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MICROMMALS IN THE DIET OF THE LONG EARED OWL (*ASIO OTUS*) AT THE W.W.F.'s OASI SAN GIULIANO (MATERA, SOUTH ITALY)

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ABSTRACT - The presence of small mammals in the winter diet of a dormitory made up of **5** specimens living at the WWF's Oasi San Giuliano (province of Matera) is analysed in the following study. The data confirm the presence of small mammals, Microtinae in particular, as a main prey of the Long-eared Owl. 1921 prey-individuals totalling 37695 grams in biomass were found. Rodentia are dominant (86.93% of the biomass); *Microtus savii* is of particular importance and represents 61.06% of the total biomass and was found in 60.42% of the pellets found. The second most frequently hunted species is the *Apodemus sp.:* 24.06% of the biomass, 37.08% of the frequency. The other mammals preyed on *(Suncus etruscus, Crocidura sp., Pipistrellus sp., Vespertilius sp., Rattus sp., Moscardinus avellanarius)* are of little importance: 1.27% of the biomass. The owls preyed upon 9 of the 11 species of mammals present (the *Talpa sp.* and the *Mus domesticus* are absent). Affinity among different periods, estimated through Sorensen's Index, was found to be medium-high (0.67-0.72). The data analysis confirms the stenophagy of the Long-eared Owl, in this area that is characterised by extensive cereal cultivation and few shrubs and trees. In comparison with other Italian localities, a greater number of preyed species was recorded (8 mammals, 9 birds, 1 insect). Roost owls preyed mainly upon *Chiroptera* (0.36% compared with 0.1-0.2). *Myotis capaccinii* and *Pipistrellus savii* were also found in the diet of the Long-eared Owl for the first time in Italy.

Key words: WWF's San Giuliano Oasi, Long-eared Owl, diet, small mammals.

INTRODUCTION

The Long-eared Owl is territorial during the breeding season. In the winter period, it forms common dormitories together with other animals of the same species. These dormitories can host a variable number of individuals: from a few to hundreds of specimens (Cramp, 1985). The aim of our work is to look into the presence of small mammals in the diet of this bird of prey through the analysis of the pellets found in an area that is very little known from the mammalogy and ornithological point of view. WWF's San Giuliano Oasi covers an area of about 1000 ha in the province of Matera. The annual average temperature at the station of San Giuliano (90 m a.s.l., 1.5 km from the site) is 16.5 °C and the mean annual rainfall is 682 mm (Cantore *et al.*, 1987). In the study area (110 m. a.s.l.) pines are prevalent. They cover about 50% of the area: *Pinus halepensis* (50%), followed by *Cupressus* sp. (30%) and *Eucalyptus* sp. (20%) (Parentini, unpublished data).

MATERIAL AND METHODS

The pellets were gathered from only one site of the Oasis. The first collection took place on 28th October 1988 when the dormitory was found. Further collections took place on 051111'88, 121231'88, 011091'89, 011311'89, 021261'89, *0313*11'89, 051251'89. The pellet analysis method was chosen, a method that has been used widely by many authors (Lovari and Renzoni, 1976; Contoli, 1980). The pellets, after having been collected, were left to dry to a constant weight. Determination

was carried out with the help of a binocular microscope (enlargement: 20x and 40x). The identification of the prey was performed by using upper and lower dental arches of small mammals (Lovari *et al.*, 1976). As far as birds are concerned, a maximum of 13 bone parameters concerning crania were taken by comparing iconographies from literature (Cuisin, 1981; Moreno, 1985, 1986, 1987). Biomass values were extrapolated from the Italian literature available (Brichetti *et al.*, 1981; Toschi, 1965; Toschi and Lanza, 1959; Van den Brink, 1969; Vernier, 1987). In order to determine the biomass of the *Rattus* genus, the method suggested by Di Palma *et al.* (1981) was used. The following indexes were used for the data analysis: species abundance index: T= (S-1)/1nN, in which S= number of taxa found on the site; N= total number of individuals; Gini-Simpson's Index (Gini, 1912); Shannon's Diversity Index (Odum, 1975); Evenness Index (Alatalo, 1981); Trophic Level Index (I.L.T.= Insectivores/Rodents; Contoli, 1980); Environmental Evaluation Index (Contoli, 1980); Environmental Index of Agronomic Type (I.A.A.= Microtinae/Murinae, Contoli, 1980); Dice-Sorensen's or Fauna Affinity Index: S= (2C/A+B), in which C= species found in both periods; A= species recorded in the first period and B= species recorded in the second period.

