Published by: National Cave Research and Protection Organization, India

Ambient Science, 2015: Vol. 02(1); 09-15
DOI:10.21276/ambi.2015.02.1.ra02

**ambient
SCIENCE**
Vol. 01(1):09-15
Year 2015

RESEARCH ARTICLE

Food Habits of Spotted Owlet *Athene brama* (Temminck, 1821) in the Campus of Tropical Forest Research Institute, Jabalpur: an Ecological representation of Central India

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Study Area: TFRI campus, Jabalpur, Madhya Pradesh

Coordinates : 79°59'23.50"E and 21°08'54.30"N

Key words: *Athene brama*, Food habit, Dung Beetles,
Small mammals, Central India

Abstract

The study on food habits of the Spotted Owlet, *Athene brama* (Temminck, 1821) in Tropical Forest Research Institute campus, Jabalpur, Madhya Pradesh, India was conducted in June 2011 to May 2012 by analyzing their regurgitated pellets. The insect order Coleoptera with three dung beetle species, *Onitis philemon*, *Onitis virens*, *Onitis brahma* and two orders and five species of small mammals, *Mus booduga*, *Vandeleuria oleracea*, *Millardia meltada*, *Suncus etruscus* and *Suncus murinus* were recorded from the pellets. The other insect taxa found in the pellets include Carabidae and Hydrophilidae beetles and Earwigs in the order Dermaptera. This is for the first time food habits of the spotted owlets, being reported from the state of Madhya Pradesh, which further provides identifying key characters of the dung beetles along with illustrations, obtained from the pellet materials. The study on the feeding habits of the owl species is very important not only for its significance in conservation but also for their predatory potential, as they are the main

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predators of insects and non insect pests (rodents) of forestry and agricultural importance.

Introduction

The Tropical Forest Research Institute (TFRI) is situated in Jabalpur district of Madhya Pradesh state of Central India. It lies at the bank of Gour River (79°59'23.50"E and 21°08'54.30"N) about 10 km south east of Jabalpur, India. The campus is spread over an area of 109 ha with semi-arid type of climate with mean annual precipitation of 1358 mm. More than 57 shrub and tree species are either planted or naturally occur in the institute campus (Tiple *et al.*, 2010) among which Teak, Bamboo, Eucalyptus, Mahuwa, Palash, Neem and Albizzia are the dominant ones. The dense vegetations of the campus are provided shelter to number of wild animals. The campus is surrounded by agricultural field with rural inhabitation. The water reservoir and the vegetation planted around the institute have created a very good habitat and source of attraction for many faunal species like insects, amphibians, reptiles, birds and mammals (Tiple *et al.*, 2012). The spotted owlet, *Athene brama* (Temminck, 1821) is most common bird species of the TFRI campus (Tiple *et al.*, 2010).

Owls (Aves: Strigiformes) play an important role in the ecosystem by maintenance of a natural balance since they are at the apex of trophic levels in terrestrial and aquatic ecosystems (Sergio *et al.*, 2008). They are commonly found near human habitation, agriculture fields and in forest areas. Owls are also known for their important role in bio-control agents and feeds number of harmful insect pests and non insect pests like small mammals species like rodents and insectivores (Pande & Dahanukar, 2011a, 2011b). Among the numerous species of owls found in India, the Spotted Owlet, *Athene brama* is the most common small-sized, nocturnal and resident Indian raptor species occurring in India (Ali & Ripley, 1983). The Spotted Owlet is a generalist predator that feeds on diverse and numbers of prey such as arthropods, annelids and vertebrates such as amphibians, reptiles, small birds and rodents (Jadhav & Parasharya, 2003; Pande *et al.*, 2004, 2007).

In India, several studies have been carried out on the food habits of different species of owls by Neelannarayan & Kanakasabai (2004), Pande *et al.* (2004), Jathar & Rahmani (2004), Jathar *et al.* (2005), Ramanujam (2006), Neelannarayan (2007), Jathar *et al.* (2011), Zade *et al.* (2011), Patki *et al.* (2014) and Nerlekar *et al.* (2014). Perusal of literature reveals that food habits of only Barn owl species were carried out from the state of Madhya Pradesh by Khajuria & Ghosal (1970) and Khajuria (1972). For the other owl species, reported from Madhya Pradesh, almost nil information is available on their food habits through pellet analysis. Therefore, it is needed to study the feeding habits of spotted owlet for not only to its conservation but also for their predatory potential, as they are main predators of insect and non insect pests (rodents) of forestry and agricultural importance. The prey species diversity of the spotted owlet, *Athene brama* was studied in TFRI campus, Jabalpur, Madhya Pradesh, central India during 2011-2012.

