



DIET COMPOSITION OF THE BARN OWL *TYTO ALBA* (AVES: TYTONIDAE) AND SPOTTED OWLET *ATHENE BRAMA* (AVES: STRIGIDAE) COEXISTING IN AN URBAN ENVIRONMENT.

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ABSTRACT: The diet of the Barn Owl *Tyto alba* and the Spotted Owlet *Athene brama* were studied in an urban habitat of Yavatmal city, Maharashtra, India, during June to October 2013. Regurgitated pellets of these two owl species were analysed to understand their dietary composition. The diet of the Barn Owl mainly comprised small mammals such as *Suncus murinus* (61.53%) and *Mus booduga* grey (23.07%), while the diet of the Spotted Owlet comprised mostly insects like Coleoptera (87.47%) and *Mus booduga* (35%). Food niche overlap between the Barn Owl and the Spotted Owlet in overall diet as indicated by Piankas index was found to be 0.131.

Keywords: Barn Owl, Spotted Owlet, Yavatmal, Owl Pellet, Owl Prey.

INTRODUCTION

The Barn Owl *Tyto alba* (Scopoli, 1769) and the Spotted Owlet *Athene brama* (Temminck, 1821) are known to coexist and use the same habitat in southern India [1]. Since these two species are small mammal predators and known to live together, they are suitable species for studying resource partitioning and ecological segregation. Coexisting species usually depend on different requirements among the total resources available to them. The diversity of prey items taken by different predator species constitutes ecological studies of sympatric or coexisting species. Studies on food partitioning are relatively scarce for raptors, and especially owls in India, but considerable reports are available regarding coexisting owls in various geographical ranges [2-5]. Owl pellets are accumulations of the undigested portions of prey which are regurgitated and ejected through the mouth in compact units. Strigidae (typical owls) prey mainly upon small rodents or insects and usually prey of a suitable size is swallowed whole. Their ability to digest bone is poor and pellets contain a good skeletal record of the small mammals consumed. Owl pellet analysis serves two primary purposes. Foremost, pellet analysis serves as a nondestructive means of diet determination. Obtained diet information can include prey species eaten [6-13], preferences of prey species [14-16] and estimates of contributions of prey biomass. Owl pellet analysis also is a useful method for gaining additional insight into small mammal communities and distribution [17-19]. Barn Owl *Tyto alba* is nocturnal cosmopolitan [20]. This raptor is distributed in the entire Indian Union, Bangladesh, Pakistan, Sri Lanka, and Myanmar. This owl is inseparable from the haunts of man. Deserted Buildings and cities, and ancient forts and ruins invariably hold their quota [21]. In general, this owl preys primarily on small mammals, and occasionally on other vertebrates and/or insects [22-24]. These owls feed on wide variety of prey and their preference varies from place to place [25]. The spotted owlet *Athene brama* is a common nocturnal raptor distributed throughout Southeast Asia including India [26]. It survives in all possible types of biotopes, adapts to the changing environment both natural and man made and usually is absent on high mountains [27]. It is common in open habitats including farmland and human habitation and has adapted to live in crowded cities also [28]. A review of literature from Indian Subcontinent indicated that there is no study available on nutritive values of prey and its influence on prey selection of Barn Owls [25] and very little is known about the food habitat of the most common resident owlet *Athene brama* [28,29].

The Barn Owl and the Spotted Owlet were studied independently by various authors in different parts of India however no attempt has been made to study the above coexisting owls in any particular area. Hence the present study was carried out to document the information about the prey preferences of coexisting Barn Owl and spotted owlet from the Yavatmal City.

MATERIALS AND METHODS

The present study was carried out in an area which is situated in the heart of the Yavatmal city, Maharashtra. The Yavatmal district consists of masses of hilly country broken by broad valleys and partially surrounded by plain. The geographical location of Yavatmal city is between +20° 24' 21.38", +78° 5' 27.47" to +20° 22' 9.88", +78° 9' 15.51".

