



Short Communication

Seasonal changes in feeding preference of Indian fox (*Vulpes bengalensis*) in western Rajasthan, India

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Abstract

Vulpes bengalensis is distributed throughout the Indian subcontinent. It is opportunistic omnivorous and feeds upon a variety of food items. The sustenance structure of the Indian fox population was studied in different habitats of Balotra region. Food preferences of this fox were investigated from January 2015 to December 2018 in Balotra region. Prey items eaten by Indian fox were identified using scat analysis method. This method revealed undigested vestiges of some species of vertebrates, invertebrates with arthropods and fruits as general food item. In summer, it prefers babool (*Prosopis juliflora* and *Acacia tortilis*), khejri (*Prosopis cineraria*), and fruits while the hairs and bones of animals were found in a higher percentage. In monsoon, it obtained maximum food from ber and small mammals. In animals, the arthropods frequency (91.89%) was very high among food items. In winter, it depended upon ber, mammals and aves.

Keywords: Indian fox, feeding preference, Season, Western Rajasthan.

Introduction

Indian fox (*Vulpes bengalensis*) is omnivorous and opportunistic feeder¹. It has been recorded as a threatened species under Schedule II of Wildlife (Protection) Act, 1972². It is disseminated from the lower regions of the Himalaya toward the Southern tip of the Indian Peninsula³. Carnivores inhabit various types of habitats from terrestrial to aquatic terrain environments which include grasslands, desert and forests⁴⁻⁶. Indian fox prefers short grassland or scrub, thorn, deciduous forest with low rainfall semi-arid region. It avoids dense forest, tall grassland and true desert⁷⁻⁹. Tolerance for human presence was also reported in agricultural fields and rural habitations^{1,10,11}.

Fox feeds on the freshly voided pellets of sheep which has been noted by the shepherds¹. Indian foxes are nocturnal animal and diet consists of small mammals, birds, reptiles, arthropods and fruits of different plants. Arthropod includes grasshopper, termites, scorpion, beetles, and centipedes. In the diet, the seasonal fruits have also played an important role which includes the fruits of *Citrullus vulgaris*, *Zizyphus mauritiana*, *Mangifera indica*, *Syzygium cumini*, *Azadirachta indica*, *Melia azedarach* and *Ficus bengalensis*^{1,7,11-13}. Many types of invertebrates and vertebrates prey species were separated by the fecal analysis in southern Tamil Nadu¹. Rodent hairs were also reported commonly in scats of pups¹¹. It also feeds upon eggs and probably chicks of the bustard¹⁴ and the populations of rodents¹⁵.

Material and methods

The study of feeding activities of *Vulpes bengalensis* was conducted in Balotra region. It lies on 25.83° N latitude and 72.23° E longitudes in Barmer district. It is the part of the Great Indian Thar Desert. The average yearly temperature is 27°C and average yearly rainfall is 252mm. Desert has the variety of habitats and landforms like grassland, sand dunes, hills, etc. Our study area also consists of three different habitats hills of Mewanagar and Asada, agricultural part of Jagsa, Budiwada and sand dune area of Manchhanio ki Dhani, Kaludi. The study areas have several villages, dhanies with the coexistence of animal and human population. There are different types of faunal and floral species present. During the survey, the questionnaires, interviews of some people including shepherds, local villagers and direct observation techniques were applied. The Nikon Coolpix B700 60X wide optical zoom camera and 20 X 50 (3rd Field) binoculars were used during the study period. We find out undigested remaining in the scat on the basis of Korschgen¹⁶ and Putman¹⁷ methods.

The scats were collected during the study period from January 2015 to December 2018. Scats were collected from den site then transferred into plastic bags and tagged the date and place. They were oven dehydrated at 60°C in the laboratory for 48 hours. After dried they were soaked in water and separated undigested materials by the help of sieve, needle and forceps. Remains were divided into groups like fruits, seeds, invertebrates, rodents, bird feathers and unidentified material.

Results and discussion

In the present study we analysed 202 scats of Indian fox out of them 95 scats were collected in summer, 37 scats in monsoon and 70 scats were collected during the winter season. It showed that the fox consumed plants and animals in a different ratio. Seasonal changes were noted in the consumption of food items which varied from fruits to animals.

