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Food Preferences of Bluebull (Boselaphus tragocamelus) in and around Muzaffarpur, Bihar, India

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ABSTRACT:
Food preferences of Bluebull (*Boselaphus tragocamelus*) were examined through the method of direct field observation between September 2022 to August 2023 in some areas of the Northern part of the Ganga plain, to explore food preference, composition of diets, and seasonal variation among food choices. Study results conclude that Bluebull consume diverse species of plants, 112 plant species (34 trees, 29 herbs, 26 grasses, 10 shrubs, and 13 creepers). Grass is a major component of Bluebull (40.66%), and among the browse species, *zizyphusmauritiana* is highly preferred with a preference rating (5.2. Bluebull diet varies from season to season, making them a good mix feeder.

Keywords:
Bluebull, *Boselaphus tragocamelus,* Ganga plain, food preference, preference rating, mixed feeder

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INTRODUCTION

Bluebull (Boselaphus tragocamelus) is the largest species of antelope in Asia. An adult male can reach a shoulder height of up to 140 cm. The typical body weight of the animal is around 250-260 kg. Bluebull calves and females (cows) exhibit a light brown hue. Male calves start darker (Gray) in color, transitioning to a light brown by the 10th month, and develop black color legs and brownish-gray shoulders by the age of two. Adult male Bluebull are characterized by a steel-gray or blue-gray coat with black legs, which fully emerges by their 4th year (Sheffield et al., 1983). Both genders feature white and dark patterns on their ears, heads, underbellies, and tails, along with noticeable white vibrissa spots on their heads. Located at the center of the front part of the neck is a tuft of hair, which is more prominent in males compared to females (Sheffield et al., 1983). Only the male possesses horns that are short in length in length (15-20 cm), thick, conical, and have a smooth texture.

Observations on the dietary habits of ungulates in India have not advanced as significantly as it in other part of world like Africa (Talbot and Talbot 1962, Gwyne and Bell 1968, Leuthold 1970, Bell 1971, Jarman and Sinclair 1979). In India, Berwick (1976) experimented with feeding wild ungulates and cattle in Gir. Haque (1990) carried out an investigation into the food habits of wild ungulates through direct observation of their feeding behavior and pellet analysis. John, Singh, and Sankar (1991) undertook a study of plants eaten by both cattle and wild ungulates, depending on direct field observations. Sankar (1994) conducted research in the feeding habits of wild ungulates in Sariska National Park based on direct observations of animals. This paper represents Bluebull's food habits documented

through direct field observations from September 2022 to August 2023 in Muzaffarpur, Bihar, India.

STUDY AREA

The study area is situated (26.60°N and 85.29° E situated about 200 km from Valmiki Tiger Reserve. The area is plain. It has an average elevation of 47m. The study area is in the North of the vast Gangetic Plain. It is situated at the foot of the great Himalayas. The study area lies in a highly active seismic zone. The climate is humid subtropical. Summers are Hot and dry, the maximum temperature in the region ranges from 28 to 45 degrees Celsius. Winters are pleasantly cold and dry, with temperatures ranging between 06 and 20 degrees Celsius. The average rainfall is around 1346.7 mm. Muzaffarpur lacks dense forest areas or long vegetation stretches as such in fact, it is a completely forest-free area.Vegetation is found here and there in small patches alongside roads and riverbeds, with naturally growing plants on barren land. As per Champion and Seth's classification, this area belongs to tropical dry deciduous forest. Some principal species are *A. marmelos*, *Acacia nilotica*, *A. leucophloea*, *Zizyphusmauritiana*, *Lagerstomia parviflora*, *Emblica officinalis*, *Butea monosperma*, *Phoenix sylvestris*, and *Terminalia tomentosa*.

