*Folia Zool.* – 54(1–2): 99–110 (2005)

# The diet of barn owl in the agricultural landscapes of central Greece

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Received 14 June 2004; Accepted 13 May 2005

A b s t r a c t . The diet of the barn owl from three localities in Thessaly, Central Greece, was studied in the breeding and non breeding seasons over one year. A total of 420 pellets with 1.013 prey items were analyzed. Twelve small mammalian species were taken (94.9% by number and 96.1% by biomass), although *Mus domesticus* (26.3%), *Crocidura* spp. (25.3%) and *Apodemus* spp. (18.4%) were the main species predated by number. Rats (*Rattus* spp.), showed the highest frequency (11%) and biomass percentages observed to date in Greece, and their presence in the barn owl diet is also among the highest in the Mediterranean Europe. Birds (*Passer* spp. and *Carduelis* spp.) and insects (Acrididae) were also present (3.9% and 1.2%, respectively). Ecological niche values, seasonal and geographical differences were tested, the results pointing to the opportunistic feeding behavior of the barn owl in the croplands of central Greece.

**Key words**: *Tyto alba*, feeding habits, rats, Thessaly

## Introduction

The barn owl (*Tyto alba* Scopoli, 1769) is the strigiform with the broadest worldwide distribution (B u r t o n 1984), and its diet has been studied more extensively than that of any other bird of prey (E v e r e t t et al. 1992). Small mammals are the main components of its diet throughout its range, along with variable proportions of birds, reptiles, amphibians, fishes and arthropods (M i k k o l a 1983, C r a m p 1985).

In Mediterranean Europe, information concerning barn owl diet is also abundant. In Italy and Spain alone there are more than 100 papers analyzing different aspects of the owls' diet over the last 30 years (Zoological Records Database). However, in other areas such as in Greece, a country within the border of the breeding and wintering range of the species (A l i v i z a t o s & G o u t n e r 1999), only nine reports have been published on its feeding habits. Half of the information comes from the Greek islands: Crete (P i e p e r 1977, C h e y l a n 1976), Corfu (B ö h r 1962), Kos (N i e t h a m m e r 1989) and the Astypalaia – Dodecanisa islands (A n g e l i c i & R i g a 1994). Mainland studies have been carried out in the scrublands in southwestern Attica (T s o u n i s & D i m i t r o p o u l o s 1992, C h e y l a n 1976) and the northern parts of Greece (A l i v i z a t o s & G o u t n e r 1999, G o u t n e r & A l i v i z a t o s 2003, V o h r a l í k & S o f i a n i d o u 2000).

However, no information exists about central Greece and its agricultural lands, a habitat that probably has the highest density of barn owls in the country. Accordingly, the aims of this study are: i) to provide preliminary information about the presence and distribution of barn owl prey in Thessaly, Central Greece, ii) to compare the owl's diet composition between seasons in each area and among the areas studied iii) to compare our results with others reported for Greece.

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## Materials and Methods

### Study area

The study was carried out in Thessaly, central Greece (Fig. 1), a region with hot and dry summers, (35–40 °C) which are followed by harsh winters with temperatures often falling below zero (-10 °C).

Pellets were collected at three villages in Thessaly (Fig. 1): Messorachi (22°21’36’’E, 39°33’57’’N, 110 m), Stefanovikeio (22°44’11’’E, 39°27’52’’N, 90m) and Armenio (22°41’36’’E, 39°29’09’’N, 90m). For each sampling site, the principal habitats were considered within a 3 km radius (Fig. 1). The villages of Stefanovikeio and Armenio are 6 km distant from each other. By contrast, Messorachi is situated 27 km away in a northwestern direction. At all sites, the barn owl is a breeding species.

A large proportion of the area is cultivated. The main crops are cotton and cereals (Fig. 1), and the annual cycles of these exert important influences on habitat structure. Cotton is planted from seeds during April and it is harvested in September–October. Cereals are planted in November and are harvested in June.


**Fig. 1.** Thessaly with the three sites were used for pellet collection, together with the percentages of each habitat type.

