

Food of the Barn Owl *Tyto alba* in Southern Syria

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Abstract. Pellets regurgitated by the Barn Owl *Tyto alba* were collected from three different localities in southern Syria. Investigation of 184 complete pellets yielded 407 individual prey. Prey items represented eight species of rodents, two shrews, at least two small birds, and at least three species of insects. As percentages, rodents constituted 85.5% of the prey items, small birds 6.9%, shrews 5.9% and insects 1.7%. By biomass, rodents constituted most of the Barn Owls' diet. Pellet content indicated that the Barn Owl consumes 1 to 7 prey individuals per day (2.23 ± 1.34) depending on availability and the size of prey species. The results prove that the Barn Owl is an important natural enemy of agricultural vertebrate pests in its hunting territory.

Key words: Barn Owl, *Tyto alba*, food, rodents, Syria.

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I. INTRODUCTION

The majority of papers that dealt with owl pellets from Syria were devoted to the systematics, distribution or species diversity of small mammals preyed on by owls (BATE 1945; PRADEL 1981; KOCK and NADER 1983; KOCK 1998; SHEHAB et al. 1999). Only one paper aimed at determining the role of owls as natural enemies of vertebrate pests in agricultural areas (SHEHAB et al. 2000).

The Barn Owl, *Tyto alba* (SCOPOLI, 1769) and the Little Owl, *Athene noctua* (SCOPOLI, 1769), are the most abundant owl species in agricultural areas in Syria. The small size and diurnal activity of the Little Owl reduce its ability to attack rodent pests. AL-MELHIM et al. (1997) reported that the main food of the Little Owl in Jordan were reptiles (35.5%) and arthropods (35.4%), while small mammals constituted only 21.8% of prey items. Due to the large size and nocturnal activity of the Barn Owl, most of its food consists of small mammals, particularly rodents. RIFAI et al. (1998) illustrated that 87% of the Barn Owl's diet consisted of rodents. RUPRECHT (1979) concluded that the relatively small individual territory of the Barn Owl and low degree of digestion of skeletal elements of prey make it an ideal species for use in investigations on the distribution and age structure of populations of small vertebrates.

The purpose of this paper is to analyze the diet of the Barn Owl in the southern parts of Syria to determine importance of this species as natural enemy of vertebrate agricultural pests. It also contributes to the knowledge of small mammals inhabiting this area.

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II. MATERIAL AND METHODS

Pellets accumulated under roosts of Barn Owls were collected from the following three locations in Southern Syria (Fig. 1).

1. Khrab Al-Shaham: 10 km west of Daraa city

On 16.05.2000 forty-one pellets were collected from a cave at Al Yarmouk river valley, very close to the Syrian-Jordanian border. The Barn Owl nested in the cave's ceiling and another owl was found dead on the floor.

2. Al-Mozirieb: 11 km NW of Daraa city

On 17.05.2000 sixty pellets were collected from Al-Mozirieb cow farm. The Barn Owl nested on a column inside a large hayloft. The collected pellets were intact because they were regurgitated over straw packages.

