

Available online freely at www.isisn.org

# **Bioscience Research**

Print ISSN: 1811-9506 Online ISSN: 2218-3973 Journal by Innovative Scientific Information & Services Network



RESEARCH ARTICLE

BIOSCIENCE RESEARCH, 2018 15(1): 81-88.

**OPEN ACCESS** 

# Diet and nesting morphometric analysis of reed warbler *Acrocephalus scirpaceus* (Hermann, 1804) near the lake of Reghaia Algeria.

Boulaouad Belkacem Aimene<sup>1</sup>, Ailam Oussama<sup>1</sup>, Abdessemed Hadjira<sup>1</sup>, Sayoud Mohamed Samir<sup>2</sup>, Daoudi-Hacini Samia<sup>1</sup>, Doumandji Salaheddine<sup>1</sup>

<sup>1</sup>Department of agricultural and forest Zoology, National high school of agronomy, Hacen badi, El Harrach, 16200 Algiers, **Algeria.** 

<sup>2</sup>Centre Cynégétique de Réghaia (C.C.R.), Algeria

\*Correspondence: belkacem\_aimene@live.fr Accepted: 25 Dec. 2017 Published online: 03 Mar. 2018

We investigated diet and nesting morphometric in a population of reed warbler (*Acrocephalus sciepaceus*) living near the lake of Reghaia, North of Algeria. Diet was estimated by analysis of fecal samples (34 feces ) During the year 2014-2015. Faecal samples were collected and treated separately in 70% alcohol to identify prey-species. In total, 181 prey items of 55 different species were found classified into 5 classes, 12 orders and 39 families. Insects were the most dominant preys (87.85%), followed by Arachnida (7.18%). The basic component of the diet was Hymenoptera (33.15%), followed by Coleoptera (14,92%), Diptera (11.05%) then Homoptera (9.94%) and Heteroptera (8.29%). Concerning the nesting morphometric analysis, the measuring of 14 nests leads to find an external diameter varying between 64 and 90 mm, an inner diameter fluctuating between 43 and 70 mm , and a height between 55 and 95 mm The distance between the nests and the ground through, varied between 0.98 and 2.94 m. The nests were placed on *Phragmites communis*.

Keywords: Acrocephalus scirpaceus, diet, nesting morphometric, Lake of Reghaia.

#### INTRODUCTION

Wetlands are among the richest ecosystems in terms of biodiversity and, paradoxically, one of the most threatened.

The reed warbler is a long-distance migrant that breeds widely and commonly in reed beds across the warm and temperate latitudes of Europe and Central Asia and winters in Africa. Localized populations in North West and Noth East Africa and Arabia appear to be partially resident (cramps 1992, Kennerly and Pearson, 2010)

In Algeria, Reed Warbler breeds in very small to large reed beds in wetlands in North Algeria (El Kala, Algiers region, Oran region), at Boughzoul as well as in some oases (Bordj Saada south of Biskra and perhaps El Golea) (Isenmann 2000 and Ledant, 1971) and in lake of Ain Zada in Bordj Bou Arreridj (personal observation).

The diet of the Reed Warbler was studied in different countries (Davies and Green 1976; Cardenas and al. 1983; Evans, 1989; Grim and Honza 1997; Chernetsov and Manukyan 1999; Rguibi-Idrissi et al., 2004; Grim, 2006; Kerbiriou et al., 2010).

The nesting biology of Reed Warbler was studied by (Bibby, 1978; Dyrcz, 1980; Borowiec, 1992; Halupka and Wroblewski, 1998; Bocheñski and Kuœnierczyk, 2003; Westwood, 2005). No studies have been conducted on the nesting and diet of the Reed Warbler in Algeria. Hence, there is no information on its diet and nesting morphometrics, therefore in this study, we focused on

(1) Describing diet composition of the reed warbler in the lake of Réghaïa and preys size.

(2) The nesting morphometric.

#### MATERIALS AND METHODS

#### Study area

The study was conducted on the lake of Reghaïa which is situated at the eastern end of the plain of Mitidja, along with the Mediterranean ( $36^{\circ} 46'$  to  $36^{\circ} 47'$  N.;  $3^{\circ} 19'$  to  $3^{\circ} 20'$  E) and is classified as a Ramsar site since 2003.

