

Prey Preferences of the Spotted Little Owl (*Athene brama*) in the Croplands Near Faisalabad-Pakistan

ZAHID ALI SHAH¹, MIRZA AZHAR BEG[†] AND AKBAR ALI KHAN[†]

Department of Zoology, GC University, Faisalabad-Pakistan

[†]Department of Zoology and Fisheries, University of Agriculture, Faisalabad-Pakistan

¹Corresponding author's e-mail: zahidshah72@hotmail.com

ABSTRACT

A total of 362 pellets of the Spotted Little Owl (*Athene brama*) were secured from the Chadhar and Prokian areas in the district Faisalabad. Per cent relative frequency of occurrence of various food remains in the pellets of the owl indicate that insects (47%) occupy the most preferred position followed by small mammals (28%), birds (12%), plant tissues (11%) and reptiles (2%). Five species of small mammals, namely, *Suncus murinus*, *Rattus melstada*, *Mus musculus*, *Mus booduga* and *Tatera indica* were represented in bony remains and in the trapped sample from the fields in the study areas. Food selectivity and relative encounter values obtained from the bony and horny remains indicated that *R. melstada* was the most preferred species; while, *T. indica* was consumed least frequently. Five orders of insect preys, namely, Orthoptera (grasshoppers), Dictyoptera (cockroaches), Hemiptera (bugs), Hymenoptera (ants) and Coleoptera (beetles) were represented in the food of the owl. Beetles were preyed upon most heavily among the insect preys.

Key Words: Snap-trapping; Insect; Mammals; Birds; Reptiles; *Athene brama*; Spotted Little Owl

INTRODUCTION

The Spotted Little Owl (*Athene brama*) is widely distributed and most common of all the owls in Pakistan (Ali & Ripley, 1968; Roberts, 1991). Small rodents constitute a significant part of its diet (Laursen, 1981; Simeonov, 1983; Akhtar & Beg, 1985). Beg *et al.* (1990) reported that the owl affecting the campus of the University of Agriculture, Faisalabad consumed mainly insects and small mammals; whereas, birds, lizards and amphibians were eaten sparingly. Shah and Beg (2001) noted that the owl's population at the interface of croplands and a sandy wasteland predated in order of decreasing importance, on insects, mammals and birds.

Unfortunately, our knowledge of the ecology of this raptor with reference to our own agro-ecosystem is highly fragmentary and incomplete. This paper reports information about the food and foraging behaviour of the Spotted Little Owl in relation to the changing food and other environmental conditions in the croplands of central Punjab. Information given here can be useful in integrating the owls' rodent suppressing activities in the management of rats and mice populations of the agro-ecosystems.

MATERIALS AND METHODS

A total of 362 pellets of the Spotted Little Owl were collected fortnightly from its roosting sites located in the Chadhar and Prokian areas of district Faisalabad. Different food remnants like bones, hairs, feathers, beaks and claws of birds, and remnants of insect body parts were cleaned under a dissecting microscope from the disentangled contents of

owl's pellets. The skulls and especially the teeth were used to identify the small mammals to species level. The birds were small passerines.

The croplands in the study areas were snap-trapped to know the relative abundance of small mammals that might become the food of the owl. Chesson's maximum likelihood estimator was used to measure prey selectivity. The estimator is defined as follows:

$$\hat{a}_i = \frac{r_i / n_i}{\sum_{j=1}^J r_j / n_j}$$

where, r_i is the proportions of the i th species in the predator's diet and n_i is the proportion of the i th species in the environment. Hedrick *et al.* (1989) was used to measure the relative encounter values defined by the equation below:

$$e_i = \frac{\hat{a}_i}{\hat{a}_i(\max)}$$

where $\hat{a}_i(\max)$ is the largest value. The common farm crops in both the study areas were sugarcane, cotton, fodder and rice. A scrub land made the Chadhar habitat different from that of Prokian which was characterized by a drainage canal and a sandy wasteland.

RESULTS

The frequency of occurrence data taken from the examination of the pellets of the owl indicated that the insects were eaten most frequently (47%) followed by small mammals (28%), birds (12%) and reptiles (2%). The plant

tissues (11%) were also found in the contents of the owls' pellets.

