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Mouane Aicha
Faculty of Sciences of nature and
of life, University Hamma
Lakhdar, BP. 789 El Oued,
Algéria.

Ayati Hadjer
Faculty of Sciences of nature and
of life, University Hamma
Lakhdar, BP. 789 El Oued,
Algéria

Korichi Raounak
Faculty of Sciences of nature and
of life, University Hamma
Lakhdar, BP. 789 El Oued,
Algéria

Mesbahi Karima
Faculty of Sciences of nature and
of life, University Hamma
Lakhdar, BP. 789 El Oued,
Algéria

Diet analysis of *Acanthodactylus scutellatus* (AUDOUIN, 1809) (Lacertidae) in the Algerian septentrional Sahara (Oued Souf)

Mouane Aicha, Ayati Hadjer, Korichi Raounak and Mesbahi Karima

Abstract

The diet of an Algerian population of *Acanthodactylus* was studied with the aims of exploring: the variation in diet among males and females and between the habitats in particular between the palm grove and the erg.

The study of the diet of lizard *Acanthodactylus scutellatus*, was realized in the region of the Souf, which is located in the South East to Algeria.

The analyzes of the stomach contents of the captured individuals made it possible to measure the relative abundance of the prey consumed. Indeed, the diet was composed of the hymenoptera with a percentage of 38.4%, Homoptera with 30.4%, of the Coleoptera with 12.2%, Lepidoptera with 6%, of Diptera with 5.6%, the Dermoptera and the Collembola with 0.4%, including, Arachnida and the plants. The present study revealed that males consume much of the hymenoptera than the females which prefers Homoptera. So the diet varies according to the sex (males and females) and according to the habitats (Palm grove and the erg). So, there exist relations between qualities, quantities of prey and the size of the individuals of *Acanthodactylus scutellatus*.

Keywords: Reptile, *Acanthodactylus scutellatus*, diet, preys and Souf.

1. Introduction

The lizards of the genus *Acanthodactylus* constitute an important portion of vertebrate fauna in much of arid ecosystems and deserts of the Middle East and of North Africa [1]. According [2], it is a lizard of north-African who also inhabits in the Iberian Peninsula. It is the only one to invest the whole of Morocco to the north and west of the Atlas. This distribution is continued in the East, on all the Mediterranean zone of Algeria, and in North, on the three quarters of the South of the Iberian Peninsula, with a prolongation along the Mediterranean until the region of Barcelona [3].

The precise knowledge of the diet of a species plays a significant role in any program of conservation [4].

The absence of the studies on the diet of the reptiles in the region of Souf, pushed us to try to make a study on the diet of *Acanthodactylus Scutellatus* (lizard) where we have tried to identify the factors that can influence on their variations, in particular the habitat, the sexes and the size of individuals.

2. Materials and Methods

The present work was carried out in the region of the Souf, a region located to the north of the Great Eastern Erg between the months of March and the beginning of the month of June 2015. This period corresponds to the biological activity of this species that hibernate from November to March.

It is in the North-East of the northern part of the Sahara 6°30' East and 33°33' Northern at an average altitude of 80 m (Fig. 1) [5]. Climate of the region is of the Saharan type at mild winter with precipitation accumulation equal to 61.92 mm. The minimum average temperature of the coldest month is registered in January (T avg. = 11.36 °C.). While the hottest month is July (T avg. = 34.47 °C.).

The stations of study of sandy nature some is in the palm grove or the erg. The vegetation which houses the *Acanthodactylus Scutellatus* consists essentially of, Fabaceae, Ephedraceae and Asteraceae. The invertebrate fauna includes of Arachnida, Coléoptera, Hymenoptera and Lepidoptera.

Correspondence

Mouane Aicha
Faculty of Sciences of nature and
of life, University Hamma
Lakhdar, BP. 789 El Oued,
Algéria