The lake of Réghaïa is a region with a typical sub-humid Mediterranean bio-climatic. The bioclimate average monthly temperature ranges from a mean minimum of 11.6 °C in January to a mean maximum of 26.3 °C in August. The annual rainfall is 746.3 mm with a five-month drought period from May until September.

All around the lake, we noted a large floristic diversity which is composed mainly of common reed *Phragmites australis*, *Typha angustifolia*, yellow iris *Iris pseudacorus* and *Scirpus lacustris*.

#### Diet and nesting morphometric analyses

Based on the observations of the reed warbler in the study environment and the search for nest locations at the vegetation level around the Lake of Reghaia during the period 2013-2014

The study of the nesting of the reed warbler is carried out taking into account the dimensions of the nests, in particular, the external diameter, the internal diameter, the external height and finally the distance which separates it from the ground. The vegetal species on which the nest is built were determined.

The diet of reed warbler was determined by fecal analysis. The feces were collected from the leaf of the vegetation of the stream in the immediate surroundings of the nests. The feces were preserved in ethanol (70%) in labeled Eppendorf tubes.

At the laboratory, each feces was separated in Petri dishes. The identification of feces components was performed under a binocular ( $\times 20$ ). The determination of arthropods was made by comparing the parts found in the feces with specimens of the Pasquier and Maurel insect collections of the Department of Zoology of the National high school of Agronomy. It was not possible to identify all species Due to the poor condition of the various chitinous fragments. The number of individual prey items in each sample was determined based on the different parts found. Paired anatomical parts with the same features were counted as belonging to one individual. A head, thorax, abdomen, two cerci, two mandibles, two elytra, two wings, two of the same antennas, or six legs corresponded to one individual (Sutherland, 2004). Davies (1977) proved that there is a strong correlation between the prey remains in the faeces and the composition of the true diet in other insectivorous passerines.

For the relative abundance (RA %), the equation was used RA% = (Ni / N) x 100 in which Ni: Number of individuals of the species i and N: Total number of individuals of all species. The diet was expressed using the Shannon–Weaver diversity index(Krebs, 1989).

### RESULTS

#### **Diet composition**

Overall, we identified 181 prey items, representing 55 prey taxa of invertebrates in the dropping that we examined of reed warbler (Appendix 1). Insects were the dominant preys (n=159 prey items, 87.85%), followed by Arachnida (n=13 prey items, 7.18%), the other classes are slightly ingested in droppings (1.66% <AR% <2 , 21%). The most abundant order in the diet of Acrocephalus scirpaceus is Hymenoptera with (n = 60 prey items, 33.15%), followed by Coleoptera (n = 27 prey items, 14.92 %), Diptera (n = 20 prey items ; R.F. = 11.05%), Homoptera (n = 18; R.F. = 9.94%) and Heteroptera (n = 18; R.F. = 9.94%) (tab .1). The species belonging to the Reed Warbler diet are reported with relative abundances ranged from 0.55 to 7.73% (Appendix 1). The highest relative abundance is Coleoptera sp1.ind and Jassidae sp ind with (AR% = 7.73%) followed by Araneae sp ind with (AR% = 6.08%) and Heteroptera sp ind. with (A.R.% = 5.52%). Shannon-Weaver Diversity index (H ') of the reed warbler remains considerable (H' = 3.72).

# Prey size

Overall, the prey size ranges are between 2 mm and 14 mm. Prey measuring 3 mm were the most abundant with a rate of 26.40%, represented for example, by Jassidae sp1., *Formicidae sp. ind.* and Aranea sp. ind. They are followed by those whose size was 4 mm (18.54%), and then by of 5 and 6 mm (14.04%) for each one (Table 2). **Nestling morphometric** 

Fourteen nests were measured near the

Réghaia marsh. The external diameter of the nests measured between 64 and 90 mm. Concerning the internal diameters of the nests,

Table 1. Relative frequency (%) of prey's of Reed Warbler *Acrocephalus scirpaceus* at the lake of Reghaia.(n: number of specimens; n %: relative abundance of the taxon considered).