Results and Discussion

The dormitory was located in a reforestation area of coniferous trees and was made up of five specimens. The pellets, as well as the average number of prey per pellet and Shannon's and Evenness Index, were smaller than those recorded in bibliography. The use of the ground within a radius of 2.5 and 5.5 km around the roost (corresponding to the theoretic home-range and to the maximum distance of removal from the dormitory; Wijnandts, 1984) is represented in Table 1. The data confirm the role of small mammals, Microtinae in particular, as the main prey of the Long-eared Owl. Prey totalling a biomass of 37.695 grams was recorded (Table 2). Rodentia are dominant (86.93% of the biomass) and the *Microtus savii* is of particular importance. It makes up 61.06% of the biomass and 60.42% of the finding frequency in the pellets. The second most frequent species preyed on is the *Apodemus sp.*: 24.06% of the biomass, 37.08% of the frequency. The other mammals preyed on (*Suncus etruscus, Crocidura sp., Pipistrellus sp., Vespertilio sp., Rattus sp., Moscardinus avellanarius)* are of little importance: 1.27% of the biomass. The owls preyed upon 9 of the 11 species of mammals available (Cecere, unpublished data); the *Talpa sp.* and the *Mus domesticus* were absent. The data confirms the stenophagy of this owl, emphasised by the high anthropization of the environment which is characterised by extensive cereal cultivation and few shrubs and trees. In comparison with other Italian localities, a greater number of preyed species has been recorded (8 mammals, 9 birds, 1 insect; Casini *et al.*, 1988; Gerdol *et al.*, 1977; Malvasi, 1995; Malvasi *et al.*, 1995; Plini, 1986; Sublimi Saporetti *et al.*, 1989). In comparison with what is recorded in literature, there is a slightly greater difference in number of the *Chiroptera* in the studied diet: 0.36% compared to the average of 0.104-0.296 (Scaravelli *et al.*, 1983). This may be due to the presence, near the dormitory, of some natural and artificial caves that give shelter to that group of mammals. Moreover, the present data has demonstrated that the Long-eared Owl preys upon the *Pipistrellus savii* and *Myotis capaccinii* (Scaravelli *et al.*, 1993).

In December there was a decrease of *Microtus savii* individuals in the pellets collected. They had been replaced by the *Apodemus sp.*. These data have been widely confirmed by other European studies (Amat *et al.*, 1981; Marti, 1974; Mikkola 1983; Wijnandts, 1984; Tome, 1994). These show that the Long-eared Owl specializes in Microtinae and choose *Murinae* of the same size and similar eco-etology, like the *Apodemus sp.*, to integrate the diet in highly

anthropized environments or when populations of *Microtinae* undergo decreases due to seasonal cycles. The percentage of birds making up this owl's diet and found in other studies (Wijandts, 1984; Marti, 1974; Mikkola, 1983) was also confirmed in this sample, though the values do not exceed 20%. This is probably due to the lack of snow covering and to the presence of an average daily temperature over 0°C. In fact, in the presence of snow covering or during prolonged periods of low temperatures, birds have a predominant presence in the diet of the Long-eared Owl (Wijnandts, 1984). The average biomass values per pellet are in accordance with European literature, too (Cramp, 1980; Wijnandts, 1984). The chi-square parametric test was adopted in order to compare the finding frequencies. The analysis enabled us to ascertain that the finding frequency of the *Microtus savii* and the finding frequency of birds contained in the pellets during the period in question is highly significant ($P<0.01$), while the finding frequency of the *Apodemus* is not significant. Fauna affinity among different periods was calculated by Sorensen's Index and is medium-high (0.67-0.76). Not considering the last period, in which the sample is made up of few pellets ($n=17$), the greatest affinity was observed between the months of December and February. The small presence of insectivores in the pellets was also highlighted by the value of the Environmental Evaluation Index (IVA= 0.017), and could be partly explained by the study period (Mikkola, 1983), and the capture selectivity of the Long-eared Owl (Mikkola, 1983; Cramp, 1985). The capture selectivity of the Long-eared Owl, and the tendency not to prey on insectivores in particular, has been highlighted by several authors (Cramp, 1985). The comparison between environmental indexes (ILT, IVA, IAA) and other research has been only partial, as the data on the presence of prey in the pellets have not always been entirely published (Table 3). The few comparisons made show that the value of the Trophic Level Index (ILT), is higher than the one taken during other research (Casini *et al.*, 1988; Sublimi Saporetti *et al.*, 1989): 0.28 compared to 0.08 and 0.09.

The value of the Environmental Evaluation Index could be a direct consequence of the small presence of Insectivora in the diet. The value of the Agronomic Environmental Index (IAA= 2.68) reflects the moderate degree of anthropization of the environment even if the vegetative community reflects typical situations referable to subordinate series. Since several authors (such as Nilsson, 1981) have highlighted substantial seasonal variations in the diet of the Long-eared Owl, it may be assumed that a mono-seasonal analysis, like this one, could undervalue or even neglect some categories of prey. The selection of prey observed through this research does not show substantial variations between single months. During the period of this study meteorological conditions never reached extreme values (snow covering and/or temperatures under 0°C), therefore variations of availability of the single preyed species with consequent changes in the diet of the Long-eared Owl did not occur (Mikkola 1983; Cramp 1985). The absence of considerable changes in the diet could therefore depend on the homogeneous availability of the prey species.

