

Nutritional Evaluation of Forage Preferred by Wild Elephants in the Rani Range Forest, Assam, India

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Introduction

Elephants are generalist feeders, consuming a large number of plant species. Numerous studies on feeding habits of African and Asian elephants have shown that proportions of various plant categories in the diet vary widely from one region to another (Sukumar 1985). Grasses, shrubs, tree leaves, aquatic plants and occasionally fruits make up the components of their diet.

Assam in India is home to about 5,300 wild Asian elephants (*Elephas maximus*), which are threatened globally. With continuous loss of habitat, qualitatively as well as quantitatively, elephants are forced to extend their range and raid crops to meet their energy requirements. Although large populations of elephants are found in the northeast regions of India and particularly in Assam, little effort has been made to study their feeding habits. Therefore, obtaining baseline data on elephant feeding habits was considered essential (Fig. 1).

The study of nutritional composition of forage consumed by *E. maximus* can present insights into the physiology of the species as well as help us in assessing its habitat and formulating habitat management plans.

Methods

The study was conducted in the Rani Range, Kamrup district, Assam. The Rani Range Forest is located around 91°37'S and 91°43'E. It has an annual rainfall of about 6.6 mm. The atmospheric temperature varies from 10.8° C to 31.8° C in extreme winter and summer respectively. The study area comprises of a forested area of 160 km², spread over the Rani Range Forest,

Kamrup, India, and is divided into three Reserve Forests, namely, the Rani Reserve Forest, the Jarasal Reserve Forest and the Kwasing Reserve Forest. The physical aspect of the area was the prevalence of plateaus and hills that rarely exceed 1,000 meters in elevation. The basic vegetation type found in the area was tropical moist mixed deciduous forest. Degraded and scrub type vegetation was found scattered over the area. According to the elephant census report for the year 2002, the population of wild elephants in the study area was 79, although the estimated approximate population was around 150.

Direct observation of elephants was done visually, with or without binoculars. Forage consumed by elephants was identified based on observation of elephant feeding in selected zones representing broad habitat categories. Plant species eaten by each visible member in a herd were recorded at 5-minute intervals through the scan sampling method (Altmann 1974). In some places where sufficient direct observation was not possible, indirect observation was made by following an



Figure 1. Feeding male.

Table 1. Proximate analysis of grasses, plants and tree leaves preferably eaten by elephants in Rani Range Forest, Assam, India (% on DM basis).

Local name	Botanical name	C. P.	E. E.	C. F.	N.F.E.	Total ash
Uluban	<i>Imperata cylindrica</i>	5.23	3.24	32.20	50.58	8.45
Dal	<i>Hymenachne amplexicalnis</i>	9.4	2.34	22.10	54.08	12.2
Nal	<i>Arundo donax linn</i>	7.90	1.88	33.45	58.30	14.05
Kayaban	<i>Cyperus rotundus</i>	7.9	2.88	26.6	48.8	14.0
Arali	<i>Leersia hexandra</i>	13.15	3.87	22.02	46.45	15.08
Aruna	<i>Setaria palmifolia</i>	14.02	3.84	19.03	52.89	10.25
Kuchi	<i>Thysanolaena maxima Roxb</i>	15.30	3.81	23.58	47.68	9.6
Heleshi	<i>Enhydra fluctuans</i>	9.08	4.4	32.3	38.6	15.4
Mikania	<i>Mikania scandens Wild</i>	19.10	4.35	17.20	46.83	12.95
Dimaru	<i>Fics glomerata</i>	13.55	2.93	21.13	46.50	15.80
Sarua	<i>Streblus asper lour</i>	17.30	3.70	24.72	37.64	16.64
Neem	<i>Azadirachta indica</i>	18.30	3.89	16.80	51.05	9.85
Tara	<i>Costas speciosus</i>	11.24	4.87	28.5	47.76	7.57
Kanchan	<i>Bauhinia tomentosa</i>	13.67	3.9	25.25	43.20	13.9
Sisso	<i>Dalbergia sisso</i>	10.2	2.7	28.10	47.4	11.4
Bamboo	<i>Dendracalamus strictus</i>	15.2	1.3	26.10	42.60	14.8
Sal	<i>Shoea robusta</i>	9.4	2.8	26.88	56.25	4.5
Kadam	<i>Anthrocephatus</i>	8.80	3.68	13.20	62.33	11.9
Kalgus	<i>Musa spp.</i>	13.8	6.5	28.24	39.15	12.3
Kathal	<i>Artocarpus heterophyllus</i>	11.3	3.10	18.9	56.17	10.5

elephant track as far as possible and the types of grasses or plants consumed identified. The botanical names of grasses and plants were identified with the help of a taxonomist.

