PRELIMINARY DATA ON THE FEEDING REGIME OF THE JUVENILE PHARAOH EAGLE OWL (*Bubo bubo ascalaphus* Savigny, 1809) IN THE SEMI-ARID REGION OF OUM EL BOUAGHI (EAST ALGERIA)

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Abstract. Few data are available on the diet of the juvenile Pharaoh Eagle Owl in North Africa. The diet of the juvenile Pharaoh Eagle Owl was analysed in a semi-arid environment in Djbel Tarf (Oum El Bouaghi) which is located in the North-Eastern part of Algeria, through the analysis of 93 rejection pellets of juveniles that were collected from the same nest during the breeding period (spring) during three successive years of study (2016, 2017, and 2018). The trophic menu of the juvenile Pharaoh eagle-owl in the region of Oum El Bouaghi is composed of 5 prey categories with a relative abundance of mammals occupying the first rank during the three successive years (43.48%, 47.47%, and 41.54%); followed by insects (29.23%, 28.09%, and 26.70%) and birds (15.70%, 13.76%, and 14.49%). In terms of relative biomass, lagomorphs (*Lepus* sp., 35% ≤ B % ≤ 51%) were the main prey species, birds (Columbidae sp., 17% ≤ B % ≤ 23%) were the second most important prey . In terms of abundance, the dominant prey species was *Meriones shawi* for the three years of study with 14.49%, 14.33%, and 12.22% respectively. It was followed by *Jaculus orientalis* (8.70% ≤ AR % ≤ 11.80%), *Gerbillus campestris* (8.45% ≤ AR % ≤ 11.24%); Oryctes nasicornis (6.11% ≤ AR % ≤ 8.45%); *Tapinoma* sp. (5.24% ≤ AR % ≤ 8.45%); Passeriformes sp. (5.62% ≤ AR % ≤ 7.49%) and *Buthus* sp. (5.34% ≤ AR % ≤ 5.76%).

Keywords: Semi-arid, Oum El Bouaghi, juvenil Pharaoh Eagle Owl - Pellets - Diet.

Rezumat. Date preliminare privind regimul alimentar al juvenililor de bufniță-faraon (*Bubo bubo ascalaphus* Savigny, 1809) în regiunea semiaridă Oum El Bouaghi (Algeria de Est). Sunt disponibile puține date cu privire la dieta juvenililor de bufniță-faraon din Africa de Nord. Dieta juvenililor de bufniță-faraon a fost analizată într-un mediu semi-arid în Djbel Tarf (Oum El Bouaghi), care se află în partea de nord-est a Algeriei. Rezultatele se bazează pe analiza a 93 de ingluvii ale puilor, care au fost colectate din același cuib în perioada de reproducere (primăvară), pe parcursul a trei ani succesivi de studiu (2016, 2017 și 2018). Meniul trofic al juvenililor de bufniță-faraon din regiunea Oum El Bouaghi este compus din 5 categorii de pradă, cu abundența relativă a mamiferelor, care ocupă primul loc în cei trei ani succesivi (43,48%, 47,47% și 41,54%); urmează insectele (29,23%, 28,09% ș(26,70%) și păsările (15,70%, 13,76% și 14,49%). În ceea ce privește biomasa relativă, iepurii (*Lepus* sp. 35% ≤ B% ≤ 51%) au fost principalele specii de pradă, păsările (Columbidae sp, 17% ≤ B% ≤ 23%) au fost a doua cea mai importantă categorie de pradă. În ceea ce privește abundența, specia de pradă dominantă a fost *Meriones shawi* pentru cei trei ani de studiu, cu 14,49%, 14,33% și, respectiv, 12,22%. A fost urmat de *Jaculus orientalis* (8,70% ≤ AR% ≤ 11,80%), *Gerbillus campestris* (8,45% ≤ AR% ≤ 11,24%), *Oryctes nasicornis* (6,11% ≤ AR% ≤ 8,45%); *Tapinoma* sp. (5,24% ≤ AR% ≤ 8,45%); Passeriformes sp. (5,62% ≤ AR% ≤ 7,49%) și *Buthus* sp. (5,34% ≤ AR% ≤ 5,76%).

Cuvinte cheie: Semi-arid, Oum El Bouaghi, juvenil de Bufnița faraonului, ingluvii, dieta.

