location	**Institution:** Yagirala Forest Research and Conservation Education Center, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka. **City/Town/Region**: Yagirala Forest Reserve, and the adjacent cinnamon (*Cinnamomum verum*), rubber (*Hevea brasiliensis)*, oil palm (*Elaeis guineensis*) and tea (*Camellia sinensis*)-dominated home gardens/plantations in Walallawita Divisional Secretariat, Kalutara District of the Western Province of Sri Lanka **Country: Sri Lanka** 5° 55' to 9° 51' North latitude and between 79° 42' to 81° 53' East longitude
Data accessibility	Date is with this Article
Related research article	**Author's name**: Hasitha Karawita, Priyan Perera, Nihal Dayawansa, *Sriyani Dias* **Title** : Data on dietary composition and foraging habitats of the Indian Pangolin (*Manis*crassicaudata) in a tropical lowland forest-associated landscape in Southwest Sri Lanka. **Journal** : Global Ecology and Conservation **DOI** : In review

Value of the Data

- The dataset in this article includes foraging preference of Indian pangolins on different habitats found in the south west region of Sri Lanka.
- Data on foraging habitat preference can be used for future conservation planning of the species and carrying capacity improvement.
- Data on dietary composition can be used for captive feed formulation for the Indian Pangolins.

Data Description

Data on foraging preference include the abundance of foraging or attempted foraging events on different food sources such as termitarium, termite infested log, arboreal ant nest or terrestrial ant nest found in randomly laid transects in five different habitats. This data category further includes

foraging preference index values calculated using the abundance of foraging events from studied habitats (Table1). Data on dietary composition includes the dry weight percentage of animal matter, plant matter and grit in the analysed 32 faecal samples (Table 2). Data on dietary composition further includes the abundance of different body parts such as heads, thoraxes, abdomens, legs, and mouthparts of the termites and ants found in each of the analysed faecal samples (Table 3). The photographic records captured by the camera traps (Browning dark OPS Extreme BTC-6HD) located in the investigated habitats are shown in the figures. The figure 1, captured on 01/26/2018 by camera trap located in forest habitat, shows an Indian pangolin sniffing the ground in search of prey organisms. Figure 2, captured on 05/24/2018 by camera trap located in rubber cultivation, shows an Indian pangolin searching for food on leaf litter substrate.

1. Data

1.0. Data on foraging preference

Table 1. Abundance of foraging on different food sources and foraging preference index calculated for each habitat.

Habitat type	Foraging source	Transects										Frequency	FPI
		1	2	3	4	5	6	7	8	9	10		
Forest habitat	**Termitaria**	**1**	**0**	**2**	**0**	**2**	**1**	**1**	**1**	**0**	**1**	**9**	**0.4**
(FH)	Termite infested logs	3	5	2	0	1	2	1	2	3	2	21	
	Ground-living ant nests	0	0	1	0	1	0	0	0	1	0	3	
	Arboreal ant nests	1	0	2	0	1	2	0	1	1	1	9	
Rubber Plantations	Termitaria	1	2	2	1	2	2	1	0	1	3	15	0.25
(RP)	Termite infested logs	0	0	0	2	0	1	0	0	0	2	5	
	Ground-living ant nests	0	1	0	1	0	0	0	1	0	0	3	
	Arboreal ant nests	0	1	0	1	2	0	0	0	1	0	5	
Oil Palm Plantations	Termitaria	3	0	1	1	0	2	0	0	0	2	9	0.12
(OP)	Termite infested logs	0	0	0	0	0	0	0	0	0	0	0	
	Ground-living ant nests	1	0	1	0	1	0	0	1	0	0	4	
	Arboreal ant nests	0	0	0	0	0	0	0	0	0	0	0	
Cinnamon	Termitaria	0	0	1	0	0	1	0	0	1	0	3	0.13
Cultivations	Termite infested logs	1	0	0	0	1	0	0	1	0	0	3	
(CC)	Ground-living ant nests	0	0	0	0	0	0	0	0	0	0	0	
	Arboreal ant nest	1	0	1	0	2	0	1	0	2	1	8	
Tea-dominated home gardens/plantations	Termitaria	0	1	0	0	1	0	0	1	0	1	4	0.1
	Termite infested logs	0	0	0	0	0	1	0	1	0	0	2	

(TP)	Ground-living ant nests	0	0	0	1	0	0	0	0	0	0	1
	Arboreal ant nest	0	1	0	0	1	0	0	1	0	1	4

1.1. Data on the dietary composition

Table 2. Dry weight percentages of animal matter, plant matter and grit found in analysed faecal samples.

Faecal sample	Animal Matter %	Plant Matter %	Grit %
1	30.3	14.2	55.5
2	34.5	12.1	53.4
3	38.8	15.9	45.3
4	37.4	3.7	58.9
5	34.8	4.7	60.5
6	35.6	5.9	58.5
7	36.7	12.9	50.4
8	37.5	16.9	45.6
9	33.2	8.3	58.5
10	34.5	20	45.5
11	33.4	18.8	47.8
12	36.5	8.7	54.8
13	38.9	2.6	58.5
14	28.9	13.2	57.9
15	33.5	16	50.5
16	40.7	2.4	56.9
17	45.7	13.5	40.8
18	37.5	14	48.5
19	38.3	5.4	56.3
20	35.2	8	56.8
21	34.1	11.6	54.3
22	39.1	4.2	56.7
23	40.3	14	45.7
24	45.2	4.3	50.5
25	34.2	5.1	60.7
26	26.8	10	63.2
27	33.5	12.3	54.2
28	46.5	2.7	50.8
29	42.8	12.8	44.4
30	33.8	9.8	56.4
31	48.9	2.2	48.9
32	38.8	5.9	55.3

1.2. Data on the abundance of different body parts of the ants and termites in each faecal sample

Table 3. Abundance of different body parts of ants and termites in each of the analysed faecal samples.