Materials and Methods:

During the study period (June, 2011 to May, 2012), food habit of the spotted owlets was observed by collecting and analyzing their regurgitated pellets (Fig. 1) from their roosting and nesting sites in and around TFRI, campus, Jabalpur. The fresh pellets were collected randomly in different seasonal periods and packed in polythene bags along with labels indicating the locality name and date of collection before being brought to the laboratory of Zoological Survey of India, Jabalpur. The pellets were kept at 70°C in a hot air oven for 24 hours to kill any associated invertebrates. Length of the pellet material was measured during identification by using a Vernier caliper with a dial graduation up to 0.05 mm. Photos of insect parts found in the pellets were taken by Leica M205A Stereo zoom Microscope. The pellets were analyzed following the method of Schueler (1972).

Mammalian prey items (skulls and mandibles) were identified up to species level following the key by Talmale & Pradhan (2009). Invertebrate prey items were identified on the basis of undigested pieces such as heads, mandibles, wings and legs (Triplehorn & Norman, 2005; Arrow, 1931).

Results and Discussion:

The regurgitated pellets of spotted owl (*Athene brama*) collected from TFRI campus, consisted of hair, small pieces of skull bones, pieces of insect head, pronotum, elytra, anal cerci, eyes, sternal processes and legs. These small parts were minutely analyzed for the taxonomic identification of animal groups found in the pellets. The detailed morphotaxonomy not only yielded the identification of 3 species of Scarabaeinae dung beetles but also 5 species of small mammals belonging to two orders; Soricomorpha and Rodentia. It was found that the spotted owl exclusively feed on the dung beetles belonging to the genus *Onitis* of sub family Scarabaeinae of family Scarabaeidae. The species identified were; *Onitis philemon* Fabricius, *Onitis virens* Lansberge and *Onitis brahma* Lansberge (Table 1). These species were identified on the basis of the structure of head, pronotum, and legs collected from the pellets. An attempt has been made here for the first time to provide the identifying key characters of the dung beetles (Table 1) which is further supplemented with the illustrations (Fig. 2), obtained from the pellet materials. The other insect taxa found in the pellets include Carabidae and Hydrophilidae beetles and Earwigs in the order Dermaptera which could not be identified up to species level. The vertebrate bones found in the pellets were identified into five species of small mammals viz. *Suncus murinus* (Linnaeus), *Suncus etruscus* (Savi) of the order Soricomorpha and *Mus booduga* (Gray), *Vandeleuria oleracea* (Bennett) and *Millardia meltada* (Gray) of the order Rodentia.

Figure-1: A. Pair of Spotted Owllet
B. Their pellets in the study site.

Figure -2: Identifying characters (Dung Beetles): *Onitis philemon* (A-C): A. Pronotum, B. Head, C. Metatibia. *Onitis virens* (D-E): D. Metatibia, E. Protibia. *Onitis brahma* (F-G) F. Head, G. Protibia

It was found that in pre monsoon and monsoon seasons, the spotted owlets feed on insects mainly dung beetles. The dung beetles remain mostly active and abundant during pre monsoon and monsoon seasons which make them easy prey to the spotted owlets. As the population of insects decline in the winter season, they switch their feeding habits to small mammals. As far as the diversity of species eaten by spotted owl in the study area is concerned, small mammals are dominant because of their availability throughout the year in contrast to insects which are mostly seasonal. Their diets depend on the seasonal population of invertebrates and vertebrates, present in the area. Among invertebrates, the beetles (Coleoptera) and more exclusively dung beetles (Scarabaeidae: Scarabaeinae) constitute major food diet of the spotted owl in the studied area. Jadhav & Parasharya (2003) in their study reported other Coleopteran (beetle) species; *Heliocopris bucephalus* (dung beetle), *Holotrichia* sp. (White grub) [Scarabaeidae], and *Drasterius* sp. (Elateridae) along with Sphingidae moths (Lepidoptera), dragonflies (Odonata) and cockroaches (Dictyoptera) from the pellets of the spotted owlets from Gujarat. The studies made by Shah *et al.* (2004) and Mahmood-ul-Hassan *et al.* (2007) also reported that beetles were the most preferred food items for spotted owl even in different localities.

The present study recorded five species of small mammals, among these three species of rodents and two species of shrews in the diet of spotted owl. The compositions of small mammal species prey in the diet of the Spotted Owlets are similar to the study carried out by Pande *et al.* (2004). The frequent occurrence of mice, rats and shrews in the pellets of the spotted owl suggest that they hunt around human settlements, forest ecosystem and agricultural areas (Santhanakrishnan *et al.*, 2011).

The study on the pellets of owl is important and indicates the faunal diversity of insects, amphibian, reptiles and small mammals in the area, which is very important to future conservation programme of the owl species in India. Hunting and trade of all Indian owl species is banned under the Indian Wildlife (Protection) Act 1972.