INTRODUCTION

Studies on the diet of nocturnal raptors are of ecological importance, as they can help to understand prey distribution, abundance, behaviour and vulnerability of prey (FULK, 1976; MARTI, 1987; TORRE et al., 2004), energetic requirements (BOZINOVIC & MEDEL, 1988) or trophic relationships between sympatric species and raptor assemblage structures (HERRERA & HIRALDO, 1976; JAKSIĆ & BRAKER, 1983; JAKSIC, 1985). In Algeria all raptor species are protected by Decree No. 83-509 of 20 August 1983 on protected non-domestic animal species. Few data are available on the diet of the juvenile Pharaoh Eagle Owl in North Africa. However, studies on the diet of adults have been carried out in the high plateaus of Algeria by SELLAMI & BELKACEMI (1989), BOUKHAMZA et al. (1994), BICHE et al. (2001), SEKOUR et al. (2010) and MARNICHE et al. (2013), in steppe areas of northern Morocco by VEIN & THEVENOT (1978), LESNE & THEVENOT (1981), BARREAU & BERGIER (2001), THEVENOT (2006) and JEZO (2016), in Tunisia by ALAYA & NOUIRA (2006) and in an Egyptian oasis by GOODMAN (1990) and SANDOR & ORBAN (2008). Similar studies were performed in the Gulf region in Qatar by MOHEDANO et al. (2014), in Jordan SHEHAB & CIACH (2008). Our knowledge of the diet of populations living in semi-arid environments is very fragmentary. For this reason we drew up a preliminary study of the diet of juvenile Pharaoh Eagle Owl (*Bubo bubo ascalaphus* Savigny, 1809) at the nest in a site located in the Djebel Taref in Oum el Bouaghi. The present work aims to study the diet of juvenile Pharaoh Eagle Owl (*B. bubo ascalaphus*) for the first time in Algeria and North Africa.

Study area. Djebel El Tarf is located in the northeastern part of Algeria, at the extreme eastern end of the high steppe plains between the Tellian Atlas in the north and the Saharan Atlas in the south (Aures massif). The study station is located south-east of Oum El Bouaghi. Its geographical coordinates are 35° 47' N and 07° 09' E and its altitude is 1134 m. Using Martonne's aridity index, we conclude that the Oum El Bouaghi region is located in the bioclimatic stage with semi-arid vegetation characterised by a cool winter. The region of Djebel Tarf was characterised by a few plantations of native species such as holm oak (*Quercus ilex*), Phoenician juniper (*Juniperus phoenicea*), Cade or juniper (*Juniperus oxycedrus*), Atlas pistachio (*Pistacia atlantica*), wild olive (*Olea europaea*) and cereal crops (MARNICHE et al., 2013).

MATERIALS AND METHODS

The diet was determined by analysis of the pellets. The pellets of the juvenile Pharaoh Eagle Owl were collected during the breeding season (spring) in three successive years from holes near the top of the cliff, knowing that we have observed two pairs of owls nesting on this site since 2009 (Fig. 1).

The pellets of the juvenile 35-day-old Pharaoh Eagle Owl are collected once they are seen leaving the nest and lying on the rock not far from their nest. 93 pellets of the juvenile Pharaoh Eagle Owl were collected from the same nest in Djebel Tarf (Fig. 2). In 2016, 30 pellets were collected, 36 pellets in 2017 and 27 pellets in 2018.

The cliffs and holes were used as perches by the juvenile Pharaoh Eagle Owl. It should be remembered that the collection of the juvenile Pharaoh Eagle Owl pellets was not an easy task at the site because of their rarity. This state of affairs is explained by the topography of the site (rough cliffs), the pellets are sometimes fragmented before landing at the bottom of the nest of the bottom of Djebel El Tarf. In the laboratory, each pellet is measured with a millimetre of paper. After that, it is peeled after soaking for about fifteen minutes in water. This softens the agglomerate of dense hairs, feathers and bones and facilitates the separation of its constituent parts and is sorted by using forceps and a binocular microscope (total magnification: 10×20). These fragments were thereafter arranged in groups in another Petri dish for being measured (Fig. 3). Mammalian prey have been identified from their skull and dental characteristics (GRASSE & DEKEYSER, 1955; OSBORNE & HELMY, 1980; ORSINI et al., 1982; AULAGNIER & THEVENOT, 1986; BARREAU et al., 1991. Avian prey was identified from the remains of the following parts: beak, humerus, femur and tibia (CUISIN, 1989) as well as feathers, using the reference collection of the Zoology Department of the National Agronomic School of El Harrach.

The arthropods were identified from various remains, including heads, mandibles, antennae, legs and especially elytra under the assistance of Professor Faiza Marniche at the National Veterinary School of El Alia. Algiers. The analysis of insects was carried out with the help of various dichotomous keys such as those of PERRIER (1932). The determination of scorpions was carried out using the keys of VACHON (1952).

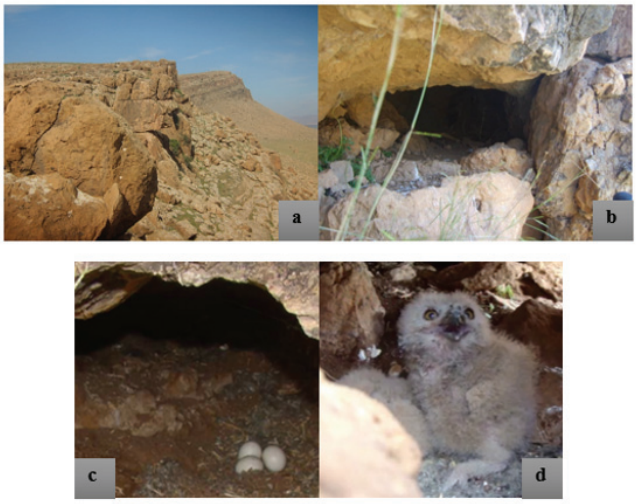


Figure 1. General features of the breeding chronology of the Pharaoh Eagle Owl *Bubo bubo ascalaphus* at Djebel El Tarf in Oum El Bouaghi: **a** - Djebel El Tarf in Oum El Bouaghi; **b** - pre-pupal nest hole of Pharaoh Eagle Owl *Bubo bubo ascalaphus* of Djebel Tarf. **c** - Pharaoh Eagle Owl *Bubo bubo ascalaphus* eggs; **d** - juvenile Pharaoh Eagle Owl (one week old). (Photos: Sedik Guarreh and Faiza Marniche, 2017).