3. Kharabow: 20 km east of Damascus city center

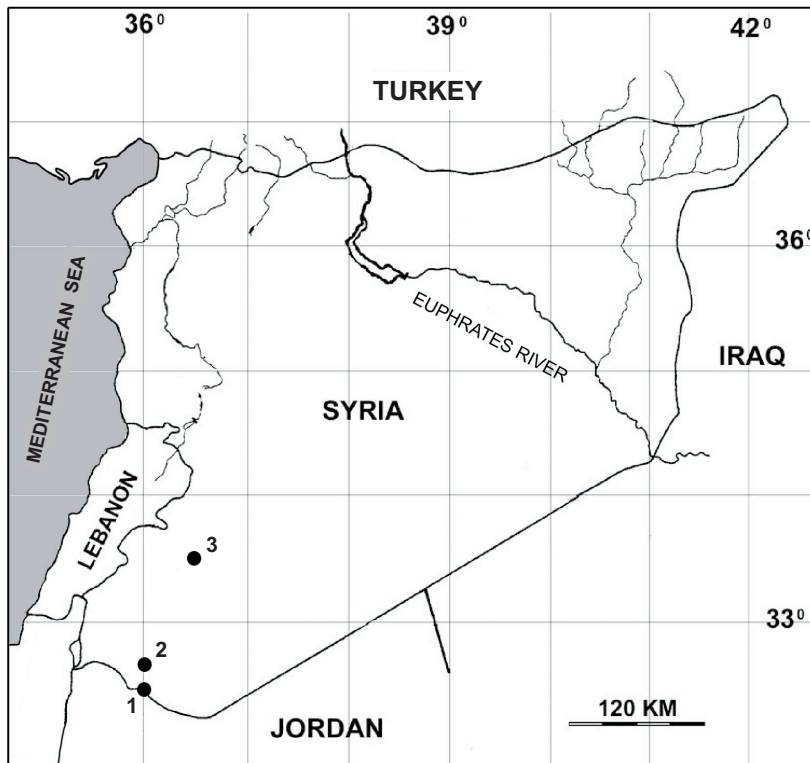


Fig. 1. Map of Syria, with locations where pellets were collected: 1 – Khrab Al-Shaham, 2 – Al-Mozirieb, 3 – Kharabow.

On 25.06.2000 eighty-three complete pellets were collected from the eastern side of the old building of the Agricultural Institute. The nesting sites were over the artificial carton roofs of a recital hall and the library. Incomplete pellets also collected from this area were not included in this study.

External measurements for intact pellets were recorded. Each pellet was dipped in water for a few seconds until saturation; all skulls, cranial bones and undigested insect remains from each pellet were removed and kept separately in a suitable, labeled plastic container.

Small mammals were identified based on their skulls, mandibles and check tooth structure. Illustrations reported by HARRISON and BATES (1991) and skulls derived from live specimens collected from Southern Syria were used for comparison.

The number of prey items in each pellet was taken as mentioned by RACZYŃSKI and RUPRECHT (1974), species frequency as reported by RIFAI et al. (1998).

Material included in this study is housed in the collection of the Animal Division, General Commission for Agricultural Scientific Research (GCASR) Damascus, Syria.

III. RESULTS AND DISCUSSION

The Barn Owl pellets were cylindrical in shape, dark green in color, measuring 18-32 mm in diameter and 30-67 mm in length.

Table I shows measurements of intact pellets from three different locations in Southern Syria.

Table I

Measurements (mm) for intact pellets of the Barn owl in southern Syria

Locality	Dimension	min	max	average	Sd	N
Al-Mozirieb	diameter	18	27	24.39	1.98	33
	length	30	67	42.45	9.98	33
Khrab Al-Shaham	diameter	22	26	24.44	1.18	41
	length	31	66	43.51	8.45	41
Kharabow	diameter	20	32	27.03	2.68	29
	length	30	63	40.17	7.32	29

Number of prey items per pellet (Table II) ranged from 1 to 7, the average for 184 pellets was 2.23 ± 1.34 .

Table II

Number of prey items found in the pellets of Barn Owls in southern Syria (value 0 was given for pellets which did not contain cranial remains)

Locality	min	max	average	Sd	N
Al-Mozirieb	0	7	2.48	1.25	60
Khrab Al-Shaham	0	4	1.39	0.97	41
Kharabow	0	6	2.46	1.39	83

The number of prey items in each pellet seems to be related to the size of the prey species. The average number of prey individuals was low in Khrab Al-Shaham (1.39 ± 0.97 prey/pellet) because most prey taken by the Barn Owl were relatively large or medium sized rodents *Meriones tristrami* 22.41%, *Spalax leucodon* 5.17% and *Cricetulus migratorius* 22.41 %.

The average volume of pellets was 19.86 cm^3 , 20.40 cm^3 and 23.01 cm^3 for Al-Mozirieb, Khrab Al-Shaham and Kharabow, respectively. The larger volume of pellets from Kharabow may be interpreted as the same average of prey items per pellet between this location and Al-Mozirieb in spite of consuming larger prey items such as *Rattus norvegicus*.

Five pellets contained post-cranial elements without skull remains for medium sized prey species (e.g. *Meriones tristrami* and *Spalax leucodon*), whereas some pellets contained cranial remains only. RACZYŃSKI and RUPRECHT (1974) quoted that it is also necessary to take into account the possibility that owls might eat only the heads of rodents, particularly during a period when the latter are very abundant. Considerations such as these suggest that to base an estimate of the mass of food consumed on bone remains alone may entail a considerable degree of error.

SMALL MAMMALS

Small mammals were the main food of the Barn Owls (Table III), constituting 91.4% of the total number of prey items, including Rodentia (85.5%) and Insectivora (5.9%).

