Short Communication *Gajah 55 (2022) 45-49*

Feeding Behaviour of Asian Elephants in Northern Odisha, India

Biswajeet Panda and Bhaskar Behera*

P.G Department of Biosciences & Biotechnology, Fakir Mohan University, Vyasa Vihar, Baleshwar, Odisha, India
**Corresponding author's e-mail: drbhaskarbehera@gmail.com*

Introduction

Elephants are regarded as mega-herbivores and consume up to 150 kg of food per day (Samansiri & Weerekoon 2007). They are non-ruminants and exploit microbial action for the digestion of cellulose in the caecum and colon (Clemens & Maloiy 1982). In elephants, a rapid rate of passage through the gut enables consumption of large quantities of forage (Roy 2010). The availability of plant species in a habitat determines the carrying capacity for elephants. Elephants do not have specialised diets and consume a variety of plants but factors such as nutritive value and toxicity of plants influences the selection of food plants. Different plant types contribute different percentages of their diets (Pradhan *et al*. 2015). The trunk acts as an efficient screening instrument to distinguish between palatable and non-palatable forage. Surveys on the food plants of Asian and African elephants have shown that the types and amounts of plant species in the diet vary from one area to another (Sukumar 1989, 1990; Pradhan *et al*. 2015). The present study documented fodder species for Asian elephants (*Elephas maximus*) in Odisha India.

Materials and methodology

Study area

Odisha is located on the east coast of India and is 155,707 km² in extent. It lies between latitudes of 17°47'N and 22°34'N and longitudes of 81°22'E and 81°22'E. Physiographically, the state can be divided into four regions consisting of the Eastern Ghats, Northern Plateau, Coastal Plains and Central Tableland. The northern area neighbours the states of West Bengal and Jharkhand.

The vegetation consists of tropical moist deciduous forest comprised of sal (*Shorea robusta*), asan (*Terminalia elliptica*), teak (*Tectona grandi*s), arjun (*Terminalia arjuna*) and bamboo (*Bambusa* sp.). The study was conducted in five selected forests in the northern area, consisting of Kuldiha (21°25'57"N, 86°36' 58''E), Nilagiri (21°28'59"N, 86°46'06"E), Krishnachandrapur (21°49'42"N, 86°52'28"E), Badampur (21°44'21"N, 86°59'42"E), and Bhattchatar (21°54'59"N, 86°59'13"E). The temperature ranges from 38°C to 41°C during summer and in winter it goes below 7°C. The annual rainfall in Baleshwar is about 1565 mm and in Mayurbhanj about 1648 mm.

Methodology

The study was conducted from April 2017 – December 2019. Searches were conducted for elephants from early morning till dusk. Upon finding elephants feeding at a place, the plants on which they had fed were collected after they left. Trails taken by elephants were followed and plants on which the elephants had fed were also collected, Collected plant species were identified by use of field guides, Forest Survey of India reports, and the Botanical Survey of India and by consultation with Botanists. Fresh dung piles were examined to identify fruit species consumed by elephants. Undigested fruit remains such as seed, pericarp were used in identifying the species ingested.

Results and discussion

We observed 58 elephants and collected 200 dung boli from the field. A total of 136 species of plants belonging to 55 families were recorded as being consumed by elephants (Table 1). The

 Manuscript Editor: Prithiviraj Fernando

percentages of dicotyledon and monocotyledon species were 93% and 7% respectively.