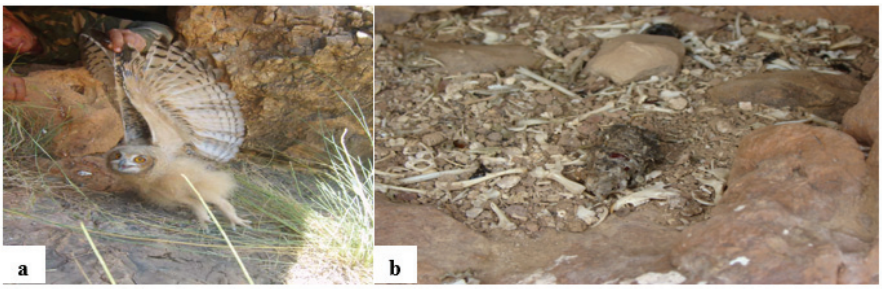


Figure 2. Collection of rejection pellets of juvenile Pharaoh Eagle Owl in the nest at dJbel El Tarf (Oum El Bouaghi) during the breeding season of the year 2017: **a** - juvenile Pharaoh Eagle Owl (35-day-old); **b** - Rejection pellet of juveniles of the Pharaoh Eagle Owl (Original photos).

Figure 3. Analysis stage of regurgitates and different prey species consumed by the juvenilethe juvenile Pharaoh Eagle Owl in the djbel El Tarf (Oum El Bouaghi) (Original photos).

Data analysis. The results obtained are evaluated in terms of relative abundance (A.R. %), i.e. the ratio of the number of individuals of a prey species (Ni) to the total number of individuals of all species combined (N) obtained in all surveys (ZAIME & GAUTIER, 1989). Relative biomass (B %) is the ratio of the weight of individuals of a given prey (Pi) to the total weight of the various prey (P) (VIVIEN, 1973). Shannon's diversity index is calculated from the following formula: H'= - Σ Pi log 2 Pi; H ': diversity index, expressed in bits (RAMADE, 1984). Pi is the probability of meeting the species and it is calculated by the following formula: Pi = ni / N: is the number of individuals of species i. N: the total number of individuals. The index of equitability (E) corresponds to the ratio of the observed diversity H' to the maximum diversity H'max. It is calculated based on the following formula: E = H '/ H'max. (PIELOU, 1969 and RAMADE, 1984). The analysis was conducted with PAST software vers. 2.17 (HAMMER et al., 2001).

RESULTS AND DISCUSSIONS

Number of prey items per pellets

The number of prey items per pellet in the juvenilethe juvenile Pharaoh Eagle Owl during the three years varied between 1 and 4 (mean = 5.4 ± 8.62). Pelts containing 5 prey items (66.67%; 41.67% and 37.04%) and 2 prey items (22.22%; 33.33% and 13.33%) are the most represented (Table 1). Similarly, the number of prey items per ball over three years of study varied between 1 and 20. The variation of prey numbers per pellet across years shows that there are two groupings that characterise the prey consumed during the three years of the study, the first grouping is that of pellets collected in 2017 and

2018 in Jebel El Tarf, and these show a good balance of variance. While pellets collected in 2016 show a large variance in the upper bound of the whisker box (Fig. 4). It should be mentioned that the number of preys per pellet is inversely proportional to the size of the prey. The smaller the size of the prey, the more prey the animal must ingest to meet its energy needs, which obviously implies an increase in the number of preys per pellet.

Table 1. Number of prey items per pellets in the juvenile Pharaoh Eagle Owl during the three years.

Years	2016		2017		2018	
Number of prey	**Nb. Pl.**	**%**	**Nb. Pl.**	**%**	**Nb. Pl.**	**%**
1	4	13.33	10	27.78	3	11.11
2	4	13.33	8	22.22	9	33.33
3	1	3.33	2	5.56	2	7.41
4	1	3.33	1	2.78	3	11.11
5	20	66.67	15	41.67	10	37.04
Total	30	100.00	36	100.00	27	100.00
Medium	6		7.2		5.4	
Minimum	1		1		2	
Maximum	30		36		27	
SD	11.06		11.73		8.62	

Legend: Nb. Pl: Number of preys; %: percentage; SD: Ecartype.