### Methods

Once nesting and roosting sites had been located, "old" pellets were carefully removed during a first visit in March 1999. New collections began in May 1999, taking place at irregular intervals (4 to 6 weeks), and lasted until March 2000 (one year). The pellets collected from May to October 1999 inclusive were categorized as belonging to the "breeding season" while those taken from November 1999 to March 2000 were categorized as belonging to the "winter season". We include the months September and October in the "breeding" period, because we noticed in all sites two broods of young which remained until late October. All pellets were dissected in the laboratory using standard methods (Yalden 1977).

Prey was identified – mainly by cranial remains- using reference books (Lawrence & Brown 1973, Chaline et al. 1974, Niethammer & Krapp 1977, 1982, 1983, Brown et al. 1987, Chinery 1991) and specimen collection. The mean weight of each prey species was taken from the literature (Perrins 1987, Macdonald & Barret 1993, Chinery 1991). All prey items were identified to species level (Table 1).

### Niche parameters

Dietary diversity was assessed by the Food Niche Breadth (FNB) according to Levins (1968): FNB = $1 / \Sigma p_i^2$, where $p_i$ is the proportion of prey category i in the barn owl's diet. The values of this index range from 1 to N (number of prey categories in a diet sample), with larger values indicating a broader niche dimension. Dietary overlap was calculated using a symmetrical index (Pianka 1973): $O = \Sigma p_i q_i / (\Sigma p_i^2 \Sigma q_i^2)^{1/2}$, where $p_i$ is the proportion of prey type i in one dietary sample and $q_i$ the proportion of the same type in the other dietary sample. This index ranges from 0 (signifying no overlap) to 1 (signifying complete overlap), being a measure of diet similarity. These values were multiplied by 100 and presented as percent similarity between diet samples (Marti 1987).

### Other parameters

Prey biomass was obtained from the bibliographical references mentioned above. The biomass contribution of each species to the diet was calculated as the percentage biomass, multiplying the number of individuals in the pellets by the estimated body mass of each prey species divided by the total sum of biomass. The average weight of mammalian prey was obtained by multiplying each prey item by its average weight, summing the products, and dividing the sum by the total number of mammalian prey in the sample (Marks 1984).

The frequency of prey species by season was calculated per location and whole sampling year, and the differences were tested using chi-square tests. All analyses were carried out with the Minitab (12x version) statistical package and the significance level was set to 0.05 (Zar 1999).

## Results

### Frequency and biomass spectrum

A total of 420 pellets was analyzed in this study, with 1.013 identified prey items and a mean of 2.42 prey items per pellet. More than 50 pellets were analyzed in each season and site in order to have more than 100 prey items per locality. Small mammals were the main prey in the

**Table 1.** Frequency (F) and biomass (B) percentages (%) of prey items, found in barn owl pellets from three localities of Central Greece (Thessaly), in the breeding and winter seasons.