Asian elephants are known to feed on a wide diversity of plant species (Sukumar 1990; Samansiri & Weerakoon 2007; Mohapatra *et al*. 2012) African elephants were recorded to consume 133 plant species belonging to 41 families and 95 genera at Sengwa Reserve, Zimbabwe (Guy 1976). Asian elephants in Southern India were recorded to consume 112 plant species, out of which 25 species provided 85% of their diet (Sukumar 1990). Elephants in Rajaji National Park consumed 74% tree species, 14% grass species, 8% shrubs, and 4% climbers out of a total of 262 flowering plant species (Joshi & Singh 2008). Mohapatra *et al*. (2013) reported 71 plant species consumed by elephants in Kuldiha Wildlife Sanctuary, Odisha. Pradhan *et al*. found 110 plant species consumed in Satkosia Tiger Reserve and recorded that feeding of grass species (55%) topped the list, with trees (37%) shrubs (5%) and herbs (3%) also being consumed. In the Shangyong National Natural Reserve in Xishuangbanna, China, elephants consumed 106 plants (Chen *et al*. 2006). However, in Manas National Park elephants consumed only 18 different flowering plant species in the dry season (Lahkar *et al*. 2007). Of 143 species of plants found in the Chunati Wildlife Sanctuary in Bangladesh, only 17 were used by elephants (IUCN 2007). Therefore, our observations in Odisha are consistent with Asian and African elephant feeding on a large number and broad diversity of plant species as has been observed by most studies.

In Asian elephants only males carry tusks. We observed that males used their tusks to remove bark, whereas cows wrapped their trunk around tree branches and pulled them down so the bark could be removed. We observed elephants to consume fruits of mango, jackfruit, blackberry. and mahula (*Madhuca indica*). The dung analysis showed seeds of mango, jackfruit, bel, jastimadhu, mahula, palm, tamarind and blackberry.

Acknowledgements

The authors are grateful to PCCF, Wildlife Odisha, DFO Balasore Wildlife Division, DFO Baripada Forest Division, Forest staffs of Baleshwar and Baripada for permission and providing necessary facilities to carry out the research work.

References

Chen J, Deng X, Zhang L & Bai Z (2006) Diet composition and foraging ecology of Asian elephants in Shangyong, Xishuangbanna, China. *Acta Ecologica Sinica* **26:** 309-316.

Clemens ET & Maloiy GMO (1982) The digestive physiology of three East African herbivores: The elephant, rhinoceros and hippopotamus. *Journal of Zoology* **198:** 141-156.

Guy PR (1976) The feeding behaviour of elephant (*Loxodonta africana*) in the Sengwa area Rhodesia. *South Afr. J. of Wildl. Res*. **6:** 55-63.

IUCN Bangladesh (2007) *Action Research for Conservation of Asian Elephants in Bangladesh: Phase I*. Ministry of Environment and Forest, Government of the P.R. of Bangladesh.

Joshi R & Singh R (2008) Feeding behaviour of wild Asian elephants (*Elephas maximus*) in the Rajaji National Park. *Journal of American Science* **4(2):** 34-48.

Lahkar BP, Das JP, Nath NK, Dey S, Brahma N & Sarma PK (2007) *A Study of Habitat Utilization Patterns of Asian Elephant Elephas maximus and Current Status of Human Elephant Conflict in Manas National Park within Chirang-Ripu Elephant Reserve, Assam*. Report, Aaranyak, Guwahati, Assam, India.

Mohapatra KK, Patra AK & Paramanik DS (2013) Food and feeding behaviour of Asiatic elephant (*Elephas maximus* Linn.) in Kuldiha wild life sanctuary, Odisha, India. *Journal of Environmental Biology* **34:** 87-92.

Pradhan RN, Chorghe AR & Nayak AK (2015) Study of elephant feeding habit of Satkosia Tiger Reserve, Odisha, India. *Natural Resources and Conservation* **3(3):** 45-49.

Roy MUKTI (2010) *Habitat Use and Foraging Ecology of the Asian Elephant (Elephas max-*

imus) in Buxa Tiger Reserve and Adjoining Areas of Northern West Bengal. Ph. D. thesis, Vidyasagar University, West Bengal, India.

Samansiri KAP & Weerakoon DK (2007) Feeding behaviour of Asian elephants in the northwestern region of Sri Lanka. *Gajah* **27:** 27-34.

Sukumar R (1989) Ecology of the Asian elephant in southern India. I. Movement and habitat utilization patterns. *Journal of Tropical Ecology* **5:** 1-18.

Sukumar R (1990) Ecology of the Asian elephant in southern India. II. Feeding habits and crop raiding patterns. *J. of Trop. Ecol.* **6:** 33-53.

Table 1. Forest plant species. Parts consumed are indicated as L: Leaf, F: Fruit, S: Shoot.