METHODOLOGY

Food habits of Bluebullare recorded by observing the plants eaten as the animal grazesand noting the locations where animals grazed and later inspecting the site to see what plants were eaten (Wallmo et al. 1973). The first of these has been called the "grazing minutes" or "grazing seconds" method (Buechner 1950) and the second the "feeding site method" (Lovaas 1958). The feeding site method was used to acquire data on the food plants consumed by the Bluebull.

Using binoculars, we observed feedings on Bluebull for four hours a day, two hours in the morning and two hours in the evening. We looked for feeding animals from a distance of approximately 10 to 40 meters, and recorded the food plants they consumed, and then counted the number of plant species they consumed from a 5-meter radius around the freshly consumed plant. Four areas were chosen for this study, and all observations were conducted on foot.

Examination of the research began from September 2022 to August 2023. Preference ratings for the edible plants were calculated as described by Petrides (1975). According to Petrides (1975), the preference value (P) of a food is basically established as 1.00. Preferred food species would have a preference rating greater than 1.00. Forage species with a preference rating of exactly 1.00 would be eaten in proportion to their abundance in the field,whereas species with ratings below 1.00 are, for whatever reason, neglected.In this study, we have not included trees and crops planted by farmers in their cropland.

Table 1: Food Plants of Bluebull (September 2022 to August 2023)

Plant species	Leaf	Fruit	Flower
Acacia leucophloea	YES	YES	
A. nilotica	YES	YES	
A. senegal	YES	YES	
A. catechu	YES		
Albizia lebbeck	YES	YES	
Azadarachta indica	YES		
Bouhinia varieta	YES		
B. malabarica	YES		
Butea monosperma	YES		
Dalbergia sisoo	YES		

Dicrostachys cinera	YES		
Dolichandrona faleala	YES		
Ehretia leavis	YES		
m Elaeodendron glaucum	YES		
Ficus species	YES		
F. glamerata	YES		
F. religiosa	YES		
F. retusa	YES		
F. benghalensis	YES		
Embica officinalis	YES		
Lagestomia parviflora	YES		
Mangifera indica	YES		
Mitragynaparvifolia	YES		
Miliosa tomentosa	YES		
Prosopis juliflora	YES	YES	YES
Pterocarpus marsupium	YES		
Pongamia pinnata	YES		
Tamarindus Indicus	YES		
Terminalia belliricia	YES		
Phoenix sylvestris	YES	YES	
Syzygium cumini	YES		
Z. mauritiana	YES	YES	
Z. xylopyra	YES		
Z. jujube	YES		
Herbs			
Ailianthus excels	YES		
Abutilon indicum	YES	YES	
Ageratum conyzoides	YES		
Amarantus species	YES		
Aegle marmelos	YES		
Boerhavia diffusa	YES		
Cassia tora	YES		
Cleome viscose	YES	YES	
Corchorus aestuns	YES	YES	
C. olitorius	YES		
Cyanotis species	YES		
C. cristata	YES		
Elytrassia acaulis	YES		
Euphorbia birta	YES		
E. prostrata	YES		
Melochia corchorifolia	YES		
Sida acuta	YES		
S. veonicaefolia	YES		
S.rhombifolia	YES		
S.rhomboidea	YES		
Solanum sps	YES		
S.xanthocarpum	YES		
S.xanthocarpum	YES		
Tephrosia Purpurea	YES		
Tridex Procumbens	YES		