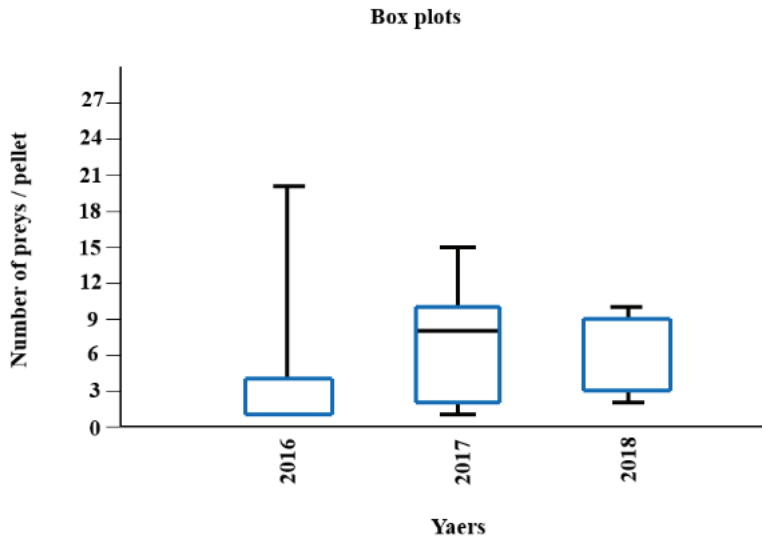


Figure 4. Number of prey items per peloton of the juvenile Pharaoh Eagle Owl during the three years of the study.

Diet

During the three years of the study, 93 pellets were analysed and 1.343 species of prey were identified, classified into five categories: arachnids, insects, birds, mammals and reptiles (Fig. 5).

The diet of the juvenile Pharaoh Eagle Owl was studied for three years and revealed the presence of five prey groups. Among the invertebrates consumed by these juvenile Pharaoh Eagle Owls, insects are the most dominant during the three years of study with a rate of AR% = 75.63% in 2016; AR% = 76.34% in 2017 and AR% = 70.83% in 2018. Arachnids come second with percentages of 23.66% ≤ AR% ≤ 29.17%. Concerning vertebrates, we noted that mammals are the highest during the three years their rates vary from AR % = 66.67% to AR % = 75.11%. Birds come second (21.78% ≤ AR% ≤ 25.59%). On the other hand, reptiles are less consumed by these young owls with values ranging from 3.11% to 10.08% (Table 2). According to SAINT GIRONS et al. (1974) in Morocco, adult Pharaoh Eagle Owl consume both rodents (49.7%) and invertebrates (36.9 %).

The juvenile Pharaoh Eagle Owl of Djbel El Tarf has a diverse diet that includes the majority of vertebrates as well as a large number of insects (especially Coleoptera and Hymenoptera) and arachnids (Scorpions and Solifuges). Among vertebrates, mammals largely prevail, as 11 species belonging to 4 orders (Rodents, Lagomorphs, Soricomorphs and Chiroptera) have been identified. The main prey are rodents (Muridae and Dipodidae), and the most consumed prey is the *Meriones shawi* (51 to 70 individuals followed by *Gerbillus campestris* with 40 to 52 individuals consumed and *Jaculus orientalis* with 42 to 50 individuals consumed). Birds are secondary prey. Finally, reptiles are rarely consumed in an environment where they are not rare (Table 3). Rodents are highly consumed in 2016 (A.R. % = 40.34% with 167 individuals), in 2017 (A.R. % = 45.51% with 162 individuals) and in 2018 (A.R. % = 39.79% with 228 individuals) (Table 3).

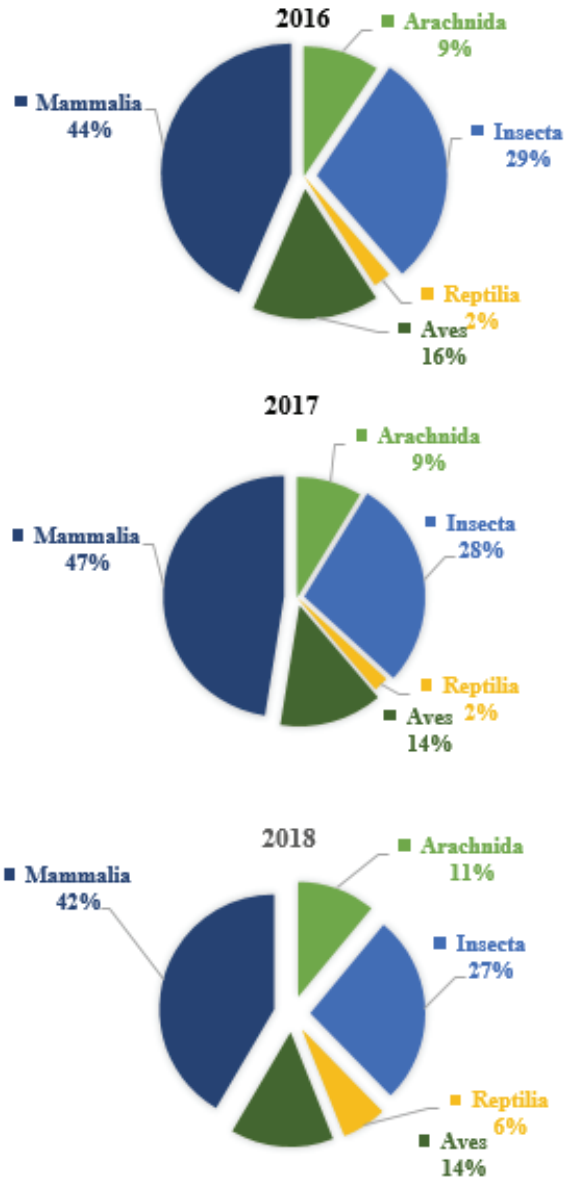


Figure 5. The diet spectrum of the different orders consumed by the juvenile Pharaoh Eagle Owl during the three study periods in Djebel El Tarf (Oum El Bouaghi).

