

Article

Sampling of rodent species in different habitats in Touggourt (Algeria)

Moussa Hadjoudj¹, Abderezak Merah¹, Khaled Amiri¹, Nacer Eddine Bekkari¹, Ali Lahcini¹

1 Scientific And Technical Research Centre For Arid Areas (CRSTRA), Biskra ;Experimental Station of the Biophysical Environment, Touggourt; Algeria merah.bm23@gmail.com ked_am83@hotmail.fr bekkarinaceur@gmail.com lahciniali@gmail.com

* Correspondence: mhadjoudj@gmail.com

Abstract: The observation was conducted at three stations in Touggourt, Southern of Algeria (33° 07' N., 6° 04' E.). In 2009, the sampling was carried out at a palm grove, sand dunes and storage shed. We used a random trapping of rodents. The capture of rodents was completed by using traps cage (Bait Trap System). In the palm grove, 8 individuals of Murinae are captured of which *Rattus rattus* dominates with 62.5% followed by *Mus spretus* (37.5%). While in the sand dunes, 14 individuals of Gerbillinae were trapped. In order of importance, we highlight a more presence of *G. gerbillus* (35.7%) and *G. nanus* (35.7%) compared to *G. tarabuli* (28.6%). On the other hand, in the storage place we note the dominance of black rat (18 individuals).

Keywords: Gerbillinae; Murinae; Sampling; B.T.S; Touggourt.

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1. Introduction

Between all orders of mammal's class's, the order of rodents is considered the most important apart from the number of species and by the population sizes [13]. Given the morphological characteristics and physical abilities, this order is the most diverse [26]. The same authors reveal that among the 5000 species of mammals existing in our planet 2000 are rodents, and within this group of rodents there are considerable differences in size. Indeed, the South American Capybara weighs up to 50 kg while the weight of the African pygmy mouse is only 5 to 7 g. [2] defined that rodents are small to medium sized animals, with elongated bodies carried by short legs, thick necks that can be split into burrowing types, these creatures have a worldwide distribution where they serve as food for many predators such as mammals, birds and reptiles. Rodents are mercilessly fought by man because they attack crops and stocks and spread diseases. This latter is confirmed by [6] where they noted in their article that rodents constitute reservoirs of germs of diseases transmissible to man such as cutaneous leishmaniasis in several regions. It has been shown, on a global scale, that rodent's damage up to 25% of food products grown by man each year and 40% of rice and other cereal stocks [28]. These reveal that at the level of food storage stores and in the fields, rodents attack all kinds of crops, vegetables and fruits at all stages of development. Worldwide, several studies are carried out on Rodentia. In Europe, the observations made on Rodents by [11], [25], [12] on the analysis of the feces of *Apodemus sylvaticus* (Linnaeus, 1758) and [27] should be highlighted. While in Africa, the work of [21], [8] in Tunisia and [2] on Mammalia in Morocco should be recorded. However, according to [5] knowledge on the biotopes of micro mammals in Algeria remains limited because few studies on the distribution of small species of mammals such as rodents have been undertaken. [24] State that the majority of research on mammals is based on materials and samples from European and American museums, these researchers reveal that European observers in 1985 signaled a collection of small mammals of Algeria during German tour. [24] Have worked in Algeria for three times on the distribution of

mammals. Also [19] and [23] have worked on *Apodemus sylvaticus* in Kabylie, of [20] on Gerbillinae in two Saharan regions (El-Golea and Beni-Abbes), of [7] on Murinae in Oued Righ. The interest of the present research is to obtain information on the species of rodents existing in three landscapes of the observed region.

2. Materials and Methods

2.1. Study region

The study region is situated in the South of Algeria (Sahara septentrional) at a 75 m of altitude [16], exactly at the high-part of Oued Righ. In the south and the east, the study area is limited by the Grand Erg Oriental. While to the north, the palm groves of Megarine are well present. The western side of Touggourt is bordered by a sand dune (Fig. 1). July represent the hottest month with an average of 35.1 °C. and January have the low recorded temperatures with an average of 11.7 °C. The rainfall is very rare during 2009. The ombrothermic diagram (Fig. 2), show two periods: a dry one that extends from February to December and the wet one extends throughout the month of January.