Family	Scientific name	Local name	Parts consumed
Rutaceae	*Aegle marmelos*	Belo	L, F
	Citrus sp.	Jungli lemon	L, F
	Chloroxylon swieteni	Bheru	L
	Limonia acidissima	Kaitho	L, F
Phyllanthaceae	*Antidesma ghaesembilla*		L
	Antidesma acidum		L
Moraceae	*Artocarpus heterophyllus*	Panasa	L, F, S
Anacardiaceae	*Buchanania lanzan*	Bana badam	L, F
	Buchanania cochinchinensis		L
Phyllanthaceae	*Briedelia retusa*		L
Fabaceae	*Acacia ferruginea*		L, S
	Albizia odoratissima	Tantra	S
	Bauhinia vahli	Siali lata	L
	Butea superba	Budhuli	L
	Butea monosperma	Palasho	L
	Dalbergia sissoo	Sisoo	L
	Dalbergia latifolia		L, S
	Dalbergia paniculata	Barbakuliaa	L, S
	Desmodium oojeinensis	Bandhana	L, S
	Cassia fistula	Sunari	L
	Caesalpinia digyna		L
	Cajanus cajan	Harada	L, S, B, F
	Millettia racemosa	Gaharani lata	L
	Mimosa pudica	Lajkuli lata	Entire plant
	Pterocarpus marsupium	Bijaa	L
	Senegalia catechu	Khairo	L
	Soymida febrifuga	Ruhini	L
	Senna siamea	Chakunda	F
	Petrocarpus marsupium	Piasal	L, S, B
	Pongamia pinnata		L
	Tamarandus indica	Tentuli	L, S
	Vigna sp.	Bana biri	L
Poaceae	*Arthraxon hispidus*		Entire plant
	Arundinella setosa		Entire plant
	Arundinella pumila		Entire plant
	Bothriochloa bladhii		Entire plant
	Bothriochloa pertusa		Entire plant
	Brachiaria ramosa		Entire plant
	Brachiaria reptans		Entire plant
	Chloris barbata		Entire plant
	Chrysopogon fulvus		Entire plant

Family	Scientific name	Local name	Parts consumed
Poaceae	*Coix lacryma-jobi*		Entire plant
	Cymbopogon flexuosus		Entire plant
	Cyrtococcum patens		Entire plant
	Oryza sativa	Dhana	Entire plant
	Saccharum officinarum	Aakhu	Entire plant
	Sehima nervosum		Entire plant
	Setaria palmifolia	Talo ghaso	Entire plant
	Thysanolaena maxima	Phuljharu	Entire plant
	Themeda triandra		Entire plant
	Vetiveria zizanioides		Entire plant
	Zea mays	Makka	Entire plant
Apocynaceae	*Alstonia scholaris*	Genduli	L
	Cosmostigma cordatum		L
	Holarrhena pubescens	Kureyi	L
	Ichnus frutocarpescens	Paso	L
Oleaceae	*Chionanthus ramiflorus*		L
Combretaceae	*Anogeissus latifolia*		L
	Combretum decandrum		L
	Getonia floribunda		L
Euphorbiaceae	*Croton persimilis*		L
	Cleistanthus collinus	Gurikanthi	L
	Mallotus philippensis	Kmalagundi	L
	Macaranga peltata		L, S
Ebenaceae	*Diospyros montana*		Entire plant
	Diospyros melanoxylon	Kendu	L, F, B
Dilleniaceae	*Dillenia pentagyna*	Raii	L, F
Moraceae	*Ficus benghalensis*	Bara	L, F
	Ficus glomerata	Dumburi	L, F
	Streblus asper	Jeleri	L
Salicaceae	*Flacourtia indica*		L, S
Convolvulaceae	*Ipomoea aquatica*	Kalama	Entire plant
Lauraceae	*Litsea glutinosa*		L
	Litsea monopetala		L
Melastomataceae	*Memecylon umbellatum*	Nireso	L
Annonaceae	*Annona squamosa*	Aato	L, S, F
	Miliusa tomentosa		L
	Polyalthia cerasoides		L, S
Ochnaceae	*Ochna obtuse*		L
Malvaceae	*Helicteres isora*	Orola	L
	Sterculia villosa	Odal	L
	Bombax ceiba	Simili	L
	Kydia roxburgianna	Ban kapasia	L
	Grewia tiliaefolia	Dhamana	L
	Pterospermum acerifolium	Kanaka champa	L
Rubiaceae	*Ixora perviflora*	Lohajhuri	L
	Ixora pavetta	Telkurma	L
	Mitragyna parvifolia	Kadamba	L, S
	Pavetta indica		L
	Psychotria adenophylla		L
	Gardenia gummifera		L
	Morinda citrifolia	Noni	L
	Tamilnadia uliginosa		L