Table 2. Prey categories consumed by in juvenil Pharaoh Eagle Owl in the El Tarf region during the three years of study.

	Years	**2016**		**2017**		**2018**	
Categories	**Classes**	**ni**	**AR (%)**	**ni**	**AR (%)**	**ni**	**AR (%)**
Invertebrates	Arachnida	39	24,38	31	23,66	63	29,17
	Insecta	121	75,63	100	76,34	153	70,83
	Total	**160**	**100,00**	**131**	**100,00**	**216**	**100,00**
Vertebrates	Reptilia	9	3,54	7	3,11	36	10,08
	Aves	65	25,59	49	21,78	83	23,25
	Mammalia	180	70,87	169	75,11	238	66,67
	Total	**254**	**100,00**	**225**	**100,00**	**357**	**100,00**

Table 3. Relative abundances of prey categories in the pellets of juvenil Pharaoh Eagle Owl in Jebel El Tarf (Oum El Bouaghi).

Djbel El Tarf (Oum El Bouaghi)			Yaers	2016 (30 pellets)		2017 (36 pellets)		2018 (27 pellets)	
Classes	**Orders**	**Families**	**Taxon-preys**	**ni**	**AR (%)**	**ni**	**AR (%)**	**ni**	**AR (%)**
Arachnida	Aranea	Salticidae	Salticidae sp.	3	0.72	2	0.56	1	0.17
		Pisauridae	Pisauridae sp.	1	0.24	-	-	5	0.87
		Thomisidae	*Thomisus* sp.	2	0.48	1	0.28	-	-
		Lycosidae	Lycosidae sp.	1	0.24	1	0.28	1	0.17
	Solifugae	Galeodidae	*Galeodes* sp.	3	0.72	2	0.56	7	1.22
	Scorpiones	Buthidae	*Buthus* sp.	23	5.56	19	5.34	33	5.76
		Euscorpiidae	*Euscorpius* sp.	5	1.21	2	0.56	10	1.75
		Famille ind.	Aranea sp.	1	0.24	4	1.12	6	1.05
Insecta	Dermaptera	Carcinophoridae	*Anisolabis* sp.	1	0.24	4	1.12	5	0.87
		Forficulidae	*Forficula* sp.	2	0.48	1	0.28	6	1.05
	Neuroptera	Ascalaphidae	Ascalaphidae sp.	1	0.24	1	0.28	1	0.17
	Orthoptera	Tettigoniidae	Tettigoniidae sp.	1	0.24	2	0.56	1	0.17
		Gryllidae	*Gryllus* sp.	2	0.48	7	1.97	-	-
			Gryllidae sp.	1	0.24	1	0.28	-	-
		Acrididae	Acrididae sp.	1	0.24	1	0.28	-	-
			Calliptamus sp.	3	0.72	2	0.56	1	0.17
			Eyprepocnemis sp.	1	0.24	4	1.12	1	0.17
			Acrotylus sp.	2	0.48	-	-	3	0.52
			Omocestus sp.	1	0.24	-	-	8	1.40
	Hemiptera	Pentatomidae	*Euryderma* sp.	2	0.48	-	-	1	0.17
	Coleoptera	Scarabaeidae	*Rhizotrogus* sp.	3	0.72	8	2.25	15	2.62
			Oryctes nasicoris	35	8.45	23	6.46	35	6.11
		Tenebrionidae	*Pimelia* sp.	4	0.97	2	0.56	6	1.05
			Scaurus sp.	1	0.24	1	0.28	3	0.52
		Curculionidae	Curculionidae sp.	3	0.72	2	0.56	4	0.70
			Lixus sp.	1	0.24	1	0.28	1	0.17
	Hymenoptera	Formicidae	*Tapinoma* sp.	36	8.70	21	5.90	30	5.24
			Messor sp.	9	2.17	6	1.69	16	2.79
			Monomorium sp.	2	0.48	1	0.28	2	0.35
			Catagliphis sp.	5	1.21	6	1.69	-	-
			Crematogaster sp.	1	0.24	1	0.28	-	-
			Messor sp.	2	0.48	4	1.12	12	2.09
			Formicidae sp.	1	0.24	1	0.28	2	0.35
Reptilia	Squamata	Scincidae	Chalcides sp.	2	0.48	1	0.28	4	0.70
		Lacertidae	Lacertidae sp.	6	1.45	5	1.40	22	3.84
		Famille ind.	Reptilia sp.	1	0.24	1	0.28	10	1.75
Aves	Passeriformes	Muscicapidae	*Oenanthe* sp.	-	-	2	0.56	1	0.17
Djbel El Tarf (Oum El Bouaghi)			**Yaers**	**2016 (30 pellets)**		**2017 (36 pellets)**		**2018 (27 pellets)**	
Classes	**Orders**	**Families**	**Taxon-preys**	**ni**	**AR (%)**	**ni**	**AR (%)**	**ni**	**AR (%)**
Aves	Passeriformes	Passeridae	*Passer* sp.	4	0.97	2	0.56	1	0.17
	Galliformes	Phasianidae	*Gallus* sp.	-	-	3	0.84	8	1.40
	Columbiformes	Columbidae	Columbidae sp.	20	4.83	14	3.93	28	4.89
	Coraciformes	Meropidae	*Merops* sp. (oisillons)	1	0.24	2	0.56	4	0.70
		Fringillidae	*Chloris* sp.	8	1.93	4	1.12	4	0.70
		Pycnonotidae	*Pycnonotus* sp.	1	0.24	2	0.56	1	0.17
		Famille ind.	Passeriformes sp.	31	7.49	20	5.62	36	6.28
Mammalia	Lagomorpha	Leporidae	*Lepus* sp.	9	2.17	4	1.12	7	1.22
	Rodentia	Muridae	*Meriones shawi*	60	14.49	51	14.33	70	12.22
			Mus spretus	20	4.83	16	4.49	22	3.84
			Lemniscomys sp.	4	0.97	1	0.28	6	1.05
			Gerbillus gerbillus	4	0.97	2	0.56	5	0.87
			Gerbillus campestris	35	8.45	40	11.24	52	9.08
			Gerbillus peramidum	3	0.72	5	1.40	7	1.22
			Gerbillus sp.	1	0.24	2	0.56	12	2.09
			Gerbillidae sp.	2	0.48	2	0.56	2	0.35
		Dipodidae	*Jaculus orientalis*	36	8.70	42	11.80	50	8.73
	Eulipotyphla (Insectivora)	Soricidae	*Crocidura* sp.	2	0.48	1	0.28	2	0.35
	Chiroptera	Vespertilionidae	*Myotis* sp.	2	0.48	1	0.28	2	0.35
			Chiroptera sp.	2	0.48	2	0.56	1	0.17
S = 5 classes	**S = 18 orders**	**S = 35 families**	**S = 57 species**	**414**	**100.00**	**356**	**100.00**	**573**	**100.00**