The Barn Owl Roost was sited on the *Polyalthia longifolia* tree (GPS location- +20° 23' 11.40" latitude and +78° 7' 49.36" longitudes), and total of 15 pellets of Barn Owl *Tyto alba* were collected from the roosting site. The Spotted owl roost site was present on the *Delonix regia* tree. (GPS location - +20° 23' 37.38" latitude and +78° 6' 14.27" longitudes), and a total of 20 pellets of spotted owl *Athene brama* were collected from this roosting site. Pellets were collected, bagged and kept in an oven at 70° for 24 h in order to kill infesting insects and then stored. Later, the pellets were subjected to NaOH treatment and the osteous and chitinous pellet contents were separated and then washed for further identification [30]. Different food remnants like bones, feathers and insect parts were cleaned under a dissecting microscope from a disentangled content of owl pellets. The diet composition of the Barn Owl was studied by the analysis of materials found in the pellets. The skull, cranial bones and the dentary bones were used to identify the small mammals upto the species level. The identity of small mammals was further confirmed by one of the author (SST). The Insect identification was carried out with the help of their chitinous remnants found in the pellets of spotted owl. Magurran (1988)[31] was followed to assess and compare the diversity in the diet of two owl species by using species richness (S), Shannon's index (H) and Evenness index (E). Food niche breadth (NB) was estimated according to Levins (1968)[32]: $NB = (\sum P_i^2)^{-1}$, where, P_i is the proportion of prey i in the food. The food niche overlap values between two owl species were calculated by Pianka's index (Pianka 1973) [33]: $O = \sum P_{ij}P_{ik} / \sqrt{\sum P_{ij}^2 \sum P_{ik}^2}$ where, P_i is the proportion of prey species i in the diet of predator j and k respectively.

RESULTS

The average pellet length of the Barn owl was found to be 4.45 ± 1.05 cm and width 3.1 ± 0.4 . The average dry weight of the pellet was found to be 3.25 ± 0.65 gm. The regurgitated pellet consisted of hair, small pieces of vertebrate bones. However some of this material was so crushed that it was very difficult to identify the taxa to which they belonged. Vertebrate bones found in the Owl pellet, formed the basis of identification of small mammals. The following taxa of small mammals viz. *Suncus murinus*, *Rattus rattus*, *Bandicota bengalensis*, *Mus booduga*, *Mus musculus*, *Aves* species could be recorded. The average pellet length of the spotted owl was found to be 2.45 ± 0.75 cm and width 1.3 ± 0.3 . The average dry weight of the pellet was found to be 0.5155 ± 0.2605 gm. The regurgitated pellet consisted of hair, small pieces of vertebrate bones, pieces of insect integuments, insect appendages etc. The following taxa of small mammals viz. *Suncus etruscus*, *Vandleuraria oleracea*, *Mus booduga*, *Mus musculus*, *Mus* species could be recorded. The remnants of insects in the pellets of the owl comprised wings, legs, antennae and head. On the basis of these remnants, insects belonging to the orders Orthoptera (Grasshoppers), Hemiptera (Bugs), Coleoptera (Beetles) were recorded from the pellets.

Table 1- Comparitive Picture of Prey Frequencies (%) and biomass (%) consumed by barn owl and spotted owl in Yavatmal city, Maharashtra, India.

Prey Items	Barn Owl		Spotted Owllet	
	% Relative Abundance	% Biomass	% Relative Abundance	% Biomass
<i>Suncus murinus</i>	61.53	55.34	-	-
<i>Rattus rattus</i>	15.38	27.67	-	-
<i>Bandicota bengalensis</i>	7.69	11.06	-	-
<i>Mus booduga</i>	23.07	3.63	35	36.01
<i>Mus musculus</i>	7.69	1.24	20	21.17
<i>Suncus etruscus</i>	-	-	10	1.41
<i>Suncus</i> species	-	-	10	1.41
<i>Mus</i> species	-	-	35	37.04
<i>Aves</i> species	7.69	1.03	-	-
<i>Vandeularia oleracea</i>	-	-	5	2.94
Coleoptera	-	-	90	-
Orthoptera	-	-	10	-
Hemiptera	-	-	5	-