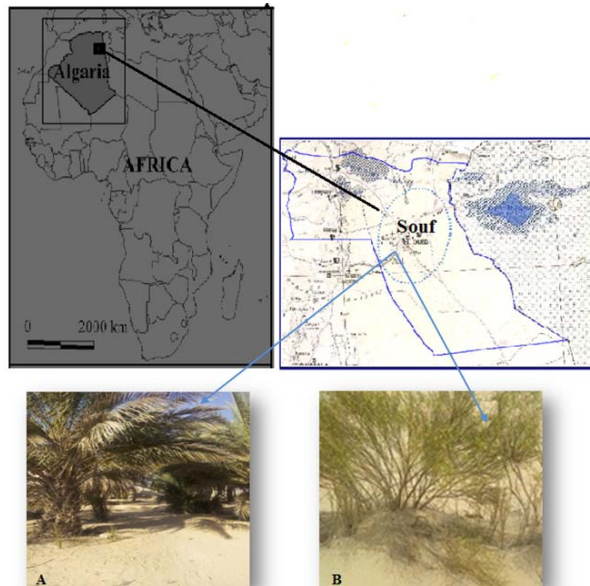


Fig 1: Geographical situation of the region of the Souf (A- palm grove, B- Erg) [6].

The study of the diet was carried out through an examination of the stomachic contents of 32 individuals captured with the hand, either in the palm grove or in the Erg. The captured animals were placed in limps annotated with date and place of capture.

Afterwards, we have calculated the biometric measurements (Total length, length of the body and length of the tail of *Acanthodactylus scutellatus* using a sliding feet (Fig.2).

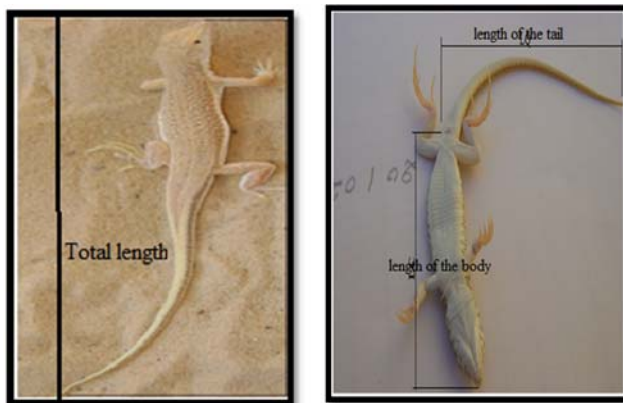


Fig 2: Biometric measures of *Acanthodactylus scutellatus*

After having measured the size, we proceeded to the dissection of animals. The sex of each specimen of the animals was determined and its stomach contents are taken and examined under a binocular microscope equipped with a micrometer, each prey was given until of the order using the keys of [7, 8 and 9]. And also using the collections of reference relating to the arthropods of the zones of study. The present study results were exploited by the ecological indices and statistical analysis following: relative abundance and the degree of presence. The relative abundance (R.A) which corresponds to the report of the number of prey (Pi) of a category (i) to (p) the total number of prey $RA = (Pi/p) * 100$. The degree of presence (DPI) which is given by the report of the number of stomachs containing the category of prey (i) on the total number of Stomachs full. Obtained data from experimental groups (LT, sexes and habitat) was subjected to one-way analysis of variance (ANOVA).

3. Results and Discussion

3.1 Results

The analyses of the diet of *Acanthodactylus scutellatus* showed that the arthropods were the animals the most preferred at this species (97.8%) on the other hand the plants are consumed little (Fig. 3). The ingested prey were essentially of insects with a percentage of 97.71% whereas arachnids were the animals most low consumed (Fig. 3).

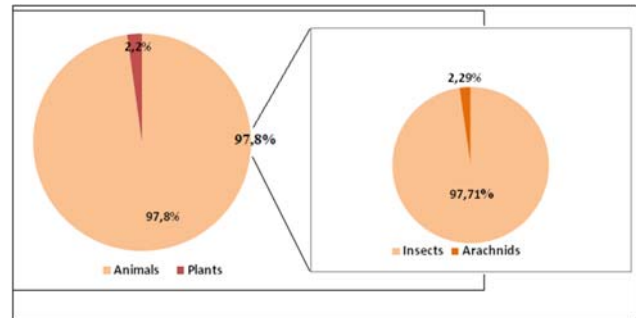


Fig 3: Abundances of the preys in the diet of *Acanthodactylus scutellatus* (animal and vegetable), and the abundance of principal the classes of identified preys.

The results obtained for the relative abundance of the prey ingested by *Acanthodactylus scutellatus* and the comparison between the diet of the males and the females are mentioned in Table 1. The two sexes (male, female) consume mainly Hymenoptera, Homoptera and Coleoptera, with relative abundances of respectively 38.4%, 30.4% and 12.2%. The relative abundances of different prey ingested by *Acanthodactylus scutellatus* showed that the prey the most consumed by the males are the Hymenoptera with a percentage of 51.29% beetles with 16.51% and Homoptera with 15.67%. In females, the Homoptera with a percentage of 48.45% and the Hymenoptera 23.7%.