| | Messorachi | | | | Stefanovikeio | | | | Armenio | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Breeding** | | **Wintering** | | **Breeding** | | **Wintering** | | **Breeding** | | **Wintering** | |
| | F | B | F | B | F | B | F | B | F | B | F | B |
| Mammals | 95.2 | 93.9 | 95.4 | 90.7 | 96.5 | 98.8 | 90.0 | 96.9 | 96.8 | 97.8 | 92.9 | 87.3 |
| *Crocidura leucodon* | 37.8 | 19.6 | 29.0 | 16.8 | 23.2 | 6.3 | 9.9 | 0.9 | 17.9 | 3.4 | 15.6 | 7.8 |
| *Crocidura suaveolens* | - | - | - | - | 1.5 | 0.3 | 0.8 | 0.1 | - | - | 2.3 | 0.9 |
| *Microtus guentheri* | 11.7 | 24.3 | 1.1 | 2.6 | 3.4 | 3.7 | 0.8 | 0.3 | 4.2 | 3.2 | 0.8 | 1.6 |
| *Microtus rossiaemeridionallis* | 1.3 | 1.9 | - | - | 3.4 | 2.6 | 0.8 | 0.2 | 1.1 | 0.5 | - | - |
| *Microtus thomasi* | 4.3 | 4.8 | 5.7 | 7.0 | 14.4 | 8.4 | 6.6 | 1.3 | 10.5 | 4.2 | 3.1 | 3.3 |
| *Apodemus flavicollis* | 2.6 | 3.7 | 3.4 | 5.4 | 1.5 | 1.1 | 0.8 | 0.2 | 2.1 | 1.1 | 4.7 | 6.4 |
| *Apodemus mystacinus* | - | - | - | - | - | - | - | - | 1.1 | 0.6 | 2.3 | 3.6 |
| *Apodemus sylvaticus* | 20.4 | 26.5 | 17.1 | 24.7 | 8.7 | 6.0 | 7.4 | 1.8 | 8.4 | 4.0 | 31.3 | 38.9 |
| *Rattus norvegicus* | - | - | - | - | 11.4 | 58.5 | 51.2 | 90.5 | 8.4 | 30.0 | - | - |
| *Rattus rattus* | - | - | - | - | - | - | - | - | 11.6 | 41.2 | - | - |
| *Mus domesticus* | 17.0 | 13.2 | 39.2 | 34.1 | 28.9 | 11.9 | 11.6 | 1.6 | 28.4 | 8.1 | 32.0 | 23.9 |
| *Muscardinus avellanarius* | - | - | - | - | - | - | - | - | 3.2 | 1.5 | 0.8 | 1.0 |
| Birds | 3.0 | 5.6 | 4.5 | 9.2 | 0.7 | 0.7 | 9.0 | 3.0 | 3.1 | 2.1 | 7.0 | 12.6 |
| *Passer domesticus* | 2.2 | 4.2 | 2.8 | 6.2 | 0.8 | 0.8 | 5.8 | 2.0 | 2.1 | 1.5 | 5.5 | 10.2 |
| *Carduelis chloris* | 0.9 | 1.4 | 1.7 | 3.1 | - | - | 3.3 | 1.0 | 1.1 | 0.6 | 1.6 | 2.4 |
| Insects | 1.7 | 0.3 | 0.0 | 0.0 | 2.6 | 0.3 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Chorthippus parallelus* | 1.3 | 0.3 | - | - | 1.9 | 0.2 | - | - | - | - | - | - |
| *Locusta migratoria* | 0.4 | 0.1 | - | - | 0.8 | 0.1 | 0.8 | 0.1 | - | - | - | - |
| Total prey items | 230 | | 176 | | 263 | | 121 | | 95 | | 128 | |

barn owl's diet, accounting for 94.9% of the total number and 96.1% by biomass. The mean weight of the mammalian prey was 29.99 g. Birds had a frequency of occurrence of 3.9%, and occupied 3.8% of the biomass, whereas insects appeared with 1.2% and contributed to only 0.1% of the total biomass (Fig. 2).

Among mammals and in terms of frequency of occurrence, the dominant prey species were the western house mouse (*Mus domesticus)*, the bi-coloured white-toothed shrew (*Crocidura leucodon*) and the wood mouse (*Apodemus sylvaticus*) (26.7%, 24.5% and 15.5% respectively).

Prey biomass was inversely related to their frequency of occurrence. Thus, *Crocidura* spp., made up only 6.8% of the total biomass, whereas *Rattus* spp. reached up to 55.5% of the total biomass consumed. The genera *Apodemus*, *Microtus* and *Mus* had a similar contribution to biomass (12.6%, 10.2% and 10.6% respectively) (Fig. 2).