Legend: - : absence of species; ni: numbers; AR %: relative abundances; S: total richness

The diet of the juvenile Pharaoh Eagle Owl in Oum El Bouaghi's semi-arid habitat is dependent on mammals, which are abundant in this region. The poor representation of other insect orders can be attributed to their low density, and therefore low energy worth, as well as their greater rarity, which makes hunting them less lucrative. The fact that the juvenile Pharaoh Eagle Owls of Djbel El Tarf eat primarily Mammals demonstrates their opportunism, as they have little to no preferred prey in this region. According to the residents of Djebel, this colony of ten or so pairs has been reproducing successfully for at least several decades (MARNICHE. com. pers).

Rodents such as *Meriones shawii*, *Gerbillus campestris* and *Jaculus orientalis* are found in half of the pellets of the juvenile Pharaoh Eagle Owl, while insects such as *Tapinoma* sp. and *Oryctes nasicornis* are found in a third.

The presence of carnivorous ants such as *Tapinoma* in the remains of the nests means that the prey consumed by the juvenile Pharaoh Eagle Owl is consumed as prey and prey is accidental. In the remains of the nest, we also found many corpses of small rodents, birds, insects, hence the presence of ants of the genus *Tapinoma* (MARNICHE. com. per). The presence of the Insectivora prey of the genus *Crocidura* (AR % = 0.48 %) in the trophic menu of the juvenile Pharaoh Eagle Owl can explain the presence of insects and also ants (Table 3, Fig. 6) It's worth noting that Insectivora is just half as common as rodents.

The parents are most likely bringing this prey back to the nest to feed the young. It is accompanied by *Lepus* sp. (Lagomorpha) and chiropterans. Birds are secondary prey. Finally, reptiles are not consumed in an environment where they are not rare (Table 3). In the stomach analysis of Long-eared owl, BIBER & SCHMIDT (1987) found an insect and some ant pupae in addition to 14 vertebrates.

Predators who hunt at night are known as nocturnal raptors. They are thought to be valuable auxiliaries for farmers because of the type of prey they choose, such as small mammals that are dangerous to crops (AMAT & SORIGUER, 1981; BAZIZ et al., 2005). According to RAMADE (1984), they contribute to the limitation of the size of prey populations even though the removal may seem small.

