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A variety of fruits are consumed depending on season and availability

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ABSTRACT:

Fruits: A variety of fruits are consumed depending on season and availability. Hanuman langurs (Semnopithecus entellus) inhabiting the Sariska Tiger Reserve primarily follow a florivorous diet, meaning they consume a large portion of their food from leaves. However, their diet is more diverse than just leaves and includes: Leaves: They prefer young, tender leaves with high nutritional value. Their specialized digestive system allows them to efficiently process these fibrous materials. Fruits: A variety of fruits are consumed depending on season and availability. These provide essential sugars and vitamins. Flowers: Flowers are another source of nutrients, particularly during times of limited fruit availability. Seeds: Though not a major component, langurs may consume seeds found in fruits or flowers. Others: Studies suggest they may occasionally consume insects or bird eggs, but this is not a regular part of their diet. Factors Affecting Food Choice in Sariska: Seasonality: The availability of different food sources fluctuates throughout the year. During dry seasons, langurs may be forced to consume more leaves and bark due to limited access to fruits and flowers. Habitat type: The specific plant communities within their home range influence their diet. For example, areas with a higher density of fruit-bearing trees will likely see langurs consume more fruits. Nutritional requirements: Pregnant and lactating females, as well as juveniles, may have specific dietary needs that influence their food choices. Research conducted in Sariska has explored the langur's food preferences within the reserve. The study suggests that: Langurs exhibit a selective feeding behaviour, choosing specific plant species based on nutrient content and digestibility. The availability of food sources influences their home range size. During periods of scarcity, they may need to travel further to find sufficient food. Conservation and Food Availability: Human activities like deforestation and habitat fragmentation can disrupt the natural food sources for langurs. This can lead to increased conflict with farmers as langurs may be forced to raid

crops for sustenance. Conservation efforts that focus on protecting and restoring langur habitat are crucial for ensuring their long-term survival and minimizing conflict with human settlements.

Keywords: Hanuman langurs (Semnopithecus entellus), Sariska Tiger Reserve, Primates, Food, Feeding, Nutrition

Introduction

Survival and reproduction of individuals depend on their ability to locate and harvest sufficient food to meet their nutritional needs. Timings and selection of food plants are synchronized to meet the requirements of proteins, carbohydrates, fats, vitamins, water, minerals, trace elements, etc. All primates have the same general need to acquire energy. The specific patterns of resource utilization may however vary according to species, age-sex classes, social group, population and habitat. All primate species interact with a variety of food distributed in their home range and is within their reach. In general, the primate feeding behaviour is extremely complex. The complexity is further increased by the surroundings in which feeding takes place, like the one in which predators must be avoided, competitors and weather coped with, social relationships maintained and reproduction pursued (Oates, 1986). Primates are therefore faced with frequent decisions between conflicting pressures on their allocation of time (Krebs, 1978). Since food is such a crucial resource, the actions needed to find it and gather it becomes the major determinants of patterns of primate activity in space and time.

Colobine monkeys are characterised by a specailised digestive system that enables them to break down plant cell walls and presumably also to detoxify otherwise indigestible, even lethal compounds present in plant foods (Bauchop and Martucci 1968; Parra, 1978). In this context Hanuman langurs are specialised. They can eat the fruit (including seeds) of *Strychnos nox-vomica*, the plant from which the poison strychnine is made (Roonwal and Mohnot, 1977). It can also eat without ill effects such repulsive and evil smelling latex bearing plants which are avoided by most animals and even insects – *Calotropis procera* in the Indian desert (Mohnot, 1974). Their complex gut anatomy aided by the presence of symbiotic *Celluloytic microflora* in the forstomach may enable Colobines to harvest plant

feeds (Davies et al. 1988). Chivers and Hladik (1980) had demonstrated the occurrence of forstomach of Colobines capable of generating volatile fatty acid in quantities comparable to small domestic ruminents (Bauchop, 1978).

Food selection by both Old and New World primates have been considered an optimizing process, balancing nutrient intake with level of toxins and digestion inhibitor such as fiber (Milton 1980; Freeland and Janzen, 1974). Most dietary studies of Colobine monkeys have involved species that live in small one-male group, occupy small defended home ranges and feed largely on leaves (e.g. black and white Colobus, Oates, 1977). Exceptions like seed eating in *Presbytis rubicunda* and *Colobus satanus* is correlated with large home range and long day range. Thus it is expected that *Presbytis entellus* at Sariska Tiger Reserve living in one-male groups, would be both territorial and folivorous. Food resource of langurs at SARISKA TIGER RESERVE was highly seasonal in their availability and leaves were the major portions of diet. Although leaves were the major dietary item, *P. entellus* showed seasonal preference for other food and plant items as they become available (Mohnot, 1971b, 1974; Roonwal and Mohnot, 1977; Srivastava, 1989, Chhangani, 2000, 2004). Rowell and Richards (1979), for instance, suggested that seasonal availability of food influences the timings of reproduction in patas monkeys. Observations at SARISKA TIGER RESERVE suggest some kind of relationship between food plants consumed and animals reproduction, birth seasonality and milk production.