Tribulus terrestris	YES		
Xanthium indicum	YES		
Grass			
Acrocera zizaniodes	YES		
Allotropis cumiciana	YES		
Apluda varia	YES		
Bothriochloa pertusa	YES		
Brachiaria distachya	YES		
B. refetans	YES		
Bambuseae	YES		
Cenchrus species	YES		
C. biflorus	YES		
Chloris barbata	YES		
Cyanodon dactylon	YES		
Cynchrus setigerus	YES		
Cyprus	YES		
Dichanthium annlatum	YES		
D. strictus	YES		
Eleusine indica	YES		
Echinochloa colona	YES		
Heteropogon contortus	YES		
Hemarthria compressa	YES		
Leersa hexandra		YES	YES
Panium sps	YES		
Paspalidium germinatum	YES		
P. puncttum	YES		
Paspallum conjugatum	YES		
Seteria verticillata	YES		
Saccharum spontaneum	YES		
Shrubs			
Calotropis gigantea	YES		
C. deciduas	YES		
C.sepiariaa	YES		
Clerodendrum phlomidis	YES		
Flacourtia indica	YES		
G. Ovalifolia	YES		
Holarrhena antidycentrica	YES		
Indigofera tinctoria	YES		YES
Launaea sp	YES		
Rundia dumetarum	YES		
Creepers			
Asparagus recemosus	YES		
Anagallis arvensis	YES		
Alysicarpus monilifer	YES	YES	
Cocculus hirsuits	YES		
Cuscuta hyalina	YES		
Ichnocarpus frutescens	YES		
Ipomoea sp	YES		
I.pestigridis	YES		
Luffa acutangula	YES		

Mucuna pruriens	YES		
Pavonia zeylancia	YES		
Plumbago zeylancia	YES		
Ziziphus oenoplia	YES		

Table 2: Food habits of Bluebull (September 2022 to August 2023)

Animal	Totalobservations	Grasses (%)	Browses (%)	leaves,fruits, and flowers (%)	Herbs, shrubs, and creepers (%)
Bluebull	486	40.66	17.66	36	5.66

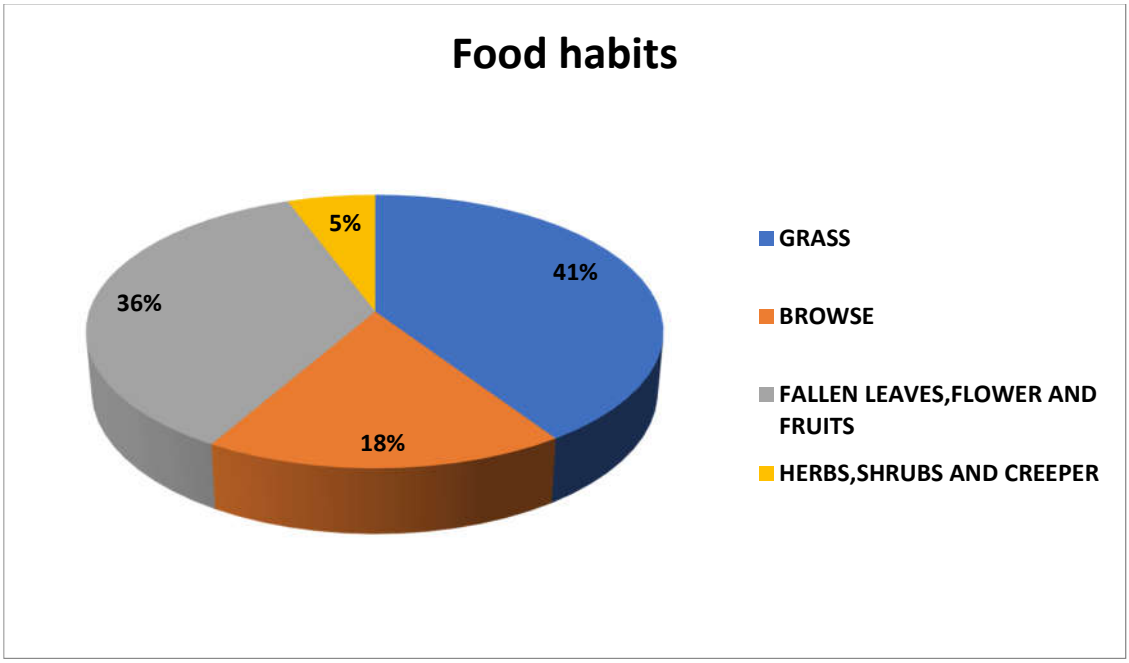

Figure 1: Pie chart showing food habits

Composition of seasonal diet

In the monsoon season, 26 observations have been made about the food habits of the Bluebull. Among them, grasses dominated the diet at 80%, followed by browse at 15%, herbs, shrubs, etc. at 2%, and fallen leaves, flowers, and fruits at 3% (see Figure 1).