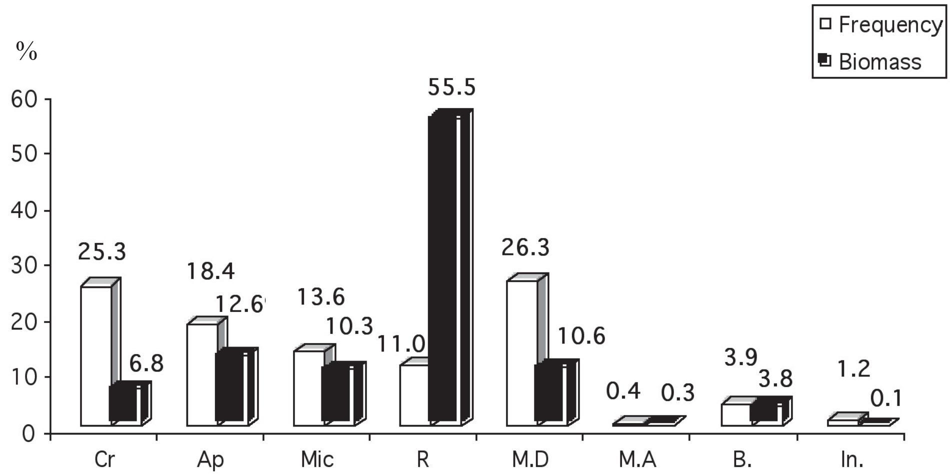


**Fig. 2.** Frequency and biomass percentages of prey in the owl's diet, compiled from all study localities. Explanations: Cr: *Crocidura* spp. Ap: *Apodemus* spp. Mic: *Microtus* spp. R: *Rattus* spp. M.D: *Mus domesticus*. M.A: *Muscardinus avellanarius*. B: Birds. In: Insects.

## Seasonal variation

At all localities, the frequency of occurrence of all the prey genera varied significantly between the breeding and wintering season (Messorachi: $^2$ = 33.53, df = 5, $P < 0.05$; Stefanovikeio: $^2$ = 100.00, df = 6, $P < 0.05$; Armenio: $^2$ = 52.10, df = 6, $P < 0.05$), (Figs 3a-b-c, Table 2). A significant decrease in the intake of *Crocidura* and *Apodemus* was observed at Messorachi and Stefanovikeio during the winter ( $^2$ = 20.83, df = 2, $P < 0.05$; $^2$ = 35.06, df = 2, $P < 0.05$). *C. leucodon* had the highest contribution in both seasons; 28.1% in the breeding and 19.5% in the wintering season. In contrast, the lesser white-toothed shrew (*C. suaveolens*) had a minor contribution of 0.7% in the breeding season and 0.9% out of it; these differences were statistically significant ( $^2$ = 9.76, df = 2, $P < 0.05$). *C. suaveolens* was absent from the barn owl's diet in Messorachi.

Although the frequency of *Microtus* decreased outside of the wintering season in all three study areas, no significant difference was observed ( $^2$ = 1.59, df = 2, ns.). Birds were mainly preyed during winter in all areas, whereas insects, which were preyed only during summer months, were absent from the diet at Armenio.