Classes	Orders	Ν	n%
Arachnida	Arachnida	13	7,18
Crustacea	Isopoda	4	2,21
Diplopoda	Julida	2	1,10
Insecta	Orthoptera 9 4		4,97
	Blattoptera	1	0,55
	Heteroptera	15	8,29
	Homoptera	18	9,94
	Coleoptera	27	14,92
	Hymenoptera	60	33,15
	Lepidoptera	9	4,97
	Diptera	20	11,05
Plants	Plants	3	1,66
Total= 4	12	181	100,00

Table 2. Preys size classification in the diet of reed warbler (N: number of specimens; n %: relative abundance of the taxon considered).

Classification		
sizes in mm	N	n%
2	18	10,11
3	47	26,40
4	33	18,54
5	25	14,04
6	25	14,04
7	16	8,99
8	4	2,25
9	3	1,69
10	3	1,69
12	3	1,69
14	1	0,56
Total	178	100,00

# Table 3. Biometry of the nests of the reed warbler at the lake of Reghaia.

Nest	External	Internal	Height	H. Ground	SUPPORT
	Diameter(mm)	(mm)	(mm)		
1	83	51	55	1,98 m	Phragmites communis
2	90	70	62	1,15 m	Phragmites communis
3	72	54	55	0,98 m	Phragmites communis
4	88	65	95	2,73 m	Phragmites communis
5	81	48	72	2,78m	Phragmites communis
6	68	45	66	1,87m	Phragmites communis
7	78	50	92	2,43m	Phragmites communis
8	64	43	74	2.63m	Phragmites communis
9	70	51	61	2.26m	Phragmites communis
10	Ι	—		2,94m	Phragmites communis
11	1	-	Ι	2.73m	Phragmites communis
13	_	-	_	2,38m	Phragmites communis
14	_	_	_	2,37 m	Phragmites communis

# Appendix.Composition of the diet of the reed warbler *Acrocephalus scirpaceus*. (N: number of specimens; n%: relative abundance of the taxon considered).

Classes	Orders	Families	Species	N	n%
Arachnida	Arachnidae	Araneae F.ind	Araneae sp. ind.	11	6,08
		Salticidae	Salticidae sp. ind.	1	0,55
		Acari F.ind	Acari sp. ind.	1	0,55
Crustacea	Isopoda	Oniscidae	Oniscidae sp. ind.	4	2,21
Diplopoda	Julida	Iulidae	<i>lulus</i> sp.	2	1,10
	Orthoptera	Gryllidae	Gryllidae sp. ind.	1	0,55
			Trigonidium cicindeloides	2	1,10
		Acricidae	Acricidae sp. ind.	6	3,31
	Blattodea	Blattodea F. ind.	Blattodea sp. ind.	1	0,55
		Capsidae	Capsidae sp. ind.	1	0,55
		Pentatomidae	Pentatomidae sp. ind.	2	1,10
	Heteroptera		Nezara viridula	1	0,55
Insecta		Coreidae	Coreidae sp. ind.	1	0,55
		Heteroptera F. ind.	Heteroptera sp. ind.	10	5,52
	Homoptera	Typhlocybidae	Typhlocybidae sp. ind.	1	0,55
		Homoptera	Homoptera sp. ind.	3	1,66
		Jassidae	Jassidae sp. ind.	14	7,73
	Coleoptera	ColeopteraF.ind	Coleoptera sp1. Ind.	14	7,73
			Coleoptera sp2. ind	4	2,21
			Coleoptera sp3. Ind	1	0,55
		Anthicidae	Anthicidae sp. ind.	2	1,10
		Chrysomelidae	Aphthona sp.	1	0,55
		Curculionidae	Sitona sp.	1	0,55
		Coccinellidae	Coccinellidae sp. ind.	1	0,55
		Buprestidae	Buprestidae sp. ind.	2	1,10
			Anthaxia sp.	1	0,55
	Hymenoptera	Formicidae	Plagiolepis barbara	2	1,10
			Tetramorium sp.	1	0,55
			Tapinoma nigerrimum	1	0,55
			Tapinoma sp.	2	1,10