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Table 1 - The use of the ground within a radius of 2.5km and of 5.5 km around the roost.

Use of the ground	radius of 2.5 km	radius of 5.5 km
cereals	52.23	66.71
lake	29.4	9.7
wood	12.74	15
olive-grove	2.54	4.47
uncultivated land	1.91	3.42
vineyard	1.27	0.79

Table 2 - Prey found in Long-eared Owl's pellets and respective values of numerical (N) and biomass importance; freq, finding frequency in the pellets.

SPECIES	N	N (%)	biomass (g)	biomass (%)	freq
Suncus etruscus	12	0.62	24.00	0.060	1.46
Crocidura suaveolens	7	0.36	24.50	0.060	0.21
Crocidura sp.	1	0.05	7.25	0.020	0.21
Crocidura	20	1.03	55.75	0.140	1.87
Myotis capaccini	1	0.05	11.50	0.030	0.00
Pipistrellus savii	2	0.10	13.00	0.030	0.00
Pipistrellus sp.	4	0.21	36.00	0.090	0.21
Chiroptera	7	0.36	60.50	0.150	0.21
Insectivora	27	1.40	116.30	0.290	2.08
Moscardinus avellannarius	10	0.52	275.00	0.730	0.83
Microtus savii	1161	60.44	23220.00	61.600	60.42
Rattus sp.	1	0.05	94.14	0.250	0.21
Apodemus sp.	432	22.49	9072.00	24.060	37.08
Murinae	433	22.54	9166.00	24.310	37.29
Rodentia	1604	83.50	32661.00	86.640	98.54
Mammalia	1631	84.90	32777.00	86.930	100.60
Motacilla sp.	13	0.68	266.50	0.710	2.29
Troglodytes troglodytes	3	0.16	28.50	0.070	0.42
Erithacus rubecola	1	0.05	16.50	0.040	0.21
Phylloscopus sp.	9	0.47	63.00	0.170	1.25
Parus major	1	0.05	18.00	0.050	0.00
Passer sp.	3	0.15	78.75	0.210	0.62
Fringilla coelebs	53	2.77	1298.50	3.440	1.46
Serinus serinus	3	0.15	34.50	0.090	0.42
Serinus chloris	5	0.26	132.50	0.350	0.21
Carduelis cannabina	2	0.100	37.00	0.100	0.42
Carduelis carduelis	14	0.73	203.00	0.540	1.87
Aves sp.	159	8.28	2717.10	7.210	18.12
Aves	266	13.85	4894.00	12.980	27.29
Coleoptera	1	0.05	1.00	0.002	0.21
Grillotalpa grillotalpa	8	0.42	8.00	0.020	0.21
Ortoptera	1	0.05	1.00	0.002	0.00
Insecta sp.	13	0.68	13.00	0.030	
Insecta	23	1.20	23.00	0.054	3.96
Mollusca	1	0.05	1.00	0.002	0.00

Table 3 - Comparison with other Italian research.

	this paper	Aloise *et al.*, 1995	Casini *et al.*, 1988	Gerdol *et al.*, 1977	Malavasi, 1995	Malvasi et al., 1995 (Palata Pepoli)	Malvasi *et al.*, 1995 (Crevalcore)	Plini, 1986	Sublimi Saporetti *et al.*, 1989
lenght (mm)	32.8 ±8.28		38.7 ±1.09	36.2k8.5	47.0 ± 10.4	47.27±9.21			
weidth (mm)	17.9±2.85		20.2 20.32	20.8 ±0.64	20.7± 2.2	21.8±2.34			
N of pellets	480	521	387	329	300			202	360
N of prey	1921	593	1157	615	655			338	866
N of preyed species	18		15	13	5	11	12	8	
maximun N of prey per pellet	7								
average prey per pellet	1.67 ±0.85	1.14	2.07	1.68 20.64	2.18	2.36	1.9	1.67	2.29
biomass (g)	37695.25		27862	14.436	13770			7558.5	16795.4
avarage meal (g)	32.7		49.8		46.0	58.7	42.18	37.4	46.1
average weight of prey (g)	19.6		24.1		21.0	24.8	22.1	22.4	20.2
species abundance index	2.38								
Gini-Simpson index	0.41		0.36					0.37	
Shannon's index	0.95	0.53			0.87	1.25	1.16		
Evenness	0.33				0.15	0.52	0.46		
ILT	0.28		0.08						0.09
IVA	0.017		0.03					0.003	0.02
IAA	2.68		0.68						9.93

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