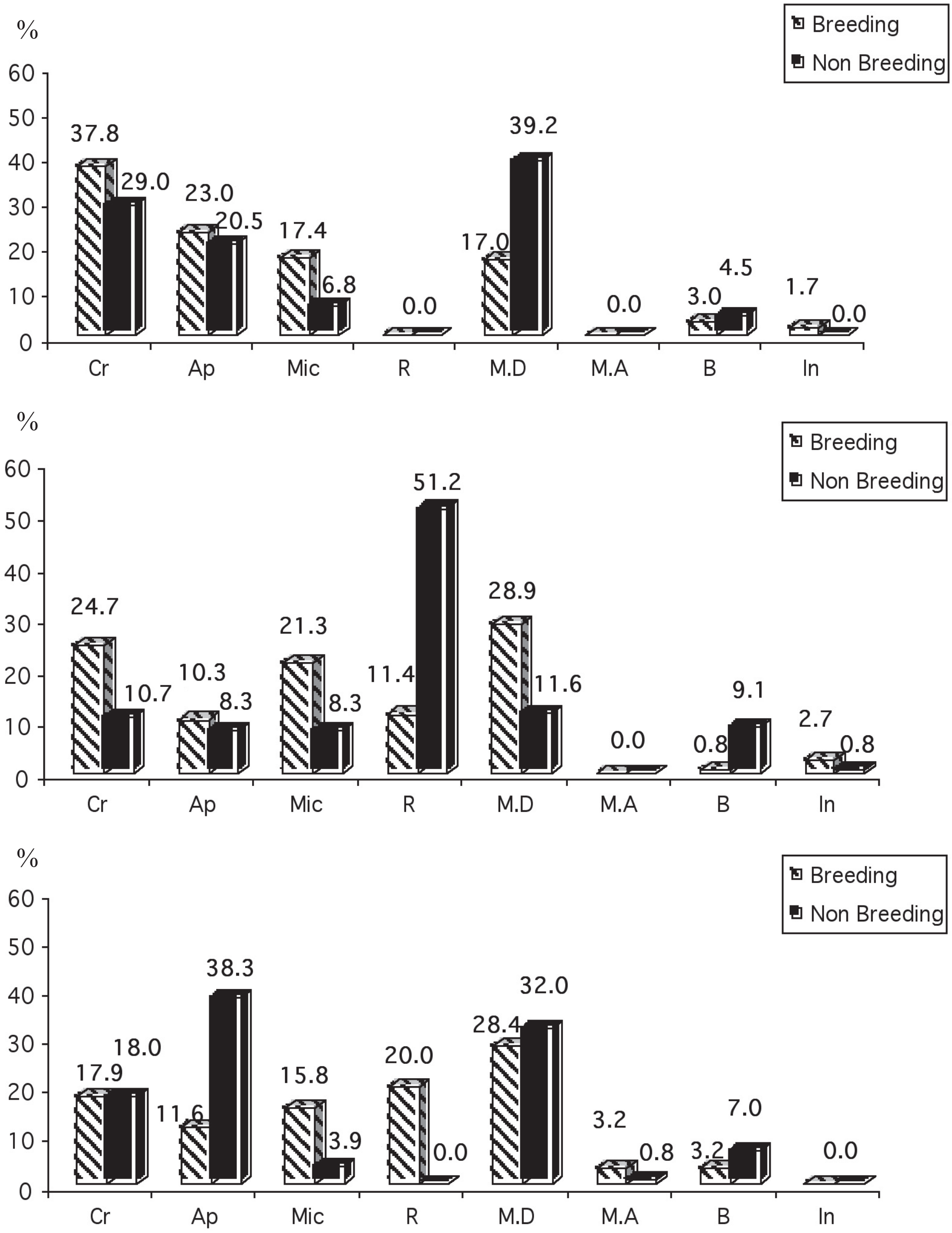


**Fig. 3.** Frequency percentages of prey genera in: (a) Messorachi (b) Stefanovikeio (c) Armenio. Explanations: Cr: *Crocidura* spp. Ap: *Apodemus* spp. Mic: *Microtus* spp. R: *Rattus* spp. M.D: *Mus domesticus*. M.A: *Muscardinus avellanarius*. B: Birds. In: Insects.

*Mus domesticus* was less preyed during the winter season at Stefanovikeio, but increased at the two other sites, the difference being statistically significant ( $^{2}$ = 52.95, df = 2, $P < 0.05$). Rats (*Rattus norvegicus* and *R. rattus*) showed an increase in the diet during the winter season at Stefanovikeio, whereas at Armenio they were completely absent from

**Table 2.** Ecological values: **FNB**: Food Niche Breadth, **O** (%): Dietary Overlap.

| | | FNB | | | O (%) |
|---|---|---|---|---|---|
| | Breeding | 4.33 | | Breeding | 81 |
| **Messorachi** | Wintering | 3.67 | **Mes-Stef** | Wintering | 33 |
| | Total | 4.32 | | Total | 76 |
| | Breeding | 5.49 | | Breeding | 76 |
| **Stefanovikeio** | Wintering | 3.33 | **Mes-Arm** | Wintering | 91 |
| | Total | 5.80 | | Total | 91 |
| | Breeding | 6.43 | | Breeding | 94 |
| **Armenio** | Wintering | 4.3 | **Stef-Arm** | Wintering | 31 |
| | Total | 5.59 | | Total | 79 |
| | Breeding | 5.71 | | | |
| **Total (Localities)** | Wintering | 5.39 | | | |
| | Total | 5.79 | | | |

the diet in the same season, the difference being statistically significant ( $^2$ = 26.34, with Haber correction for continuity df = 1, P < 0.05). *Apodemus* decreased at Stefanovikeio, but increased at Armenio during the winter season ( $^2$ = 35.05, df = 2, P < 0.05). Of the three *Apodemus* species included in the owls' diet, *A. sylvaticus* had the highest percentage among seasons (13.3% in breeding and 18.6% in winter), whereas the yellow-necked mouse (*A. flavicollis)* and rock mouse (*A. mystacinus)* were scarcely preyed upon (Table 1).