Small mammals. Bones and especially the skull and teeth found in the pellets enabled us to identify the mammals to species level. Table I shows that five species namely, *S. murinus*, *R. meltada*, *M. musculus*, *M. booduga* and *T. indica* were present in the Chadhar sample while four species namely, *R. meltada*, *M. musculus*, *M. booduga* and *T. indica* occurred in the Prokian sample. The picture regarding the utilization of different species of small mammals by the owl during different seasons of the year in the combined data of the two localities did not change much especially in the case of the two numerically dominant species viz. *R. meltada* and *M. musculus*.

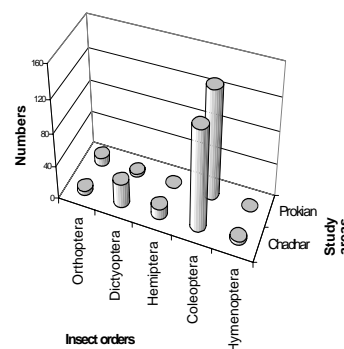
In order to know the relative abundance of small mammals inhabiting the croplands, the latter were snap-trapped in October, February and June using a total of 396 trap nights at Chadhar and Prokian each. At both the localities, the proportions of *R. meltada* was much greater in the sample obtained from the pellets than in the trapped sample. The opposite was true with regard to *T. indica* at Chadhar where its proportion was much greater in the trapped sample. At Prokian, the proportion of this species in the two types of samples was comparable (Table I).

Food preferences. The food selectivity value a_i and relative encounter value e_i was calculated using maximum likelihood estimator (Chesson, 1983). *R. meltada* was the most captured species relative to its abundance both at Chadhar and at Prokian. Owls' preference relative to other species was, in decreasing order, *M. musculus*, *M. booduga*, *S. murinus* and *T. indica* at Chadhar and at Prokian it was *M. booduga*, *M. musculus*, *T. indica* and *S. murinus*. In the combined sample, the order of preference for the various species was similar to that indicated for Prokian (Table II).

Insect preys. The remnant of insects in the pellets of the owl comprised wings, legs, antennae, heads, cuticularised body segments and the genitalia. On the basis of these remnants, insects belonging to the orders Orthoptera (grasshoppers), Dictyoptera (cockroaches), Hemiptera (bugs), Coleoptera (beetles) and Hymenoptera (ants) were recorded from the

pellets. At both the localities, beetles were the major food of the owl as assessed from the relative frequency of occurrence (Fig. 1).

Fig. 1. Frequency of occurrence of different insect orders in the pellets of the Spotted Little Owl (*Athene brama*)



DISCUSSION

As is obvious from the per cent relative frequency of occurrence, the insects were represented in nearly half (47%) of the owls' pellets collected during the study period, which points towards the fact that the insects were the most preferred food ingredient which is in agreement with other studies (Hibbert-Ware, 1938; Beg *et al.*, 1990; Shah & Beg, 2001). Heavy dependence of the Spotted Little Owl (*Athene brama*) on the insects is perhaps because of their easy availability and universal presence. However, the raptor has to put in a lot of effort to gather small bits of biomass to fulfill its nutritional need. Micromammalia (28%) were ranked second in food preference of the owl studies (Hibbert-Ware, 1938; Beg *et al.*, 1990; Shah & Beg, 2001). The presence of Micromammalia in almost one-third of the total owls' pellets is perhaps due to the fact that a large quantity of biomass can be secured in a single attempt compared to the insects where a large number of attempts are needed to procure the same amount of food. Birds were found only in 12% of the pellets of the owl. This low representation of birds in owls' pellets is perhaps because the owl can prey upon small sized birds only (Hibbert-Ware, 1938). The other reason may be that birds offer more resistance to digestion due to their heavy coat of feathers. Plant tissues (11%) came out to be an important and unusual component of owls' food. Owls are known to supplement their food with plant tissues (Thiollay, 1968; Haverschmidt, 1946; Festetics, 1959) perhaps because high fiber content aids in digestion. Plant tissues are also used as binding material for pellet formation (Glue, 1969). Only 2% of the total pellets of the owl exhibited reptile content suggesting that these were consumed only

Table I. Per cent relative abundance of small mammals found in the pellet samples of *Athene brama* and in the trapped samples