			Formicidae sp1. ind.	6	3,31
			Formicidae sp2. ind.	3	1,66
			Pheidole pallidula	6	3,31
			Tetramorium biskrens	8	4,42
			Messor barbarus	5	2,76
			Componotus picens	1	0,55
			Aphaenogaster sp.	1	0,55
			Aphaenogaster depilis	1	0,55
		Ichneumonidae	Ichneumonidae sp. ind.	4	2,21
		Apoidae	Apoidae sp. ind.	8	4,42
		Hymenoptera F. ind.	Hymenoptera sp1. ind.	5	2,76
		Hymenoptera F. ind.	Hymenoptera sp2. ind.	1	0,55
		Aphelinidae	Aphelinidae sp. ind.	3	1,66
		Chalcidae	Chalcidae sp. ind.	2	1,10
		Tineidae	Tineidae sp. ind.	1	0,55
	Lepidoptera	Noctuellidae	Noctuellidae sp. ind.	1	0,55
		Lepidoptera F. ind.	Lepidoptera sp. ind.	7	3,87
		Cyclorrapha F.ind.	Cyclorrapha sp. ind.	4	2,21
		DipteraF.ind	Diptera sp .ind.	1	0,55
		Calliphoridae	<i>Lucilia</i> sp.	2	1,10
	Diptera	Brachycera F. ind.	Brachycera sp. ind.	4	2,21
		Psychodidae	Psychodidae sp.ind.	1	0,55
		Hyppoboscidae	Hyppoboscidae sp. ind.	1	0,55
		Nematocera F.ind.	Nematocera sp.ind.	7	3,87
Plants	Plants	-	-	3	1,66
Total = 4	12	-	-	181	100,00

they were between 45 and 70 mm. The heights of the nests varied between 55 and 95 mm. The heights of nests location relative to ground level were between 0.98 and 2.94 m. The support was always *Phragmites communis* (A.R.% = 100%) (Tab.3).

# DISCUSSION

The feeding spectrum of the Reed Warbler was composed of 5 classes, most of the prey belong to the category of insects, which represent about 87.851%. They were followed by arachnids (A.R. = 7.18%),. The other classes were poorly reported in droppings (1.66% <A.R. %< 2.21%). The dominance of Insecta was confirmed by various authors, Rguibi-Idrissi et al., (2004) in Morocco, (Grim et al., 2001) in the Czech Republic, Kerbiriou et al., (2010) in France, (Cardinas et al. 1983) in Spain and Evans (1989) to Great Britain. The most abundant order in the diet of Acrocephalus scirpaceus was Hymenoptera with 60 individuals (AR = 33.15%), followed by Coleoptera with 27 individuals (AR = 14.92%), Diptera with 20 individuals = 22.05%), Homoptera in fourth position with 18 individuals (AR = 9.94%). The species belonging to the Reed Warbler diet were reported with relative abundances ranging from 0.55 to 7.73%. The highest relative abundance was that of Coleoptera sp1.ind and Jassidae sp. ind. (A.R.% = 7.73%) followed by Araneae sp. ind. with (A.R.% = 6.08%). In third position Heteroptera sp. ind. (A.R.% = 5.52%). Rguibi-Idrissi et al. (2004), on studying the diet of Reed Warbler in Morocco, noted the dominance of Hymenoptera with (AR = 42.8%) followed by Coleoptera with (AR = 33%) in Kerbacha. In Sidi Boughaba, Hymenoptera dominated with 62% followed by Coleoptera with (AR% = 21.7%). Cardinas et al., (2003) reported the dominance of Coleoptra, with a mean total percentage (53.47%), followed by Hymenoptera (12.13%), the third Diptera (9.05%) and Arachnida (3.67%), Hemiptera with (2.43%), Odonptera (1.99%) and Lepidoptera with (0.15%). Grim et al (2001) in the Czech Republic, Kerbiriou et al. (2010) in France, Bibby et al. (1985) and Evans (1989) in Great Britain noted the dominance of the Diptera in the diet of the Reed Warbler.

This hymenoptera selectivity has been found in a certain number of other species of bird in Algeria, in particular, the House Martin (56.7%, Merzouki et al., 2014), the spotted flycatcher (53.1% in 1994 and 41.7 in 1995, Boukhemza-Zemmouri et al., 2011), the Common Chiffchaff (68.7%, Bouaziz et al., 2016) or the Bee-eater (92.1%, Marniche et

al., 2007).