## Geographical variation

The presence of different prey species between localities and their contribution to the barn owl's diet are shown in Fig. 4. During the study, *M. domesticus* contributed a significantly higher percentage at all three sites (Messorachi: 26.6%, Stefanovikeio: 23.4%, Armenio: 30.5%), ( $^2$ = 9.05, df = 2, P < 0.05). Messorachi had the highest *Crocidura* spp. intake (34%); Stefanovikeio the highest *Microtus* percentage (17.2%), and Armenio had the highest *Apodemus* percentage (26.9%), all these differences being statistically significant (*Crocidura* spp: $^2$ = 52.21, df = 2, P < 0.05; *Microtus spp*: $^2$ = 24.17, df = 2, P < 0.05; *Apodemus* spp: $c^2$ = 21.90, df = 2, P < 0.05). The sibling vole (*Microtus rossiaemeridionalis*) made a minor contribution to the total diet (1.4%); Guenther´s vole (*M. guentheri*) was mostly preyed at Messorachi (7.1%) and Thomas´s vole (*M. thomasi*) was mainly taken at Stefanovikeio and Armenio (12% and 6.3% respectively). These differences were statistically significant (*M. guentheri*: $^2$ = 21.86, df = 2, P < 0.05; *M. thomasi*: $^2$ = 21.70, df = 2, P < 0.05).

Rats were absent from the prey taken in Messorachi, but were present at the other two sites, with a significantly higher frequency of appearance at Stefanovikeio ( $^2$ = 46.00, with Yates´s correction, df = 1, P < 0.05). The brown rat (*R. norvegicus*) had the highest percentage (9.9%) whereas the black rat (*R. rattus)* was preyed at 1.1%. Armenio was the only site where *R. rattus*, *A. mystacinus* and the common dormouse (*Muscardinus avellanarius*) appeared in the diet. Birds were randomly preyed in almost equal proportions among sites (Messorachi: 3.7%; Stefanovikeio: 3.4%; Armenio: 5.4%) without significant differences ( $^2$ = 0.35, df = 2, ns.), as well as insects (Acrididae), which are a negligible prey due to their low contribution in frequency and biomass.

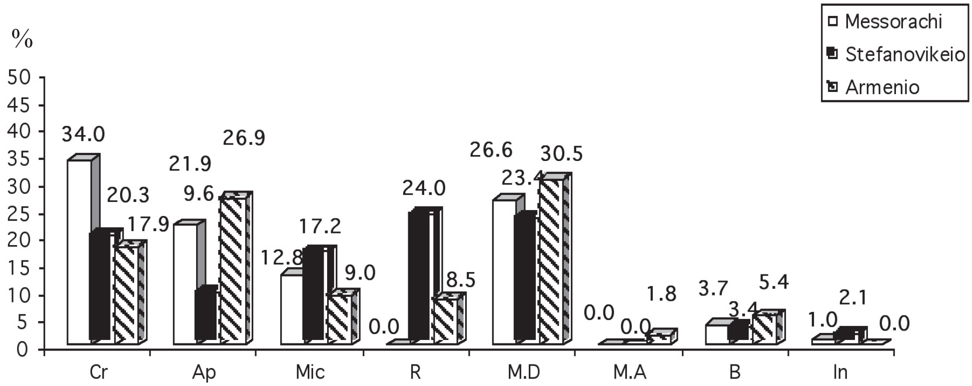


**Fig. 4.** Total frequency percentages of prey genera in all three localities (Messorachi, Stefanovikeio, Armenio). Explanations: Cr: *Crocidura* spp. Ap: *Apodemus* spp. Mic: *Microtus* spp. R: *Rattus* spp. M.D: *Mus domesticus*. M.A: *Muscardinus avellanarius*. B: Birds In: Insects.