Species	Chadhar Numbers (%)	Prokian Numbers (%)	Combined Numbers (%)
Pellet sample			
<i>S. murinus</i>	4(4.9)	0(0.0)	4(2.5)
<i>R. meltada</i>	35(43.2)	24(29.6)	59(36.4)
<i>M. musculus</i>	35(43.2)	32(39.5)	67(41.3)
<i>M. booduga</i>	6(7.4)	10(12.3)	16(9.9)
<i>T. indica</i>	1(1.2)	15(18.5)	16(9.9)
Trapped sample			
<i>S. murinus</i>	8(6.6)	9(8.7)	17(7.6)
<i>R. meltada</i>	10(8.2)	7(6.8)	17(7.6)
<i>M. musculus</i>	56(45.9)	57(55.3)	113(50.2)
<i>M. booduga</i>	6(4.9)	10(9.7)	16(7.1)
<i>T. indica</i>	42(34.4)	20(19.5)	62(27.6)

Table II. The food preference values (ai) and relative encounter values (ei) computed from the average proportions of the small mammals recorded in the pellet (ri) and trapped samples (ni)

Species	Ri	ni	ri/ni	ai	ei
		Chadhar			
<i>S. murinus</i>	0.039	0.067	0.582	0.063	0.083
<i>R. meltada</i>	0.488	0.070	6.971	0.760	1.000
<i>M. musculus</i>	0.420	0.473	0.888	0.097	0.128
<i>M. booduga</i>	0.040	0.058	0.690	0.075	0.099
<i>T. indica</i>	0.013	0.332	0.039	0.004	0.005
		Prokian			
<i>S. murinus</i>	0.000	0.078	0.000	0.000	0.000
<i>R. meltada</i>	0.308	0.073	4.219	0.606	1.000
<i>M. musculus</i>	0.415	0.539	0.770	0.110	0.182
<i>M. booduga</i>	0.118	0.097	1.216	0.175	0.289
<i>T. indica</i>	0.159	0.213	0.746	0.107	0.177
		Combined			
<i>S. murinus</i>	0.019	0.073	0.260	0.032	0.047
<i>R. meltada</i>	0.387	0.070	5.443	0.676	1.000
<i>M. musculus</i>	0.421	0.505	0.834	0.104	0.154
<i>M. booduga</i>	0.089	0.075	1.187	0.148	0.219
<i>T. indica</i>	0.090	0.278	0.324	0.040	0.059

occasionally perhaps because some reptiles are poisonous which may mimic the palatable ones.

The proportions of the five species of small mammals identified on the basis of their bony remnants in the pellets differed greatly from the trapped sample at both the localities. The difference in proportions of various small mammals in the pellets is the result of selective predation by the owl. *R. meltada* was the most captured species at both the localities. *M. musculus* had low selectivity value at both the localities. Compared to this, *M. booduga*, which was represented by approximating that of *M. musculus* at Chadhar and exceeding that of the later species by about two folds at Prokian. *T. indica* had a very low selectivity at Chadhar as compared to that of Prokian. One explanation for this is that the encounter frequencies of the predator with various prey species varied due to prey behaviour or other factors. These values suggest that the owl encountered *R. meltada* most frequently, *M. booduga* about one fifth as often and *T. indica* and *S. murinus* infrequently. One point that deserves consideration here is that *T. indica* and *S. murinus* had greater encounter values at Prokian than at Chadhar. This may be attributed to the habitat conditions available at the two localities. At Prokian, sandy wasteland was extensive and the farm crop grown along the wasteland was not irrigated. Resultantly, the crop along the wasteland was sparsely vegetated enhancing the chances of encounters between the owl and the two prey species viz. *T. indica* and *M. booduga*. Both the species are known to have affinity for sandy soil (Beg & Ajmal, 1977; Roberts, 1977; Rana, 1991). Under representation of *S. murinus* at Prokian in the pellet sample might have been related to better food opportunities in relatively open interface between the cropland and the sandy wasteland than in the vegetationally better covered croplands away from the interface. It is also possible that the

trapped samples do not reflect the true composition of the small mammal community encountered by the owl.

CONCLUSIONS

R. meltada is over represented in the owls' diet and *T. indica* is underrepresented. The reason for under representation of *T. indica* may be that the large sized rodents are probably not swallowed whole by the owl rather it shears the dead bodies of the larger preys and consumes largely fleshy parts avoiding the skulls, limbs, bones and girdles. The *Athene brama* of the present study area heavily depended on insects and small mammals for its food. Among insects, the beetles and orthopterans and among the mammals the rodents were the chief sources of its nutriment. Among the rodents *T. indica* and the mice were the preferred species; whereas, *S. murinus* and *M. hurrianae* seem to be poorly utilized relative to their abundance. The low intensity of consumption of the *S. murinus* by the owl seems related to its aversion towards the shrew possibly because of its musk glands.

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