The diet diversity of the Reed Warbler remains considerable (H' = 3.72). Cardinas et al. (1983) in Spain indicated a value of Shannon-Weaver's diversity equal to 1.65 bits. Rguibi-Idrissi et al. (2004) reported a value of 0.76 for the equitability index.

Concerning size classes, there were 11 size classes, 3 mm species were frequent with 47 individuals (26.40%), followed by the 4 mm class with 24 individuals (18.54%),, the class of 5 and 6 mm with 25 individuals (14.04%). 97.75% of the species ingested had a size less or equal to 10 mm. Tomas Grim and Honza (2001) suggested a mean size of ingested species equal to 5.6 mm. The same authors noted a mean size of ingested species of 5.6 mm in 1996 and 6.0 mm in 1997. Rguibi-Idrissi et al., (2004) defined an average of 5.4 mm for prey size, Kerbiriou et al., (2010) noted that the mean size of prey ingested by the Reed Warbler is 5.1 mm.

In the present study, we identified Fourteen- nest of Reed Warbler which were placed on Phragmites communis (100%). The distance between the base of the nest of the Reed-warbler and the ground fluctuates was between 0.98 and 2,94 m, the external diameter measured between 64 and 90 mm, the internal diameter was between 43 and 70 mm and the height of the nests varied between 55 and 95 mm. Bocheñski et al., (2003) noted that the external diameter varies between 63.5-90.0 mm with an average of 74.7 mm, the internal diameter was between 43.0-57.5 mm with an average internal diameter of 50.7 mm, the height was 50-140 cm with an average height of 75.5 mm and nest depth varving from 38-62 mm with a mean of 48.3 mm, nests were arranged on Phragmites communis (92.4%), Solanum dulcamara (2.5%), Salix sp (2.5%). Dyrcz (1980) observed in the Lake of Neuchatel in Switzerland that the nests of the Reed Warbler were installed at heights relative to the ground from 30 cm to 140 cm with an average height of 79.7c m. The dominant support is Phragmites communis with 94 nests and in the lake of Milicz in Poland noted that the nests were installed at heights varied between 30 cm and 130 cm with an average height of 66.9 cm the dominant support was Phragmites communis with 77 Nests followed by Typha sp with 7 nests.

# CONCLUSION

Finally, we conclude that the reed warbler's diet and nesting morphometric differ from our study and the previous studies. In addition, some other studies should be conducted to the growth of the nestling and its diet in different locations in Algeria

# CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest".

#### ACKNOWLEGEMENT

We are very grateful Djallal BOULAOUAD, DJETTI Tayeb, RAKEM Karima, anonymous reviewers for valuable comments of our manuscript.

# AUTHOR CONTRIBUTIONS

BBA, AO, AH, performed the experiment and also wrote the manuscript. SMS performed the nesting morphometric. DHS, DS Contributed to complete the fieldwork and ensure the determination of species. All authors read and approved the final version.

#### Copyrights: © 2017 @ author (s).

This is an open access article distributed under the terms of the **Creative Commons Attribution License (CC BY 4.0)**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and source are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

# REFERENCES

- Bibby C J, Thomas D K, 1978.Breeding and diets of the Reed Warbler at a rich and a poor site.Bird Study. 32, 19-31
- Bocheñski P, Kuœnierczyk, 2003. Nesting of the *Acrocephalus* warbler. Acta zoologica cracoviensia,46(2): 97-195, Kraków, 30 June, 2003.
- Borowiec M, 1992. Breeding ethology and ecology of the reed Warbler *Acrocephalus scirpaceus* at Milicz, SW Poland. Acta Zool. Cracov.35: 315-350.
- Bouaziz A, Daoudi-Hacini S, and Doumandji S, 2016.Insects in the Diet of Common Chiffchaff *Phylloscopus collybita* Surroundings Tonga Lake, North East of Algeria. Global Veterinaria 16 (3): 219-221.
- Boukhemza-Zemmouri N, Belhamra M, Boukhemza M, Doumandji S, &Voisin J F, 2011. Trophic ecology of the Spotted Flycatcher *Muscicapa striata* during the

breeding period in Algeria. *Rev. Écol. (Terre Vie)*, vol. 66. 183-194p.