## Discussion

Small mammals were the most important prey in the barn owl's diet in agricultural sites in central Greece. On the mainland of Greece (Tsounis & Dimitropoulos 1992, Goutner & Alivizatos 2003, Cheylan 1976), as well as on islands such as Kos (Niethammer 1989), Corfu (Böhr 1962) and Crete (Cheylan 1976), the barn owl has been reported to prey highly on *Mus* spp. (47.1%, 31%, 19%, 46.9%, 14.3% and 72% respectively). In this study, *M. domesticus* also had the highest frequency percentage (26.3%) among the prey taken. In northern Greece, through a combination of pellet analysis and trap plots, it has been shown that the dominance of mice in the owl's diet is rather due to the fact that it is the most abundant prey in the study area (Goutner & Alivizatos 2003, Vohralík & Sofianidou 1992). In our study, the fact that *Mus domesticus* was the prey most taken is also probably related to its dominance in the area, although no further proof is currently available.

The results also show that rats form a high percentage (11%) of the diet. Both rat species (*R. norvegicus* and *R. rattus*) formed 55.5% of the total biomass consumed (Fig 2); these findings are also the first report in Greece where rats contribute such high percentage by number, and more than half of the total biomass. Since *Rattus* species are often decapitated before they are swallowed (Morton et al. 1977), it is possible that their numbers could be even higher, since some pellets contained no cranial remains. In other parts of Greece, rats have always been a minor dietary constituent: 1% in northern Greece (Goutner & Alivizatos 2003), 3.1% in Corfu (Böhr 1962) and 4.1% in Kos (Niethammer 1989), whereas in other localities, *Rattus* spp. were absent from the barn owl's diet; Attica-Hymmetus (Tsounis & Dimitropoulos 1992) and Crete (Pieper 1977).

In Mediterranean Europe, such as the Iberian and the Italian Peninsulas, rats also contribute a minor percentages to the barn owl's diet; thus in Western Spain: 0% (Amat & Soriguer 1981), Southwestern Spain: 1% (Herrera 1974a), Southeastern Spain: 2% (Vericad 1976), Southern Spain: 4% (Vargas & Antunez 1981–82), Central Spain: Salamanca – 0.2% (Campos 1978), Sierra de Guadarrama – 0.06% (Veiga 1978(1980)), the high plateau – 0% (Delibes et al. 1984), Northern Spain: 0.8% (Gonzalez et al. 1993); Northern Italy: 0.6% (Montanari 1995), Southern Italy: 3.2% (Contoli et al. 1978), Northeastern Italy: 2.8% (Bon et al. 1997), Eastern Italy:

0.7% (Bon & Bazzani 1999), Central Italy: 0.3% (Capizzi & Luiselli 1995), 0% (Guidoni et al. 1999), 2.3% (Petretti 1977), Sicily: 2.6% (Catalisano & Massa 1987). Outside the Mediterranean, rats conprised 4.5% of the diet in the Canary Islands (Aurelio et al. 1985).

The different amounts of urban areas among the study areas (Messorachi 1.5%, Stefanovikeio 8.0%, Armenio 6.7%) could be related to the rats' abundance in the barn owl's diet in central Greece, since *R. norvegicus* which was highly preyed, is a species closely linked to urban habitats (Becker 1978). In fact, in urban areas of Sicily- Italy (Maurizio 1999), the intake of rats by barn owls has a similar high percentage (11.32%), to those observed in the present work. In contrast, at Messorachi, where there is the smallest urban area, no rats were included in the diet.

Armenio, the only locality with orchards, natural grasslands, and a heterogeneous (mosaic-like) landscape, is the only site in which certain species, such as *R. rattus*, *M. avellanarius* and *A. mystacinus,* appear. The former two are related to tree – growing areas and farmland hedgerows (Montgomery 1985, Bright & Morris 1996), and the latter to rocky habitats (Storch 1978).