Table III

Diet of the Barn Owl, *Tyto alba*, in three different localities in Southern Syria

Taxa	Al-Mozirieb		Khrab Al-Shaham		Kharabow		Total	
	MNI	%	MNI	%	MNI	%	MNI	%
<i>Mus musculus</i>	46	32.17	16	27.58	130	63.11	192	47.17
<i>Microtus socialis</i>	41	28.67	8	13.79	3	1.46	52	12.78
<i>Cricetulus migratorius</i>	23	16.08	13	22.41	–	–	36	8.85
<i>Meriones tristrami</i>	10	6.99	13	22.41	–	–	23	5.65
<i>Apodemus mystacinus</i>	–	–	–	–	21	10.19	21	5.16
<i>Rattus norvegicus</i>	–	–	–	–	18	8.74	18	4.42
<i>Dryomys nitedula</i>	–	–	–	–	3	1.46	3	0.74
<i>Spalax leucodone</i>	–	–	3	5.17	–	–	3	0.74
<i>Crocidura suaveolens</i>	10	6.99	–	–	13	6.31	23	5.65
Shrew (large)	1	0.70	–	–	–	–	1	0.25
Birds	9	6.29	3	5.17	16	7.77	28	6.88
Insects	3	2.10	2	3.45	2	0.98	7	1.72
Total	143	100	58	100	206	100	407	100
Number of Pellets	60		41		83		184	

Rodentia

The percentage of rodent remains was 83.9% for Al-Mozirieb, 91.4% for Khrab Al-Shaham and 85 % for Kharabow.

Eight rodent species belonging to four families were identified (Muridae: *Mus musculus*, *Apodemus mystacinus*, *Rattus norvegicus*; Cricetidae: *Cricetulus migratorius*, *Microtus socialis*, *Meriones tristrami*; Gliridae: *Dryomys nitedula*; Spalacidae: *Spalax leucodon*).

House Mouse *Mus musculus* LINNAEUS, 1758

Remains of the House Mouse were the basic component of Barn Owls pellets, constituting 47% of the total number of prey items. It was the predominate prey species in all locations: 32.17% for Al-Mozirieb, 27.58% for Khrab Al-Shaham and 63.11% for Kharabow. The number of mice per pellet ranged from 1 to 6 individuals. The percentage of *M. musculus* was high in the diet of the Barn Owl nesting beside commensal areas, which may be favorable for plagues of this rodent species (RUPRECHT 1979), whereas it was low in pellets collected from rural areas (RIFAI et al. 1998).

Social Vole *Microtus socialis* (PALLAS, 1773)

The Social Vole constituted 12.78% of the total number of prey items. The percentage of this species in the material from Al-Mozirieb was relatively close to that of the House Mouse: 28.67 % and 32.17% respectively, while it was 13.79% at Khrab Al-Shaham representing the fourth grade of abundance, whereas it was very rare, 1.46% at Kharabow. The number of the Social Voles per pellet ranged from 1 to 3 individuals. Social Voles are abundant in open areas and during outbreaks of vole populations this rodent species is the most abundant in the hunting territory of the Barn Owl, making the basic food for owls.

Gray Hamster *Cricetulus migratorius* (PALLAS, 1773)

The Gray Hamster constituted 8.85% of the total number of prey items. It ranged third in abundance in the material of Al-Mozirieb (16.08%), and second in Khrab Al-Shaham (22.41%), whereas it was absent from Kharabow.

This species was found in owl pellets collected from Krak des Chevaliers in central Syria (PRADEL 1981), and in the pellets of the Barn Owl from Ebla, northern Syria (SHEHAB et al. 1999). Seeds of various species (wheat, corn, melon, oat) were found only in pellets containing remains of Gray Hamsters and it was easy to predict the presence of this species in a pellet before investigation when seeds were seen on its surface. SHEHAB et al. (1999) interpreted the presence of cereal grains (wheat and barley) as a consequence of owls preying on hamsters during nocturnal foraging when the cheek pouches of the latter are filled with seeds.

Tristram's Jird *Meriones tristrami* THOMAS, 1892

This rat size jird made up 5.65% of the total number of prey items. It constituted only 6.99% of the remains of Al-Mozirieb, while it was very abundant in the material of Khrab Al-Shaham (22.41%) where it shared with the Gray Hamster the second grade of abundance, whereas it was absent from the material of Kharabow.