Material and Methods

Study site: Sariska Tiger Reserve is a tiger reserve in Alwar district, Rajasthan, India. It stretches over an area of 881 km2 (340 sq mi) comprising scrub-thorn arid forests, dry deciduous forests, grasslands, and rocky hills. This area was a hunting preserve of the Alwar state and was declared a wildlife sanctuary in 1958. It was given the status of a tiger reserve making it a part of India's Project Tiger in 1978. The wildlife sanctuary was declared as tiger reserve and national park in 1982, with a total area of about 273.8 km2 (105.7 sq mi). Altitude varies from 900 to 3200 feet metric system above a level. Sariska is characterized by distinct winter, summer and monsoon. During summer, temperature fluctuates between 30 – 35oC, and reach may 48oC during May and June.

Mean winter temperature is 5oC, and may go down to 2oC during December – January. The average annual rainfall is about 825 mm; minimum 423 mm and maximum 950 mm. This wide range of climatic conditions along with the great altitudinal variations provides different micro- habitats. There fore, this sanctuary encompasses different vegetation types such as deciduous, dry-deciduous, dry-savannah-forest, euphorbia scrub and dry grasslands. The forest is dominated by 'gorya dhawa' (*Anogeissus latifolia*), dhawa (*A. pendula*), salar (*Boswellia serrata*), gol (*Lannea coromandelica*), kherni (*Wrightia tinctoria*), kumbat (*Acacia senegal*), khair (*A. catechu*), ber (*Zizyphus mauritiana*), dhonk (*Butea monosperma*), etc. The undergrowth mainly consists of jharber (*Z. nummerlaria*), ardnsa (*Adhatada vasica*), gangan (*Grewia tenex*), franger (*G. flavescens*), kanter (*Capparis separaia*), lantana (*Lantana indicus*), etc. Some climbers and grasses are also found.

The main fauna of Sariska includes Tigers (*Panthera tigris*), leopard (*Panthera pardus*), hyaena (*Hyaena hyaena*), Indian Wolf (*Canis lupus*), Jackal (*Canis aureus*), Sloth bear (*Melwisus ursinus*), Hanuman langur (*Semnopithecus entellus*), Rhesus Macaque (*Macaca mulatta*), Porcupine (*Hystix indica*), Fourhorned antelope (*Tetracerus quadricornis*), Chinkara (*Gazella g. bennetti*), Porcupine (*Hystrix indica indica*), Samber (*Cervus unicolor*), Spotted dear (*Axis axis*), (Bluebull (*Boselaphus tragocamelus*), Toddy cat (*Paradoxurus hermaphroditus*), Jungle cat (*Felis chaus*), Fox (*Vulpes bengalensis*), Crocodile (*Crocodylus palustris*) and Rock python (*Python molurus*).

Methods: Data was collected as and when encountered during travelling and regular field visits recorded from December 2016 to December 2018 in and around Sariska National Park. A well-planned questionnaire was prepared for generating information on type of crops, crop raid behaviour, seasonality food preference, crop protection strategies, economic loss estimation and such other issues concerning livelihood and wildlife conservation. Besides this scane sampling and ad-libitum sampling methods (Altamann, 1974) were also used to collect additional information by direct observations. For population estimation of wild animals' census data of state forest department were used. Photography and videography were also done to confirm the presence of vertebrate pests in the study area. During this sample interval scan sample of five minutes for all animals was attempted. If any animal was eating, the record of plant species and plant part eaten was noted.

Observation schedules for all the troops were evenly distributed over the study period so as to achieve statistical compatibility of data.

Chivers (1974) and Hledik (1977) have used estimate of feeding rates and food weight to quantify diet more precisely. Since food weight for different types of plant vary, but in a long-term study with large amount of data hours proportions of time is considered acceptable. The measure being used for diet is therefore feeding effort rather than food intake. This treatment is consistent with nearly all other studies of Colobine behavioural ecology (Curtin, 1975; Struhsaker, 1975; Hladik, 1977; Oates, 1977; Davies, 1984; Gurmaya, 1986; Srivastava, 1989; Stanford, 1991 Newton, 1992; Bennett and Davies, 1994 and Koenig et al. 1998).

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