Geographic variation was marked between localities. The highest *Microtus* frequency was recorded at Stefanovikeio, which has the most appropriate habitat for voles, 92% of its surface being permanently irrigated land, offering open croplands with a stable vegetation cover during most of the year. Shrews, although in general distasteful to many predators (Alivizatos & Goutner 1999), are taken in great numbers by barn owls, a fact often related to local availability of this prey (Bunn et al. 1982, Mikkola 1983). Thus, Messorachi, which has the highest percentage of non-irrigated arable land (34%), offers an appropriate environment for *C. leucodon*, and it was accordingly highly preyed upon (34%). Armenio, with a greater degree of habitat fragmentation, had the highest intake of *Apodemus* spp. (26.9%). These geographical dissimilarities are also reflected in the ecological niche values mentioned in Table 2, with the food niche breadth ranging from 3.33 up to 5.80 and the diet overlap ranging from 33–91%. At Messorachi, where *Rattus spp*. and *Muscardinus avellanarius* are absent from the owls' diet, the FNB value was 4.32, whereas at Stefanovikeio and Armenio, where rats and dormice appear, the niche dimension increased up to 5.80 and 5.59 respectively. Nevertheless, although Stefanovikeio and Armenio are "neighboring" localities, a greater diet overlap can be observed between Messorachi and Armenio (O=91%).

Geographical variations in prey use by the barn owl have been attributed to different factors such as habitat, location, altitude, rainfall and temperature (Herrera 1974b, Marti 1974, Torre et al. 1996, Yom Tov & Wool 1997). In our study area, the climatic characteristics and altitude are similar. Thus, the geographical particularities in small mammal diversity, along with habitat structure, are probably the factors involved in prey selection in the sites studied, as reported by Marti (1988).

All prey genera (except *Microtus* spp.) at the three localities showed significant variations between seasons; however, none of them seemed to follow a general pattern. *Microtus* spp. were the only prey to decrease homogeneously (Fig. 3) during winter season. As reported earlier (Giger 1965, Glue 1974), in geographic areas with large percentages of irrigated farming –an ideal habitat for voles- *Microtus* spp. are predominant in the barn owl's diet. In this study, voles also showed high percentages, and their decrease during the winter season is possibly related to the cotton harvest in October, which radically alters the soil surface. *M. domesticus* varied significantly through all areas between seasons, but only decreased at Stefanovikeio during the winter season, while it increased at the other localities. This peculiarity is possibly related to the synchronized increase and availability of *Rattus* spp. (Fig. 3), which are absent from the owl's diet at the other sites during the winter. *Crocidura* and *Apodemus* spp. were captured less during the winter at Messorachi and Stefanovikeio, but at Armenio the former species remained stable and the latter increased significantly. This change at Armenio is probably related to the absence of *Rattus* spp. and the strong decrease in *Microtus* spp. from the owl's diet at this locality.

The fluctuations in prey variety are also reflected in the different niche values between seasons. At Stefanovikeio, where the intake of *Rattus* spp. during the wintering season is high, the FNB decreased from 5.49 to 3.33. At Armenio, during winter the prey captured was also less diverse than in the breeding season, *Rattus* spp. being completely absent. Thus, a similar decrease from 6.43 to 4.30 was observed. Finally, birds and insects were the only prey items that were preyed upon in a more season-dependent way. Birds probably increase in the barn owl's diet during the winter because they are easier to capture at communal winter roosts, a fairly successful hunting technique used by the owl (Sage 1962, Fernandez & Garcia 1971), whereas insects decrease during the winter months, as expected.

Seasonal differences in diet have been reported in other studies and have been attributed to seasonal fluctuations of mammalian prey, to climate changes, and to habitat alterations (Campbell et al. 1987, Taylor 1994, Webster 1973, Brown 1981, Goszczynski 1981). The seasonal variations in the diet of the barn owl could be related to the annual agricultural cycle and how this affects the population cycle of small mammals by changing the soil surface. However, to date there is an absence of data concerning small mammal biology, distribution and dynamics in the area. In any case, the barn owl in Thessaly displays a highly opportunistic behavior, as in other places of the world (Glue 1967, Herrera 1974a, Marti 1974, Jaksic & Yanez 1979).

Acknowledgements

One author (V. Bontzorlos) is the recipient of a grant "BecasMAE – AECI", and S. P a MEC travel grant. We also wish to thank to Efthimios Dafos for his help during field and laboratory work. The first draft was greatly improved from two anonymous reviewers and the managing editor, Dr Pavel Bláhák. Prof. C. Mason made the linquistic revision.

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