During the monsoon season, Bluebulls mainly consume grasses as they occur in plenty during this time. Sankar (1994) had suggested that grass formed an important component of the Bluebull food during monsoon >88.1%.

There have been roughly 190 feeding records of the Bluebulls during the winter season. From these observations, the winter diet of Bluebulls was found to be 45% fallen leaves, flowers, and fruits, 20% Browse, 10% herbs, shrubs, and creepers, and 25% grasses (Figure 1).

When winter arrived, grasses started to mature and grow less. When green grasses are plentiful, such as in the winter and summer, Bluebull's mostly graze on them. However, when grasses become sparse, they transition to browse, fallen leaves, flowers and fruits as well as grasses. . 170 feeding observations were made during the summer. It was noted that there was little variation in the Bluebull's diet. The summer diet consisted of 60% fallen leaves, flowers, and fruits, 15% browsing, 20% grass, and 5% herbs, shrubs, creepers, and stragglers.

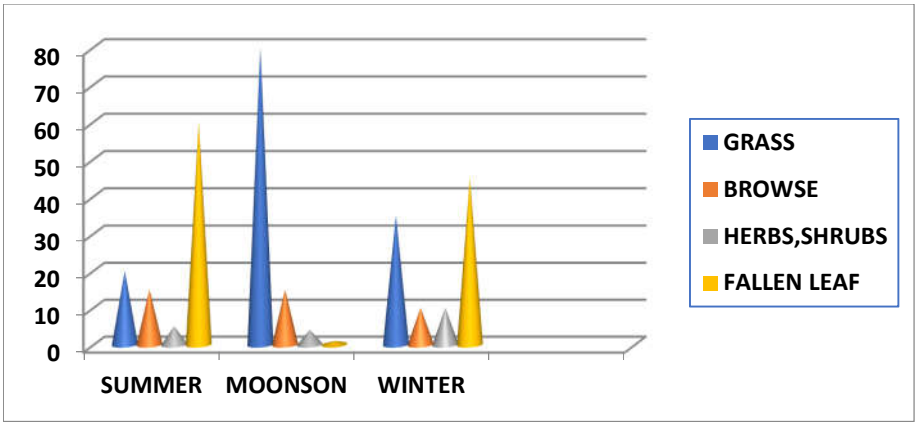

Figure 2: Seasonal variation of food habits

RESULTS AND CONCLUSION

The dietary habit of the Bluebull comprised diverse plant species. Bluebull used 112 species, i.e., 34 of trees, 29 herbs, 26 grasses, 10 shrubs, and 13 creepers (Table 1). Out of 486 total dietary observations of Bluebull, it was studied from September 2022 to August 2023 that grass accounted for 40.66%, flowers and fruits 36%, browse 17.66%, and herbs, shrubs, etc., 5.66% of the Bluebull diet (Table 2). The mixed proportion of plants confirms that Bluebull antelopes are mixed feeders. Among browse species preferred by the Bluebull, Zizyphusmauritiana had the highest preference rating (5.2), and Butea monosperma, Acaccia nilotica, and Azadaracantha indica came next with preference ratings of 2.4, 1.7, and 1.4, respectively (Table 3). Preference rating is computed as percentage diet choice over diet availability (% diet choice / % diet availability [p = d/a]). Bluebulldoes not like some plants and discardssome vegetative parts of herbs such as C. viscosa and C. tora, but during winter, the pods of these herbs form their main food. It also eats fallen leaves and fruits of *Zizyphusmauritiana*, fallen flowers and fruits of Butea monosperma, and fallen leaves of Anogeissus pendula and Dalbergia sissoo. Plant species like *Butea monosperma*, *Zizyphusmauritiana*, *Acacia nilotica*, A. leucophloea, Anogeissus pendula, Prosopis Juliflora, Terminalia bellirica, etc., are restricted to only a few localities in the Study area.