- Cardenas A M, Torres J A, Bach C, 1984. ESTUDIO COMPARADO del regimen alimentatio de *Acrocephalus scirpaceus* y *Acrocephalus arundinaceus* en la Laguna de Zonar. Ardeola .30:33-44.
- Chernetsov N, Manukyan A, 2000. Foraging strategy of the Sedge Warbler (*Acrocephalus schoenobaenus*) on migration. Die Vogelwarte.40, 189–197.
- Cramp S, 1992. Handbook of the birds of Europe, the Middle East and North Africa: the birds of the Western Palearctic. Volume IV. New York: Oxford University Press, s. 193 – 212.
- Davies N B, 1977. Prey selection and the search strategy of the Spotted Flycatcher *Muscicapa striata*, a field study on optimal foraging. Anim. Behav.25, 1016–1033.
- Davies N B, and Green R E,1976 The development and ecological significance of feeding techniques in the reed warbler (*Acrocephalus scirpaceus*). Anita Behav., 24, 213-229.
- Dyrcz A, 1980. Breeding ecology of Great Reed Warbler *Acrocephalus arundinaceus* and Reed Warbler *Acrocephalus scirpaceus* at fish-ponds in SW Poland and lakes in NW Switzerland.Actaornithologica.
- Evans MR, 1989. Population changes, body mass dynamics and feeding ecology of Reed Warblers *Acrocephalus scirpaceus* at Llangorse Lake, South Powys. Ringing and Migration, 10: 99–107.
- Grim T, Honza M, 1997.Differences in parental care of reed warbler (*Acrocephalus scirpaceus*) to its own nestlings and parasitic cuckoo (*Cuculus canorus*) chicks. Folia Zool. 46: 135–142.
- Grim T, Honza M, 2001. Does supernormal stimulus influence parental behaviour of the cuckoo's host? Behav. Ecol. Sociobiol.49:322–329.
- Grim T, 2006.An exceptionally high diversity of hoverflies (Syrphidae) in the food of the reed warbler (*Acrocephalus scirpaceus*).Biologia , 61/2: 235–239p.
- Haluplka L, Wroblewski, 1998. Breeding ecology of the reed warbler *Acrocephalus scirpaceus* at milicz fish-ponds in 1994. PtakiSlaska .12: 5-15p.
- Isenmann P., and Moali A, 2000 Birds of Algeria.Société d'Etudes Ornithologiques de France.Paris, France.

- Kennerley P and Pearson D, 2010. Reed and bush warblers. A&C Black.
- Kerbiriou C, Bargain B, Le Viol I, Pavoine S, 2010. Diet and fuelling of the globally threatened aquatic warbler at autumn migration stopover as compared with two congeners. Animal Conservation, 14:261–270
- Krebs C J, 1989. Ecological Methodology. New York: Harper Collins.
- Ledant J P, Jacob J P, Jacobs P, Malher F, Ochando B, &Roché J, 1981. Mise à jour de l'avifaune algérienne. Le Gerfaut, 71, 295-398.
- Marniche F, Doumandji S, & Voisin J-F, 2007. Régime alimentaire du Guêpier d'Europe en Algérie. Alauda,75: 331-335.
- Merzouki Y, Souttou K, Sekour M, Daoudi-Hacini S, Doumandji S, 2014. Sélection des proies par l'Hirondelle de cheminée *Delichon urbica* Linné ,1758 (Aves : Hirundinidae) en milieu suburbain à Alger (Algérie). C. R. Biologies, 337, 53–61.
- Rguibi-Idrissi H, Lefebvre G, Poulin B, 2004. Diet of Reed Warblers (*Acrocephalus scirpaceus*) at two stopovers sites in Moroco during autumn migration.Revue d'Ecologie. 59, 491–502.
- Sutherland W, J, 2004. Diet and foraging behavior. Bird ecology and conservation: a handbook of techniques, 1, 233.
- Westwood, 2005. Reed Warblers reusing nests. British Birds.98 ; 98-102