Table-1 showing during summer Khejri fruits (67.37%) were consumed in higher percentage followed by babool fruits (63.16%) and ker (50.53%) while in animals, the mammals were the most consumable food item (Figure-3). The highest frequency percentage and consumption of fruits of *Zizyphus mauritiana* (81.43%) were observed in winter. Thereafter bones (64.28%) and hairs (62.86%) were found in remains (Figure-5). The seasonal fruits of *Punica granatum* (44.29%) were also observed in scat analysis. In this region the population of rodents were higher like gerbils (*Tatera indica*), rats (*Rattus rattus*), squirrel (*Funambulus tristriatus*), Shrew (*Suncus*), etc., they were arboreal and fossorial inhabit so they were easily caught by the fox. During monsoon, we observed the maximum number of arthropods (91.89%) followed by the hair (56.76%), ber (40.54%) and bones (37.83%) in scats (Figure-4). The availability and activities of invertebrates in the rainy day were higher so foxes mostly depend on them. Home and Jhala¹⁸ noted that arthropods contributed a considerable part of the fox diet. Ferrari and Webber¹⁹ reported that the wild fruits were the main food in both season autumn and winter of Red fox in Switzerland and in present study we observed almost same occurrence of food items in scat analysis during winter.

In harsh landscape various types of vegetation are found, amongst them most common is *Prosopis cineraria* (Khejri), *Prosopis juliflor* (Angregi babool), *Acacia tortilis* (Israiali babool), *Acacia nilotica* (Deshi babool), *Tecomella undulate* (Rohira), *Acacia Senegal* (Kumat), *Salvadora persica* (Jal), *Zizyphus mauritiana* (Ber), *Capparis deciduas* (Ker) while *Cordia myxa* (Gunda), *Punica granatum* (Anar), *Cucumis* (Kachra) and *Citrullus* (Water melon) are found in irrigated area. Presence of hairs, feathers, bones also showed that foxes depend on mammals, aves and reptiles in the scarcity of seasonal fruits. The diet of these fox was varied with season. In the summer, foxes mostly depend upon rodents and small mammals while in the monsoon, the variety of food availability is higher because of the plentiful availability of greenery and the insect probability than the other seasons. In the scat analysis bones of mammals, vertebrates, teeth, jaw, hairs and insect parts like mouthparts, mandibles, wings, legs were identified. In the winter, mostly foxes are found in the day time and the seasonal fruit is easily available in this season, so they feed on them. Vanak and Gompper²⁰ opined in their study that Indian foxes are less subject to human-determined food, for example agricultural produce and are profoundly reliant on invertebrates, rodents and seasonal fruits. Vanak²¹ and Vanak et al.²² reported that in spite of more availability of rodents the foxes avoided the agricultural fields due to the presence of domestic dogs. Johnsingh¹, Manakadan and Rahmani¹¹ reported that insect, ground lizard, rodents, fruits, snakes, hedgehogs, hare, etc. found in the diet of foxes. In our study, we observed almost the same food items in scat analysis. In scat analysis, the other items like polythene, skin, stones, cotton, claws, shell and coconut remains were identified with low frequency.

Table-1: Frequency and frequency percentage of food components which found in the scats of Indian fox.

Season	Ber	Babool	Khejri	Melon	Jal	Ker	Kachra	Anar	Hair	Bones	Feathers	Arthropods	Others
Summer	-	60	64	-	38	-	-	-	65	48	24	33	19
	-	63.16%	67.37%	-	40%	50.53%	-	-	68.42%	50.53%	25.26%	34.74%	20%
Monsoon	15	2	-	8	-	-	4	-	21	14	9	34	10
	40.54%	5.40%	-	21.62%	-	5.40%	10.81%	-	56.76%	37.83%	24.32%	91.89%	27.02%
Winter	57	15	-	-	-	-	-	31	44	45	34	2	-
	81.43%	21.43%	-	-	-	-	-	44.29%	62.86%	64.28%	48.57%	2.86%	-



Figure-1: Scat of Indian fox.



Figure-2: Undigested food components which obtained by scat analysis.