Table 1: Relative abundance (A.R) and prey diversity of *Acanthodactylus scutellatus* by sex.

Sex	Relative abundance		
	♂	♀	♂+♀
Number of individuals	N = 18	N = 14	N = 32
Arachnida	1.73	2.06	1.8
Coleoptera	16.51	7.13	12.2
Collembola	0.86	0	0.4
Dermoptera	0	1.03	0.4
Diptera	6.07	5.15	5.6
Hyménoptera	51.29	23.7	38.4
Homoptera	15.67	48.45	30.4
Lépidoptera	5.2	7.13	6
Orthoptera	0	3.09	1.4

The degree of presence of the preys ingested by this lizard confirms the results of relative abundance. The dominant preys in the mode of the males and the females are the Hymenoptera with a degree of presence higher than 80% for the two sexes, the Coleoptera for the males with 66.66% and Homoptera for the females with 50%. The frequent preys are the dipterous ones, Homoptera and the Lepidoptera in the males (Fig.4) and arachnids, Coleoptera and Lepidoptera in females (Fig. 5), with a degree of presence higher than 25%. The prey accessories were 14.88% in females, the accidental prey whose degree of presence was less than 10% is in males: arachnids and Collembola, in females this were Dermoptera and Orthoptera.

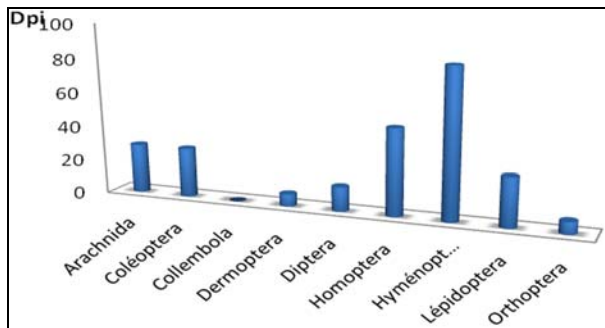


Fig 4: Degree of presence (Dpi) of the preys consumed by the males of *Acanthodactylus Scutellatus*.

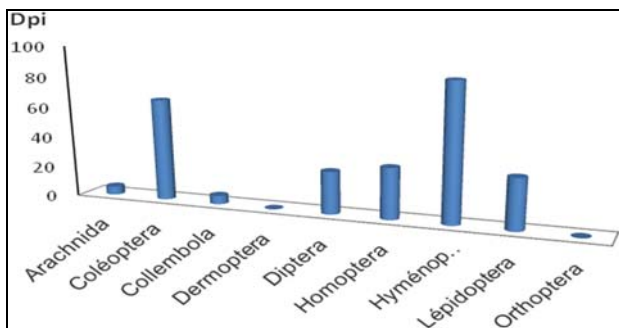


Fig 5: Degree of presence (Dpi) of the preys consumed by the females of *Acanthodactylus Scutellatus*.

The difference in the diet of *Acanthodactylus scutellatus* between the erg and the Palm grove are presented in Table 2. The analysis of the abundance of key type of prey in the two types of habitats (Table 2) highlights the broad food opportunism of the *Acanthodactylus scutellatus*. Of a general marl-pit, prey, the most consumed were the Hymenoptera, whereas the arachnids, Collembola, Dermoptera and Orthoptera rarely appear (Fig. 6 and 7).

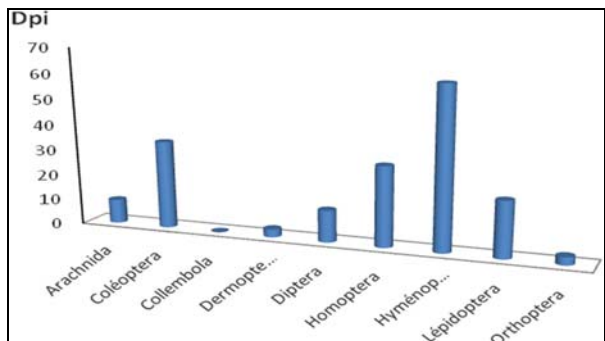


Fig 6: Degree of presence (Dpi) of the preys consumed by *Acanthodactylus Scutellatus* in the Palm grove.