Four pellets contained post-cranial remains of one individual, but did not contain cranial bones (such pellets were considered as without prey), whereas other pellets contained only cranial remains. This suggests that the Barn Owl may divide large prey for two meals, or share meals with a partner or with nestlings as mentioned by BOCHENSKI et al. (1993). In spite of this, the remains of two jirds or a jird and another medium sized prey species (Gray Hamster or Social Vole) were found in one pellet.

Broad-toothed Field Mouse *Apodemus mystacinus* (DANFORD & ALSTON, 1877)

The remains of this species constituted 5.16% of the total number of prey items. It was recovered only from the material of Kharabow, where it formed 10.19% of the remains. The Broad-toothed Field Mouse was recovered from owl pellets in different locations in Syria (unpublished data).

Norway Rat *Rattus norvegicus* (BERKENHOUT, 1769)

This large sized rat was taken by the Barn Owl of Kharabow only, its remains constituted 8.74% at that location, which was 4.42% of the total number of prey items. Measurements of skulls and cranial remains of this species indicated that they were juveniles or subadult individuals.

The cow farm that is 100 meters away from the nesting site at Kharabow where Norway rats were abundant provided a good source of food for the Barn Owls, whereas at Al-Mozirieb's cow farm no Norway rats were found in the pellets.

Forest Dormouse *Dryomys nitedula* (PALLAS, 1779)

This arboreal species is very rare in the study area but is still found in forests of the coastal region and in some locations along the Barada river valley, causing variable damage to orchards (SHEHAB et al. 2003). The remains of the Forest Dormouse were found only in the material of Kharabow, constituting 1.46% of the Barn Owl food there, and 0.74% of the total number of prey items in this study. The presence of this species (as chance food) in the diet of the Barn Owl may be due to either the rarity of the forest dormouse in the hunting territory or difficulty in hunting arboreal species by the Barn Owl. OBUCH (2001) reported that the percentage of dormice in the diet of the Barn Owl in Syria was 0.05 % of the prey.

Mole Rat *Spalax leucodon* NORDMANN, 1840

Remains of Mole Rats were found only in material collected from Khrab Al-Shaham constituting 5.17% of the Barn Owl's food, and 0.74% of the total number of prey items.

Mole Rats are adapted largely for subterranean life and rarely appear above soil surface where they become prey for owls (HARRISON and BATES 1991; QUMSIYEH 1996). The presence of this species in the pellets of Khrab Al-Shaham and its absence from the two other locations do not mean that its distribution is restricted to the first location, but suggests that the barn owl attacks available helpless prey. It also may suggest that the hunting territory of the Barn Owl is more extended in rural areas.

Insectivora

Two species belonging to the family Soricidae were recovered from the pellets: the lesser white-toothed shrew *Crocidura suaveolens* (PALLAS, 1821), and another unidentified larger shrew. The remains of the lesser white-toothed shrew constituted 6.99% of the material of Al-Mozirieb and 6.31% of those from Kharabow, while no insectivore remains were found in the diet of the Barn Owl at Khrab Al-Shaham which is considered less suitable for shrews than the other locations. The abundant occurrence of this shrew may be explained by the presence of Al-Mozirieb Lake and the wet meadows, where this shrew finds favorable or optimal conditions as mentioned by RUPRECHT (1979). The lesser white-toothed shrew is known from areas with enough humidity and dense vegetation to support the varied insect diet of this species (QUMSIYEH 1996). In 1985 Khaled Al Housien trapped 15 specimens of the lesser white-toothed shrew in the same area not far from Al-Mozirieb Lake (personal communication).

Remains of a larger shrew (one skull only) were found in the material of Al-Mozirieb, proving the existence of another species of shrew in this hunting territory.

SMALL BIRDS

Remains of at least two species of small birds constituted 6.88% of the total number of prey items. The most abundant was the House Sparrow *Passer domesticus* (LINNAEUS, 1758). The percentage of small birds was similar at all locations: 6.29% for Al-Mozirieb, 5.17% for Khrab Al-Shaham and 7.77% for Karabow (Table III). These results suggest that the small birds form a supplementary component of the Barn Owls' food. It is worth pointing out that the Barn Owl regulates populations of sparrows that may become agricultural pests in some field crops and orchards. RUPRECHT (1979) mentioned that the sociability of the sparrows and their noisy behavior were additional factors that made it easier for owls to catch them.