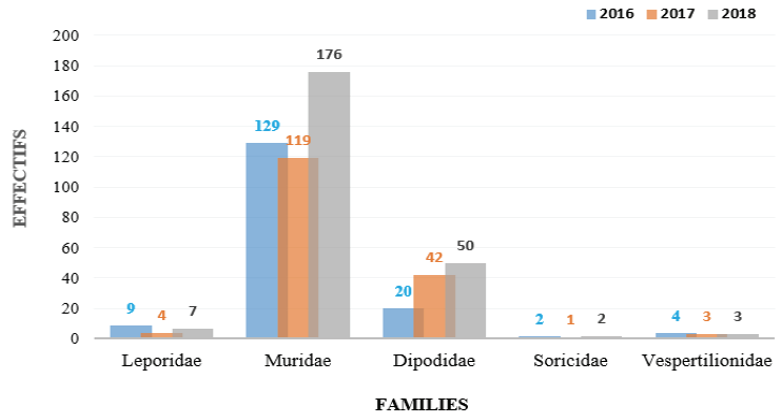
In terms of biomass. lagomorphs rank first in the menu of the juvenile Pharaoh Eagle Owl (51.69% in 2016 ≤ B% ≤ 35.38% in 2017 ≤ B% ≤ 38.25% in 2018) (Table 4). In contrast, invertebrates constitute very low rates (B varies between 0.00 and 0.02%). Rodents are the most important biomass prey. The Merione of Shaw is the most profitable prey in terms of biomass for the juvenile Pharaoh Eagle Owl (B = 12.54% and 16.42%). This can be explained by the importance of the latter prey in terms of numbers in the high plateaus (MARNICHE et al., 2003). In second place comes *Jaculus orientalis* (B = 11.4% to 20.80%). Among the birds, it is the Columbidae (B = 17.46% and 23.25%). In contrast, the other categories are poorly represented (B ≤ 3.14%).

The relatives of the Great Horned Owl are opportunistic hunters, i.e. they consume a wide range of prey depending on their availability in the habitat (SANDOR & MOLDOVAN, 2010). The composition of its diet therefore reflects the distribution of its prey and changes in their numbers over time (MOHEDANO et al., 2014). It feeds mainly on small mammals and arthropods (although the latter represent a low biomass) and more occasionally on birds and reptiles (BARREAU & BERGIER, 2001).

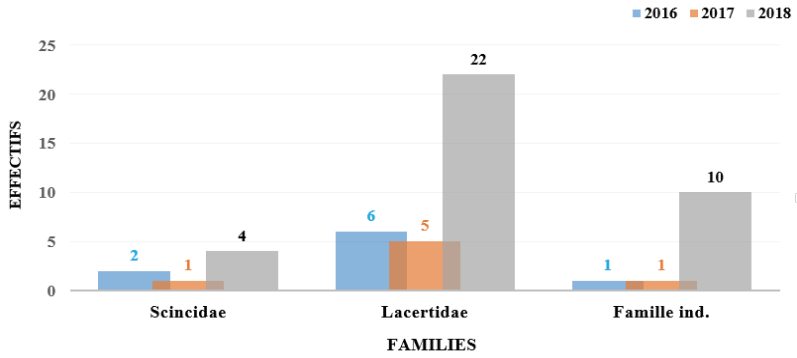
The Shannon diversity index values of the pellets of juvenile Pharaoh Eagle Owl are high, which shows the importance of the diversity of the diet of this predator, and the equability varies from 0.52 to 0.54, which is considered to be a young generalist predator (Table 5).

The importance of rodent damage is well documented. On a global scale, they damage up to 25% of the foodstuffs grown by humans each year (AMEUR, 2000). In Morocco, they cause considerable crop losses, particularly in cereals (GIBAN & HALTEBOURG, 1965). The main perpetrator of this damage is most often the Merione of shaw *Meriones shawii*, which is sometimes associated with the Field Gerbil *Gerbillus campestris* (Loche, 1867) and the Black Rat *Rattus rattus* (Linnaeus, 1758) (GIBAN & HALTEBOURG, 1965; LAAMRANI, 2000; OUZAOUIT, 2000). Shaw's Merione can cause up to 4 quintals of crop loss per hectare (LAAMRANI, 2000). Because of the damage to cereals, which can exceed 7 quintals per hectare, it is known as an agricultural pest in Algeria (Executive Decree No. 95-387 of November 28, 1995) (MADAGH, 1997).

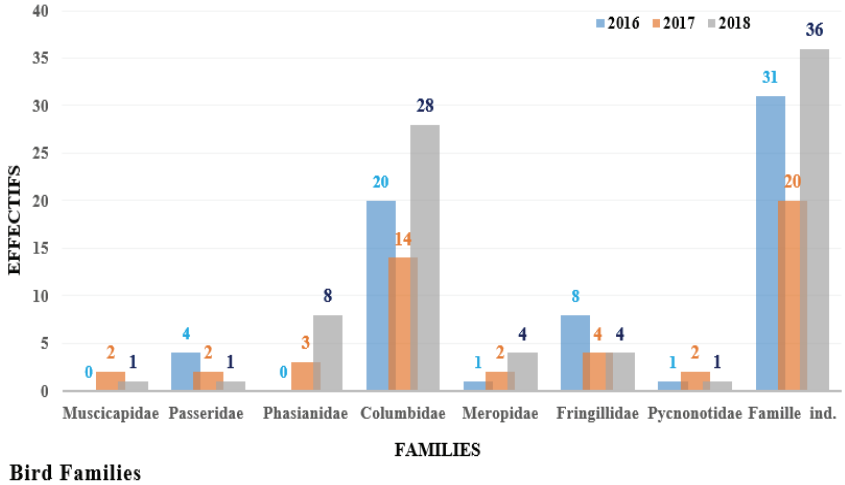
The diet of he juvenile Pharaoh Eagle Owl in the Oum El Bouaghi region, therefore, shows both spatial and temporal variability. However, the factors that can explain this variability are multiple and sometimes difficult to quantify. A rigorous sampling frequency would allow for a more accurate identification of the sources of temporal variation. Thus, by consuming the species present in their environment, raptors regulate prey populations, particularly harmful species that tend to proliferate. Besides, the information obtained from the study of the composition of the pellets is both useful for developing knowledge of the ecology of this raptor, but also gives an idea of the evolution of the community structure of prey species. Global warming or anthropogenic threats, such as urbanization and pollution, modify and degrade habitats, thus disturbing the functioning of ecosystems.