Table 3: The ratings of preference and the dietary importance of species of Bluebull (September 2022 to August 2023)

S. No	Forage species	Available (A)	Diet (D)	Rating preference (p)
1	*Zizyphusmauritiana*	3.9	20.6	5.2
2	*Butea monosperma*	5.8	14.4	2.4
3	*Acacia nilotica*	6.9	12.4	1.7
4	*Azadarictha indica*	7.1	10.5	1.4
5	*A. Leucophloea*	9.0	9.8	1.0
6	*Dalbergia sissoo*	13.3	9.4	0.7
7	*Prosopis juliflora*	18.7	7.1	0.3
8	*Capparis decidua*	30.1	6.7	0.2
9	*Syzygiumcumini*	42.1	3.3	0.07
10	*Phoenix sylvestris*	80.6	2.6	0.03

P= D/A

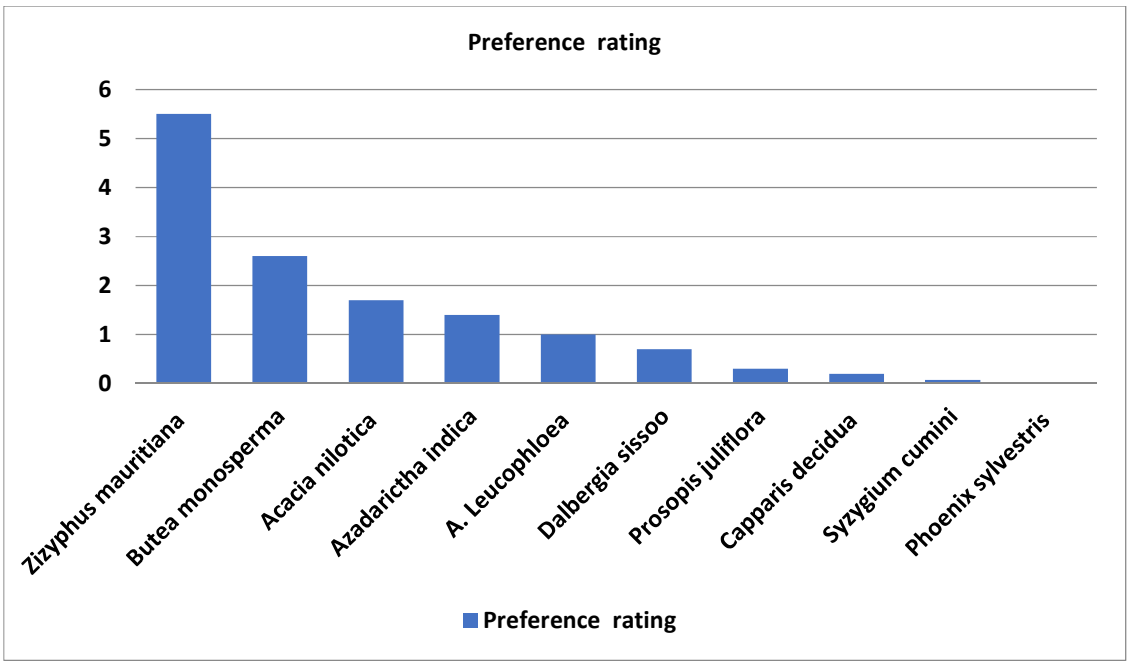

Figure 3: preference rating of plant species (September 2022 to August 2023)

Sankar (1994) stated that browse, fallen leaves, flowers, fruits, and grasses are a major part of the diet of the bluebull. The results of the present study are in close agreement with the generalizations made by Sankar.

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