Faecal sample	Termites						Ants					
	Head	Mouth parts	Thorax	Abdomen	wing	Legs	Head	Mouth parts	Thorax	Abdomen	Wing	Legs
1	0	2	0	0	23	0	9	2	0	2	0	3
2	0	1	0	0	25	1	4	1	1	0	0	2
3	0	0	0	0	12	0	15	1	0	4	0	0
4	0	2	1	0	6	0	8	5	0	4	1	4
5	0	0	0	0	12	0	9	3	0	0	1	0
6	0	3	0	0	11	2	8	5	0	6	0	3
7	0	4	0	0	0	2	20	4	0	6	1	0
8	0	3	0	0	9	0	14	9	0	11	0	4
9	0	0	0	0	15	1	23	8	0	8	2	0
10	0	4	0	2	8	0	9	6	0	13	0	1
11	0	6	0	0	17	0	12	8	0	4	0	2
12	0	2	0	0	18	2	16	11	0	4	0	4
13	0	0	0	0	0	0	30	21	1	8	0	0
14	0	0	1	0	8	0	20	8	0	3	2	6
15	0	4	0	0	0	3	24	5	0	6	0	4
16	0	5	0	0	21	2	0	0	0	0	0	0
17	2	4	0	1	9	0	12	4	0	4	0	0
18	0	2	1	0	14	1	6	2	0	0	0	3
19	0	4	0	0	4	0	12	4	0	3	0	5
20	0	6	0	0	5	0	4	6	0	4	2	9
21	0	3	0	1	0	0	24	8	0	5	1	1
22	0	4	0	0	10	2	5	4	0	3	0	5
23	0	0	0	0	9	0	23	8	0	8	0	4
24	1	4	0	0	20	0	4	4	0	3	2	6
25	0	5	0	0	4	0	15	5	0	6	0	4
26	0	0	0	0	0	0	26	3	3	5	0	6
27	0	4	0	0	5	1	28	9	0	2	0	5
28	0	8	1	0	22	1	8	8	0	3	0	6
29	2	2	0	0	32	1	0	0	0	0	0	0
30	0	3	0	1	6	0	12	3	0	6	2	8
31	2	4	0	0	5	2	0	0	0	0	0	0
32	1	8	0	0	0	0	25	3	0	5	0	4

1.3. Information on foraging habitat utilization

All the camera tarps located in investigated habitats were able to capture 15 foraging events. Out of fifteen photographic records, 9 records were collected from forest habitats, 4 records were from rubber cultivations and 2 records were from cinnamon cultivations.

Figure 1. Sniffing the ground in search of prey organisms; captured by camera trap located in forest habitat on 01/26/2018 .

Figure 2. Food searching among leaf litter; captured by camera trap located in rubber cultivation on 05/24/2018.

2.0. Experimental Design, Materials, and Methods

The study of foraging habitat utilization using direct observations is problematic due to elusive behaviour of pangolins[2-5]. Identification of the range of pangolins was done using local knowledge and the verifiable evidences such as presence of scratch marks on termitaria, foot prints, faecal samples , living burrows , feeding burrows and damages on red weaver ant colonies [6-9]. After the

identification of the range, foraging frequency was examined in each habitat. Feeding or attempted feeding on a single specified food source termitarium, termite infested log, arboreal ant nest or terrestrial ant nest was counted as a foraging event. All the five selected habitats forest, rubber plantation, cinnamon cultivation, oil palm plantation, and tea-dominated home gardens/cultivated areas were surveyed to measure the foraging event abundance by randomly located ten transects. Each transect was composed of five 10m*10m plots with 20m gap and sampling was carried for a period of 16 months. The foraging preference index of each habitat was calculated using the following equation.

$$\text{Foraging Preference Index (FPI)} = \frac{\text{Number of foraging events in a habitat}}{\text{Total foraging events in all habitats sampled}}$$

The same transects were repeatedly sampled in all the five selected habitats for a period of 16 months to collect faecal samples of Indian Pangolins. The initial identification of faecal samples was done using the field microscope; the collected samples were stored in 70% alcohol[10]. During the laboratory analysis of faecal samples, each sample was added into a flask containing 100ml of 70% alcohol and shaken for 10 minutes using rotary shaker (Remi-RS24BL) at 60 rpm to detach the constituents. Then each of the faecal samples was separated into animal matter, plant matter and grit. The abundance of ant and termite body parts in each faecal sample was determined by counting the body parts such as the heads, thoraxes, abdomens, legs, and mouthparts. The separated constituents were oven dried at 60°C for 36 hours [10, 11]. The dry weight of each constituent was measured using an analytical balance (ME104TE/00) and then the percentage of dry weights was calculated[12]. To further study the foraging habitat utilization by the pangolins in different habitats, the Infrared (IR) active camera tarps (Browning dark OPS Extreme BTC-6HD) were located. Due to the limited number of camera traps, each habitat was studied for a period of 10 weeks using eight camera traps. The camera tarps were located in suspected foraging sites and the photographic records were collected from each of the camera trap in every 10 days during the period[3, 6].

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Competing Interests

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

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