Family	Scientific name	Local name	Parts consumed
Sapindaceae	*Schleichera oleosa*	Kusumo	L, S
Dipterocarpaceae	*Shorea robusta*	Salo	L, S, R, B
Bignoniaceae	*Sterospermum colais*		L
Myrtaceae	*Syzygium cumini*	Jambu	L, S, B, F
Rhamnaceae	*Ziziphus jujube*	Bar koli	L, S, F
	Ziziphus oenoplia	Char koli	L, S, F
	Ziziphus xylopyrus	Ghonta	L, S, F
Salicaceae	*Casearia tomentosa*		L
	Casearia graveolens		L
	Flacourtia jangomas	Bhaincha	L
Sapotaceae	*Madhuca indica*	Mahulo	L, F
	Manilkara zapota	Sapeta	L, S, F
	Xantolis tomentosa	Jasti madhu	L, R
Smilacaceae	*Smilax zeylanica*	Muturi	L
Solanaceae	*Leea indica*	Pitchkundi	L
Vitaceae	*Ampelocissus latifolia*	Pani lahara	L
	Cissus quadrangulari	Hadabhanga	L
Anacardiaceae	*Lannea coromandelica*	Moi	L
	Mangifera indica	Ambo	L, S, F
	Semecarpus anacardium	Valia	L
Arecaceae	*Phoenix acaulis*		L
	Borassus flabellifer	Talo	L, R, F
	Cocos nucifera	Nadia	L, F
	Areca catechu	Gua	L, F
Combretaceae	*Anogeissus latifolia*	Dhaure	L, S
	Combretum decandrum	Atundi	L
	Terminalia arjuna	Arjun	L, S
	Terminalia tomentosa	Asana	L
	Terminalia bllirica	Bahada	L, S, F
	Terminalia chebula	Harada	L, S, F
Lecythidaceae	*Careya arborea*	Kumbhi	L
Phyllanthaceae	*Phyllanthus emblica*	Anala	L, S, F
Boraginaceae	*Cordia macleodii*	Koksa dumuar	L
Caesalpiniaceae	*Caesalpinia cucullata*	Pursinga	L
Zingiberaceae	*Alpinia* sp.	Kiya	Entire plant
Bromeliaceae	*Ananas comosus*	Sapuri	Entire plant
Cyperaceae	*Cyperus* sp.	Mutha ghaso	Entire plant
Symplocaceae	*Symplocos racemosa*	Budhikunthi	L
Flacourtiaceae	*Homalium nepalense*		L
Typhaceae	*Typha* sp.		L
Orchidaceae	*Eria bambusifolia*	Parijata	Entire plant
	Dendrobium sp.	Parijata	Entire plant
Annonaceae	*Miliusa tomentosa*	Gadha sal	L
Costaceae	*Costus speciosus*	Baspara ghaso	Entire plant
Burseraceae	*Garuga pinnata*		L
	Protium serratum		L
Magnoliaceae	*Michelia champaca*	Champa	L
Musaceae	*Musa paradisiaca*	Kadali	Entire plant
Dilleniaceae	*Dillenia indica*	Oou	L, F
Myrtaceae	*Syzygium samarangense*	Jamrul	L, S, F
Anacardiaceae	*Anacardium occidentale*	Kaju	L, S, F, B
Loranthaceae	*Loranthus* sp.	Malango	Entire plant