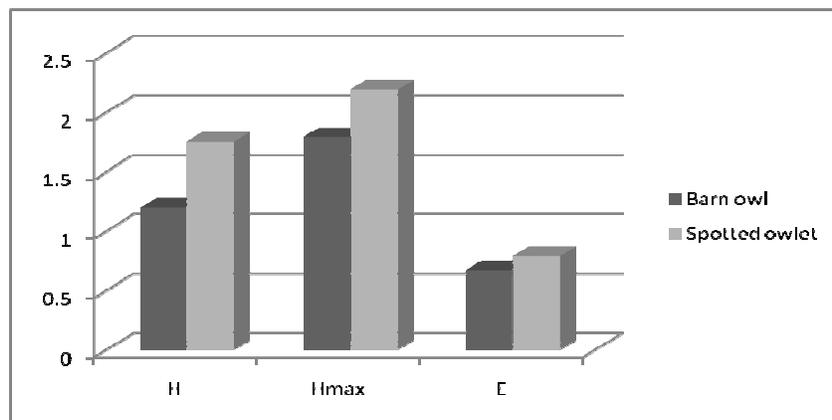


Figure 1 – Comparative Prey diversity and evenness in the diet of Barn owl and spotted owllet.
(H –Shannon's Index, Hmax - Maximum diversity possible, E - Evenness.)

The niche breadth of the Barn Owl and spotted owllet was found to be 3.21 and 4.29 respectively. The food niche overlap between the Spotted Owllet and the Barn Owl in overall diet composition was 0.1313.

DISCUSSION

The average length and width of the pellets of Barn owl and Spotted owllet were similar to those reported by Mohammad and Santhankrishnan (2012) [1].

The pellet analysis of the barn owl showed presence of small mammals as major constituents in the diet. This was according to the Marti (1974) [10] [5,16,34-44]. Numerically, *Suncus murinus* dominated the prey composition (Table 1) as observed by Mohammad and Santhankrishnan (2012) [1]. The presence of insects in the diet of the Barn Owls has been described by many authors in different locations [35,45,46], However in the present study no insects were observed in the diet of barn owl.

The pellet analysis of Spotted Owllet showed that it is not a specialist, with a diet composition of approximately 50% invertebrates and 50% vertebrates of spotted owllet. However Ali et al (2012) reported diet composition of 84.9% invertebrates and 12.1% vertebrates. Among the insect prey, Coleopterans (90%), Orthopterans (10%), Hemipterans (5%) were found, thus it is evident that Coleopterans form the most preferred diet of the raptor. Several previous studies have also confirmed the presence of coleopteran insects as one of the important food resources of the spotted owllet [47-50]. Though we recorded enormous number of appendages, elytra, mandibles and head of various species of beetles in the pellets, we could identify upto the order level due to the paucity of proper methods and key characters for identification. Tariq et al (2003) [51], Shah et al (2004) [52] and Mahmood ul Hassan et al (2007a)[42] studied the food habits of spotted owllet in various localities and all the studies inferred that the coleopteran insects were the most preferred food items.

The proportion of the five species of mammals in spotted owllet diet differed greatly. *Mus booduga* and *Mus* species was found to be the most captured species. *Mus musculus* was the next ranking prey species, followed by *Suncus etruscus* another uncommon species. However in study carried out by Zade et al. (2011) [53] *Mus musculus* was found to be the most captured species. The low evenness index found in the Barn owl (Fig.1) was largely due to their concentration on mammal prey. Similarly the low diversity indices in barn owl show that the diet was based upon the small number of small mammal species most of which were rodents. These results are in corroboration with those of Travaini et al. (1997)[35]. Mohammad and Santhankrishnan 2012 reported that the niche breadth of Barn owl (2.8) was wider than Spotted owllet (2.3), however in the present study we found that the Niche breadth of Spotted owllet (4.29) was considerably wider than Barn owl (3.21). According to Mohammad and santhankrishnan (2012)[1], the low dietary overlap between the two owl species may be due to their different body sizes. The Spotted Owllet is smaller (80–100g) than the Barn Owl (400– 500g) and seems to prefer comparatively smaller prey. The prey size selection of small mammals in the study area indicated that the Spotted Owllet had consumed 68% of the mammals in the 1–20g weight class interval, whereas the Barn Owls had selected 73% mammals with 1–60g weight class interval [54,55]. The observed differences between the Barn Owl and the Spotted Owllet diet in the study area may be caused by several of the factors.

Taken collectively, their body size, prey availability, habitat type used for hunting prey, and hunting techniques allow these owls to minimize potential competition for food. This is evident in the present study where the Spotted owllet fed totally on the mammal prey that weighed between the range of 1- 20g whereas the Barn owl fed on only 31.25% of the mammals that weighed between 1- 20 g.

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