Conclusion:

Being at the apex of trophic levels in terrestrial and aquatic ecosystems, the owls play an important role in maintaining natural balance and also help biologically in controlling harmful insect pests as well as small mammalian pests like rodents and insectivores (Pande & Dahanukar, 2011a, 2011b). In the present investigation, the feeding habits of the spotted owl (*Athene brama*) in the campus of Tropical Forest Research Institute, Jabalpur (Madhya Pradesh, India) were studied by analyzing their regurgitated pellets. The fresh pellets were

collected randomly in different seasonal periods during June, 2011 to May, 2012. The identification of chitinous and boney body parts found in the pellets revealed 3 species (*Onitis philemon*, *O. virens*, *O. brahma*) of the dung beetles belonging to subfamily Scarabaeinae of family Scarabaeidae and five species of small mammals (*Suncus etruscus*, *S. murinus*, *Mus booduga*, *Vandeleuria oleracea*, and *Millardia meltada*) belonging to two orders Soricomorpha and Rodentia.

As pellet analysis serves as non destructive means of diet determination for both prey and predator (Talmale & Pradhan, 2009), the present study is aimed to accurately identify the prey species data for the studied owl species. For the first time, key identifying characters of the dung beetles along with the illustrations were provided which may further be used by naturalists and conservationists for identification of these taxa in the pellets of spotted owl. The study on the pellets of owl is ecologically and in conservation point of view very significant as it reveals the faunal diversity of insects, amphibian, reptiles and small mammals occurring in the area and this data can further be utilized in conservation planning and management of the owl species in India.

Table 1: Classified list of Dung Beetles and Mammals preyed by *Athene brama*

S. N.	Prey Species	Species identifying characters based on body parts found in the pellets
	Phylum Arthropoda Subphylum Hexapoda Class Insecta Order Coleoptera Superfamily Scarabaeoidea Family Scarabaeidae Subfamily Scarabaeinae Tribe Onitini	
	Genus <i>Onitis</i> Fabricius	Protarsi absent (Fig.-2E). Pronotum with two basal impressions on each side of middle at base (Fig.- 2A).
1.	<i>Onitis philemon</i> , Fabricius (20)*	Head (Fig.-2B): clypeus rugose, parabolic, excised in middle, separated from frons by a narrowly interrupted clypeofrontal carina, a tubercle present behind it and a slightly elevated carina in front of it; frons minutely granular; an oblique carina separates clypeus from smooth genae. Pronotum (Fig.-2A): strongly, closely and uniformly punctate without a well marked median line; front angles a little pointed; lateral side rounded; base angulate. Legs (Fig.- 2C): Mesofemora with a minute tooth at extremity.
2.	<i>Onitis virens</i> , Lansberge (2)*	Protibiae long, slender, curved, and quadridentate; 4th teeth blunt, joined with 3rd; terminal spur pointed and curved (Fig. 2E); mesofemora with a strong lobe in middle of posterior and a tooth at extremity (Fig.-2D).

3. *Onitis brahma*, Lansberge (3)* Head (Fig.-2F): clypeus closely granulate, strongly reflexed and excised at front, separated from frons by an interrupted clypeofrontal carina, behind it a small tubercle and in front of it an elevated transverse carina present; genae impunctate, separated by an oblique carina from clypeus; frons slightly hollowed on each side, sparsely granulate. Proleg (Fig.-2G): Profemur with 2 processes, one blunt process before extremity while other pointed at end; protibiae strongly curved and quadridentate; teeth small; terminal spur blunt; a strong pointed process present at inner side just behind 4th tooth.

Class	Mammalia	Skull Bones (Maxilla, Mandible, upper and lower dentition of shrews and rats)
Order	Soricomorpha	
Family	Soricidae	
Subfamily	Crocidurinae	
4. *Suncus murinus*, Linnaeus (6)* See Talmale and Pradhan (2009) for identification
5. *Suncus etruscus*, Savi (4)* See Talmale and Pradhan (2009) for identification

Order	Rodentia
Family	Muridae
Subfamily	Murinae
6. *Mus booduga*, Gray (4)* See Talmale and Pradhan (2009) for identification
7. *Vandeleuria oleracea*, Bennet (3)* See Talmale and Pradhan (2009) for identification
8. *Millardia meltada*, Gray (1)* See Talmale and Pradhan (2009) for identification

*total numbers found in the pellets.

Acknowledgements:

The authors are grateful to Director, Zoological Survey of India, Kolkata and Officer-in-Charge, Central Zone Regional Centre, Zoological Survey of India, Jabalpur for providing all the necessary facilities.

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