Results

The food selected by elephants in the Rani Range forest consisted of grasses, shrubs, tree leaves, bark, aquatic plants and sometimes fruits. During the study period, it was observed that elephants fed on about 20 species of grasses, plants and trees (Table 1). Grass constituted by far the most predominant component of the diet (Fig. 2).

Proximate analysis of the plants eaten by elephants in Rani Range forest carried out on percent dry matter basis, contained an average 11.8% crude protein, 2.85% ether extract, 23.95% crude fibre, 48.25% Nitrogen Free Extract (NFE) and 11.55% total ash (Table 1). In the study area, the highest percentage of crude protein was found in Mikania *Mikania scandens* (19.10%), ether extract in Kalgus *Musa spp* (6.5%), crude fibre in Nal *Arundo donax linn* (33.45%), NFE in Kadam *Anthrocephatus* (62.33%) and total ash in sarua *Streblus asper lour* (16.64%).

Discussion

The food resources crucial to elephants in natural condition were studied in the Rani Range forest. It was clear from the study that the food items of *E. maximus* consist of grasses shrubs, tree leaves, bark, aquatic plants and sometimes fruit. The major grasses were *Imperata cylindrica*, *Leersia hexandra*, etc. and the plants or tree leaves were *Ficus glomerata*, *Mossa spp*, etc. Similar findings were also reported by Sivaganesan and Johnsingh (1995) who found that grass formed the major portion of elephant diet in the Mudumalai

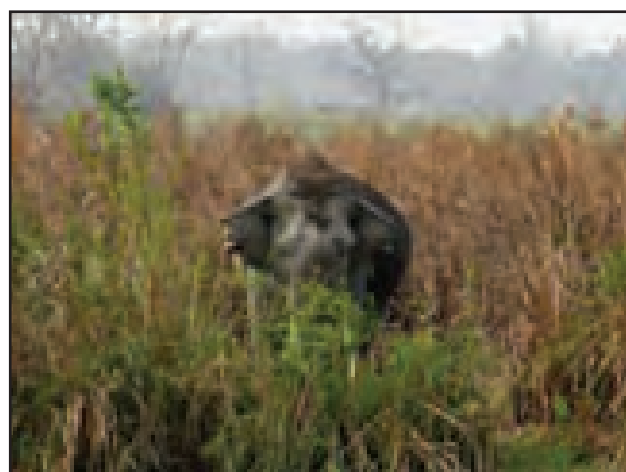


Figure 2. Feeding male.

Wildlife Sanctuary. The most important species were *Themeda* spp and *Apluda mutica*. The species variation of the grasses eaten can be attributed to the different geographical location of the study area. McKay (1973), Moss (1988), Sivaganesan and Kumar (1995) and Mercy (2002) also reported similar observations.

The study helped us in knowing the food preference of elephants in the area (Fig. 3) and thus would contribute to management plans of the forest department and formulate actions to safeguard the habitat in the long run.

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References

Altmann, J. (1974) Observational study of behaviour: Sampling methods. *Behaviour* **49**: 227-67.

McKay, G.M. (1973) *Behaviour and Ecology of the Asiatic Elephants in Southeastern*

Ceylon. Smithsonian Contributions to Zoology 125, Smithsonian Institution Scholarly Press, Washington D.C.

Moss, C. (1988) *Elephant Memories, Thirteen Years in the Life of an Elephant Family*. William Morrow and Co. Inc, New York.

Mercy, A.D. (2002) Feeding of elephant. *Journal of Indian Veterinary Assoc., Kerala* **7(3)**: 18-20.

Sivaganesan, N. & Johnsingh, A.J.T. (1995) Food resources crucial to the wild elephants in Mudumalai Wildlife Sanctuary, south India. In: *A Week With Elephants*. Daniel, J.C. & Datye, H.S. (eds.) Proc. of the International Seminar on the Conservation of Asian Elephant, Bombay Natural History Society, New Delhi. pp 405-423.

Sivaganesan, N. & Kumar, A. (1995) Status of feral elephants in Andaman. In: *A Week With Elephants*. Daniel, J.C. & Datye, H.S. (eds.) Proceedings of the International Seminar on the Conservation of Asian Elephant, Bombay Natural History Society, New Delhi. pp 97-117.

Sukumar, R. (1985) *Ecology of the Asian Elephant (Elephas maximus) and Its Interaction with Man in South India*. Unpublished Ph.D. Thesis, Indian Institute of Science, Bangalore.

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Figure 3. Herd and males feeding in the high grass.