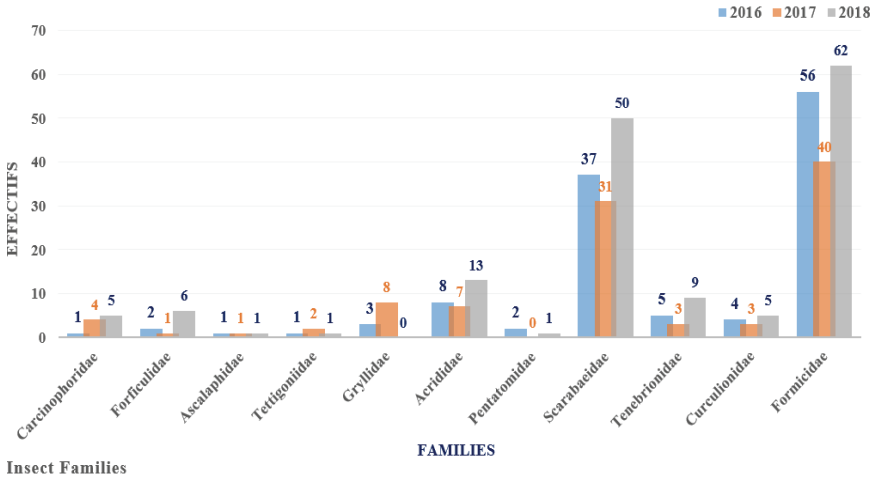
Mammalian families



Reptile Families



Bird Families



Insect Families

Figure 6. Families consumed by the juvenile Pharaoh Eagle Owl in Djebel El Tarf during the three-year study.

Table 4. Biomass of prey-categories consumed by the juvenile Pharaoh Eagle Owl in the El Tarf region during the three years of study.

Categories			Years	2016	2017	2018
Classes	**Orders**	**Families**	**Taxon-prey**	**B%**	**B%**	**B%**
Mammalia	Lagomorpha	Leporidae	*Lepus* sp.	51.6934	35.3804	38.2541
	Rodentia	Muridae	*Meriones shawi*	12.5443	16.4201	13.9245
			Mus spretus	0.8730	1.0756	0.9137
			Lemniscomys sp.	0.2389	0.0920	0.3410
			Gerbillus gerbillus	0.2693	0.2073	0.3202
			Gerbillus campestris	1.4474	2.5474	2.0460
			Gerbillus peramidum	0.2964	0.7607	0.6580
			Gerbillus sp.	0.0588	0.1811	0.6715
			Gerbillinae sp.	0.1149	0.1769	0.1093
		Dipodidae	*Jaculus orientalis*	11.5793	20.8037	15.3016
	Eulipotyphla (Insectivora)	Soricidae	*Crocidura* sp.	0.0340	0.0262	0.0324
	Chiroptera	Vespertilionidae	*Myotis* sp.	0.0965	0.0743	0.0918
			Chiroptera sp.	0.1516	0.2335	0.0721
Aves	Columbiformes	Columbidae	Columbidae sp.	17.4609	18.8224	23.2585
		Famille ind.	Passeriformes sp.	2.8489	2.8304	3.1478
Reptilia	Squamata	Lacertidae	Lacertidae sp.	0.2206	0.2830	0.7695
Insecta	Coleoptera	Scarabaeidae	*Oryctes nasicoris*	0.0241	0.0244	0.0230
			Tapinoma sp.	0.0001	0.0001	0.0001
Arachnida	Scorpiones	Buthidae	*Buthus* sp.	0.0476	0.0605	0.0649
				100.0000	100.0000	100.0000

Legend: B: Biomass, %: percentage

Table 5. Shannon diversity and equitability of the young ascalaphe diet in Djebel El Tarf during the three years of study.

Années	**2016 (30_pellets)**	**2017 (36_pellets)**	**2018 (27_pellets)**
Taxa_S	55	53	51
Individuals	414	356	573
Dominance_D	0.07	0.07	0.05
Shannon_H' (bits)	4.54	4.57	4.72
H'max. (bits)	8.69	8.48	9.16
Equitability_J'	0.52	0.54	0.52

CONCLUSIONS

In conclusion, the study of the diet of these juvenile Pharaoh Eagle Owls shows their role in maintaining the biological balance and the importance of protecting them from all the factors that can cause their extinction. Thus, these bird species do man a great service by ridding him of crop pests such as the merione of shaw without spending money on the one hand, and without using control products that pollute the environment on the other. Finally, the importance of the nutritional and energetic value of the main prey ingested deserves attention in further studies to understand predator choice.

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