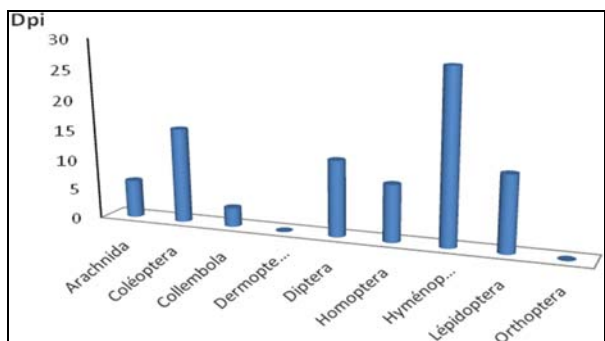


Fig 7: Degree of presence (Dpi) of the preys consumed by *Acanthodactylus Scutellatus* in the Erg.

It appears that only the total length of *Acanthodactylus* was correlated with the number of prey ingested (highly significant). Larger lizards eat more prey than small ones but the rest of the parameters were uncorrelated (sex or habitat) (Table 3).

Table 3: Analysis of data by ANOVA

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	2.57522	0.26657	9.661	< 2e-16 ***
LT	-0.07039	0.02254	-3.123	0.00179 **
Sexe [T.mal]	-0.07841	0.14008	-0.560	0.57567
Habitat [T.2]	0.16615	0.15400	1.079	0.28063

3.2 Discussion

The diet of the *Acanthodactylus scutellatus* consists mainly of insects with more than 97%, by against the arachnids presents a very low rate with 2.29%. These results may classify the *Acanthodactylus scutellatus* as insectivores. This agrees with [10], *Acanthodactylus* consumes mainly the insects and their larvae, but also of Arachnida, the worms or Molluscs.

On the food plan, Hymenoptera (Formicidae), Homoptera and the Coleoptera occupy an important place in the trophic spectra of individuals studied. According [11], the Importance of Formicidae and/or Isoptères for several populations of lizards could be interpreted by the high abundance of these insects in the arid and desert. The prey of stomach contents in the *Acanthodactylus scutellatus*, are prey relatively large and agile as the Orthoptera, are seldom taken, according to our results, it seems that this predator prefers easier prey to catch as the Hymenoptera (Ants), Homoptera and the Coleoptera. Thus, when the opportunity presents, this predator ingests a large number of prey of small volume, whereas it can consume only a small number of large prey. This agrees with the results published by [12], at *Acanthodactylus schreiberi syriacus*.

The diet of the males differs from that of females at the level of the Prey accessories and accidental, the size of males is higher than females (average size of males 11.97 mm and that of females 10,14 mm) This explains the variation to the prey in the food of males. According to [12], the diet of the males differs slightly from that of the females on the level as of additional and accidental preys. The males having a superior size average size of the males equal to 71.99 mm and that of the females equal to 63.93 mm) appear more exploring and more aggressive. They introduce more preys and they attack the small lizards of the same species (cannibalism) with a significant percentage of which the degree of presence is equal to 5.8%.

The diet of *Acanthodactylus scutellatus* which lives in the palm grove more diversified of that which lives in the Erg that explained why the palm plantation is an environment richer in species. The latter creates a microclimate favorable for the diversity and the abundance of prey of this species. The palm plantation represents a true forest offering a méso-climate very favorable to the life of the living beings [13].

4. Conclusion

The present study was carried out with an aim of knowing the trophic menu of *Acanthodactylus scutellatus* and to have highlights on the fauna and the flora of the region of Souf. The study of the diet one of the 32 individuals of *Acanthodactylus scutellatus*, made it possible to make the following observations:

The diet *Acanthodactylus scutellatus* consists mainly of insects by against the arachnids and the plants are low. The

diet of the females was mainly constituted of Homoptera in comparison with the Hymenoptera and other orders, on the other hand the males; it was mainly constituted of the Hymenoptera in comparison with the Homoptera and other orders. The quality of the regime is varied between species of the Palm grove and the Erg, the food modes of the species that live in the Palm grove is more diversified by contribution the species that live in the Erg.

As our work is a preliminary study, we expirons shout a research network to meter to light the different ecological factors and their influences on the diets of the reptiles.

5. Acknowledgements

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