2.2. Study sites

Three sites were sampled; a palm date, a storage site and sand dunes. The sampling sites are limited by palm dates in the north and at the east we found Merdjadja wetland and the sand dunes are in the south and west. The palm grove is very abundant. Weeds are abundant such as common reed (*Phragmites australis*), great hemlock (*Conium maculatum*) and chrysanthemum (*Chrysanthemum myconis*)

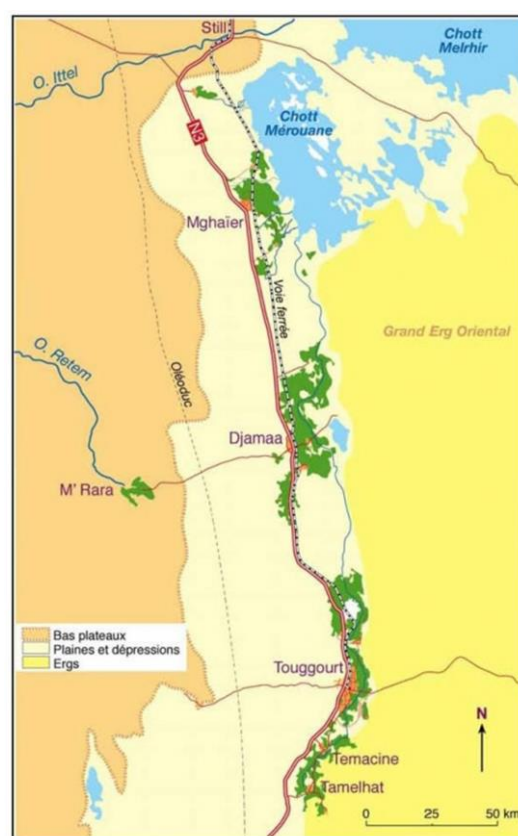


Figure 1. Geographic situation of Touggourt region [3]

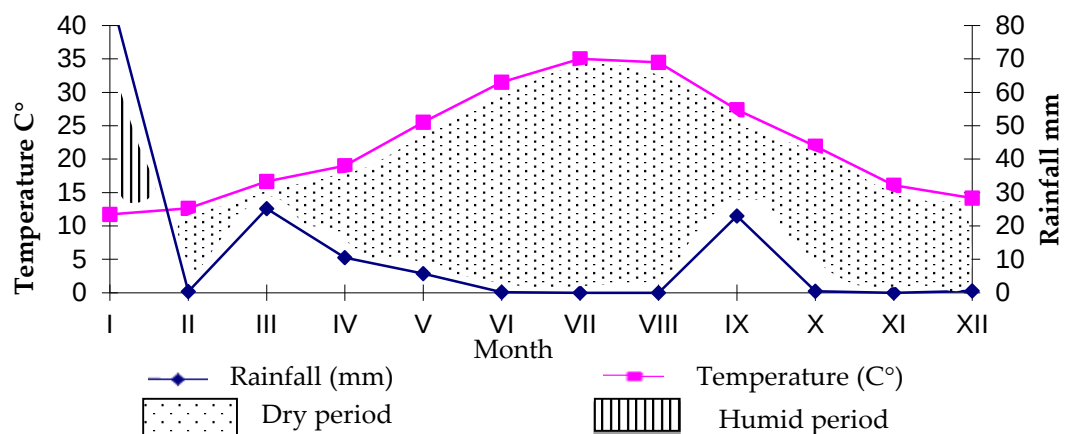


Figure 2. Ombrothermic diagram of Gaussen for Touggourt region

The sand dunes represent a landscape with low density of vegetation. The palm date limited this station in the north and the sand dunes limited the east part. In the south we found palm groves and in the west is bordered by a sand dunes (33° 05' N., 6° 04' E.). As a plants occupying the sandy soil, the fabagella (*Zygophyllum album*), the "zita" (*Limoniastrum guyonianum*) and the chenopodium (*Traganum nudatum*).

The storage place is used as a site for storing crops and materials. It is located near to the palm grove.

2.3. Sampling technic

To capture live individual rodents in the study, we have used the random technic of trapping between February 2009 and January 2010, with the use of 24 live traps BTS (Bait Trap System). The traps are set at the end of the day and are visited the next morning for 3 successive nights.

2.4. Data analysis

2.4.1. Total richness (S)

It's represent the overall number of species in a population ([9]; [4]). This index is calculated for the rodents captured in this study.

2.4.2. Relative abundance (AR%)

[14] and [15] gave the formula as follows:

$$AR \% = (n_i \div N) \times 100$$

2.4.3. Shannon-Weaver diversity (H')

The author [10] offers a formula to calculate this index; it is:

$$H' = - \sum p_i \log_2 p_i ; \text{ when } p_i = (n_i \div N)$$

2.4.4. Equitability (E)

[9] have determined it by the ratio of resolved diversity (H') to maximum diversity (H' max.), which $H' \text{ max} = \log_2 S$

3. Results

In the three sampled sites, the values of total richness ranges from 1 to 5 species (Tab.1). Three species of rodents are captured in dunes and two in palm grove, also one species is founded in a storage location. The high average richness is noted in the sand dune station (0.91) followed by those of the palm grove (0.58) and the shed (0.5).