INSECTS

Insects represented a chance food for the Barn Owl in southern Syria (1.72%). Only seven insects were recovered from the material of this study: one Moroccan locust *Dociostaurus maroccanus* (THUBERG, 1815), one mole cricket *Gryllotalpa gryllotalpa* (LINNAEUS, 1758), and five unidentified medium sized beetles represented by more than one species. In respect of biomass, the weight of the recovered insects together does not exceed the weight of one house mouse. RIFAI et al. (1998) compared results of the diet of the Barn Owl from different parts of the Middle East, and illustrated that Arthropods constituted less than 2.5% of the total number of prey items in five papers out of eight.

IV. CONCLUSIONS

The food of the Barn Owl differs depending on the conditions of the hunting territory.

Rodents were the main food of the Barn Owl in southern Syria, small birds were supplementary food, and insects were chance food.

The Barn Owl is an important natural enemy of vertebrate pests in agricultural areas.

Seasonal changes in diet of the Barn Owl in southern Syria should be studied.

The present paper contributed to the knowledge on the distribution of ten species of small mammals in southern Syria.

REFERENCES

- AL-MELHIM W. N., AMR Z. S., DISI A. M., BADER A. K. 1997. On the Diet of the Little Owl, *Athene noctua*, in the Safawi Area, Eastern Jordan. *Zoology in the Middle East*, Heidelberg, **15**: 19-28.
- BATE D. M. A. 1945. Notes on small mammals from the Lebanon Mountains, Syria. *Annals and Magazine of Natural History*, London, **11**(12): 141-158.
- BOCHENSKI Z. M., TOMEK T., BOEV Z., MITEV I. 1993. Patterns of bird bone fragmentation in pellets of the Tawny Owl (*Strix aluco*) and the Eagle Owl (*Bubo bubo*) and their taphonomic implications. *Acta zoologica cracoviensia*, Kraków, **36**(2): 313-328.
- HARRISON D. L., BATES P. J. J. 1991. The mammals of Arabia. 2nd ed., Harrison Zoological Museum Kent, England, xv + 354 pp.
- KOCK D. 1998. The gerbils and jirds of Syria (Mammalia: Rodentia: Muridae: Gerbillinae). *Senckenbergiana biologica*, Frankfurt a. M., **77**(2): 117-122.
- KOCK D., NADER I. A. 1983. Pygmy shrew and rodents from the Near East (Mammalia: Soricidae, Rodentia). *Senckenbergiana biologica*, Frankfurt a. M., **64**(1/3): 13-23.
- OBUCH J. 2001. Dormice in the diet of owls in the Middle East. *Trakya Univ. Journal of Scientific Research*, Edirne, **2**(2): 145-150.
- PRADEL A. 1981. Biometrical Remarks on the Hamster *Cricetulus migratorius* (PALLAS 1773) (Rodentia, Mammals) from Krak des Chevaliers (Syria). *Acta zoologica cracoviensia*, Kraków, **25**(11): 271-292.

- QUMSIYEH M. B. 1996. Mammals of the Holy Land, 389 PP. Texas Tech University Press. USA.
- RACZYŃSKI J., RUPRECHT A. L. 1974. The effect of digestion on the osteological composition of owl pellets. *Acta ornithologica*, Warsaw, **14**(2): 25-38.
- RIFAI L., AL- MELHIM W. N., AMR Z. S. 1998. On the diet of the Barn Owl, *Tyto alba*, in Northern Jordan. *Zoology in the Middle East, Heidelberg*, **16**: 31-34.
- RUPRECHT A. L. 1979. Food of the Barn owl, *Tyto alba guttata* (C.L.Br.). *Acta ornithologica*, Warsaw, **16**(19): 493-511.
- SHEHAB A. H., KOWALSKI K., DAOUD A. 1999. Biometrical remarks on the Golden Hamster *Mesocricetus auratus* (WATERHOUSE, 1839) (Cricetidae, Rodentia) from Ebla, Northern Syria. *Acta zoologica cracoviensia*, Kraków, **42**(3): 403-406.
- SHEHAB A. H., SAMARA F., DAOUD A., KOWALSKI K. 2000. Role of owls in biological control of rodents in Syria. *Damascus University Journal for Agricultural Sciences*, Damascus, **16**(2): 41-51. (In Arabic with English abstract).
- SHEHAB A. H., MOUHRA O., ABU BAKER M. A., AMR Z. S. 2003. Observation on the forest dormouse, *Dryomys nitedula* (PALLAS, 1779) (Gliridae: Rodentia), in Syria. *Zoology in the Middle East, Heidelberg*, **29**: 4-12.