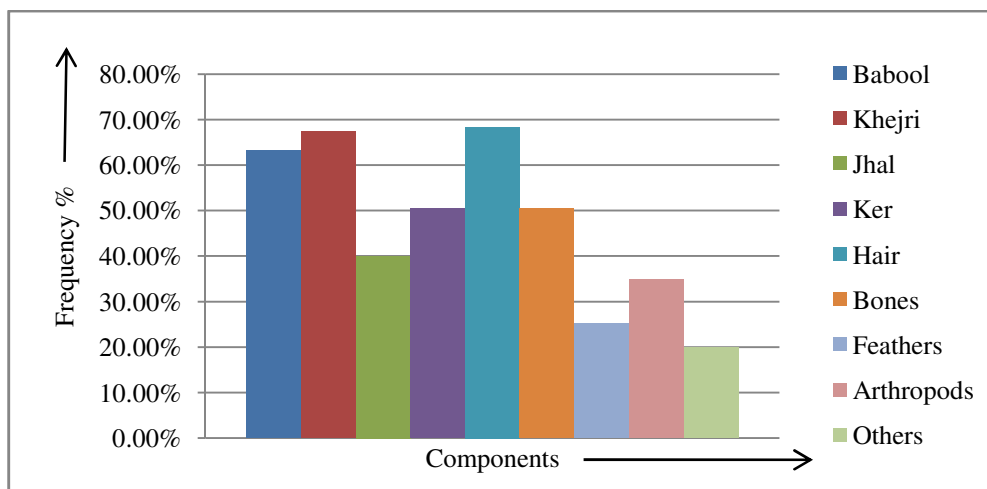


Figure-3: Summer season.

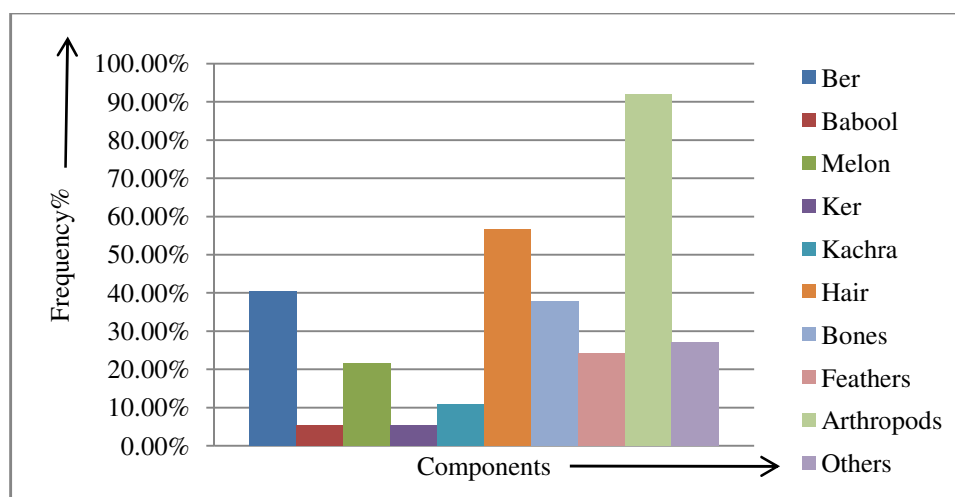


Figure-4: Monsoon season.

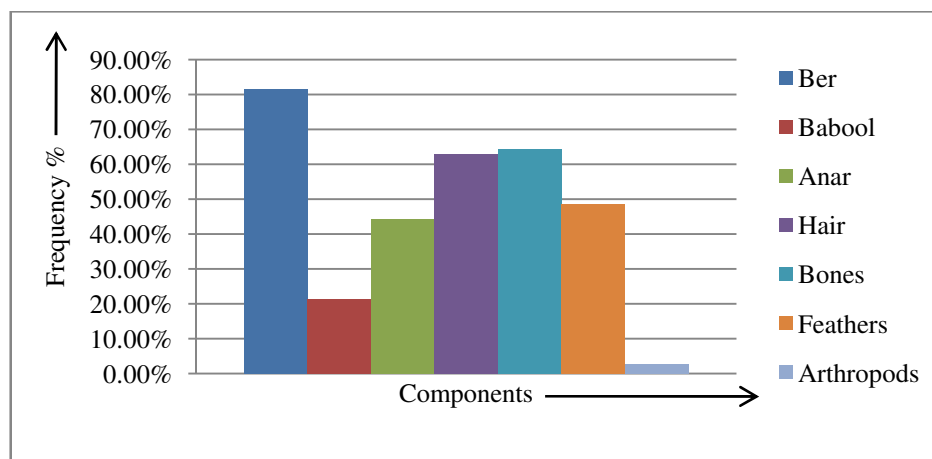


Figure-5: Winter season.

Conclusion

It concluded from the study that the food preference and feeding adaptability of Indian foxes was changing season to season in western Rajasthan. In summer season it mostly depends on Khejri fruits and small mammals. In Monsoon, it mostly prefers Arthropods and Ber as food whereas, in winter, Ber and small mammals. The study showed that Indian fox is an opportunistic omnivore and consume effortless accessible plants and animals according to their habitat and season which is necessary to survive in all weather conditions.

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