Table 1. Total and average richness in study sites of Touggourt

	Palm grove	Storage place	Sand dune
Total richness	2	1	3
Average richness	0,58	0,5	0,91

The Murine species are abundant in palm site. The black rat is strongly present with 62.5% of abundance followed by the Algerian mouse (37.5%) (Tab.2). The black rate is the most species present in the storage point 100% of frequency. Contrarily, in dunes Gerbils species are dominant with *Gerbillus gerbillus* (35.7%), *Gerbillus nanus* (35.7%) and *Gerbillus tarabuli* (28.6%).

Table 2. Relatives abundances of rodent captured in study sites of Touggourt

	Palm grove		Storage place		Sand dune	
	n.	RA. %	n.	RA. %	n.	RA. %
<i>Gerbillus gerbillus</i>	-	-	-	-	5	35,71
<i>Gerbillus nanus</i>	-	-	-	-	5	35,71
<i>Gerbillus tarabuli</i>	-	-	-	-	4	28,57
<i>Mus spretus</i>	3	37,5	-	-	-	-
<i>Rattus rattus</i>	5	62,5	18	100	-	-
Total	8	100	18	100	14	100

The Shannon-weaver index noted in the sand dunes equal to 1.09 bits (Tab.3) and 0.66 bits in the palm. The evenness fluctuates between 0.95 and 0.99 for dunes and palm. The evenness is close to 1, and this means that the numbers of species are balanced between them with each other (Tab.3).

Table 3. Shannon-Weaver index (H') and Evenness (E) for the study sites

	Palm grove	Sand dune
H' (bits)	0,66	1,09
H' max (bits)	0,69	1,1
E	0,95	0,99

4. Discussion

In the sand dunes, an overall richness equal to 3 species of rodents was noted. This result confirms those of [17] where he recorded the same species of gerbillinae at El Moustakbel near to Touggourt. The nature of the soil (sandy) and plant cover represent a common aspect to these two sites previously cited. In the palm grove, 2 species of Murinae are captured. This result coincides with those of [7] and [5] where these researchers note the existence of 3 species of Murinae in palm groves near to Touggourt (Ranou, Debba, Bentebba and Bentouati). A similar observation made at Bahia palm in Touggourt, [18] observe that *Rattus rattus* is the only rodent present in this site. [1] At Souf palm groves, observe a similar species trapped in the present study. So our results confirm those of [1] Souf. Finally in the storage place, *Rattus rattus* is the only abundant species. [7] Worked at storage place in Bahia (Touggourt) and mentioned the presence of black rats only. The

results of this observation agree with those noted by [7]. The Murine species are usually caught in the surroundings of human beings (habitations and orchards). In Tâadmit region at Djelfa, [28] mention the existence of 4 gerbiles (*Meriones shawi*, *Gerbillus campestris*, *Gerbillus nanus*, *Gerbillus gerbillus*), 2 murines (*Mus musculus*, *Mus spretus*) and one Dipodidae (*Jaculus orientalis*). Our observation disagrees with the work of [28]. This difference in results is perhaps explained by the differences in climate, vegetation (alfa, durum wheat, barley) and by the soil structure (clay). As well as the Djelfa region is a semi-arid area with cool winters.

Murine's species are mostly present in palm date. The black rat has the high abundance value with 62.5% followed by the Algerian mouse (37.5%). This dominance of the black rat is also reported in the storage area with 100%. This result confirms the value of [22] in Ouargla when these authors highlighted the dominance of the gray mouse (41.5%) in the palm date of the Technical Institute of Development of Saharan Agriculture. Also, the same authors note a high frequency of the black rat in the storage of the palm date of Ouargla with 100%. Our results are similar with those noted in palm grove of Bahia; where [21] found that the black rat is the most abundant (100%). A study carried out in 3 agricultural sites in Souf region, [1] mention the dominance of gray mouse (50%; 44,1%; 39,3%) in Ouermes, Hassi Khalifa and Ghamra successively. Further from Touggourt, in a cultivated environment at Menia region, [20] report a high frequency of *Gerbillus gerbillus* (50%). At Béni Abbes, [20] also in agricultural places composed of cereals, market gardening, palm date and citrus fruits, report the dominance of *Gerbillus nanus* (30.3%) in Kroua and 66.6% in Oubared. In Djelfa, *Meriones shawi* is most frequent with 68.8% relative abundance [28]. Our values are in disagreement with those of [20] and those of [28]. Gerbillinae (3 species) are the only species contacted in the sand dunes, it should be noted that *Gerbillus gerbillus* shares the first position with *Gerbillus nanus* (35.7%) and it's followed by *Gerbillus tarabuli* (28.6%). Our values coincide with that of [18] in Touggourt where they report that *Gerbillus tarabuli* (94.4%) dominates in the sand dunes. [20] Note that *Gerbillus nanus* (53.6%) is abundant in Belbachir and *Gerbillus campestris* (66.6%) the most frequent in Hassi El Garra. Juifa in Beni Abbes, the same authors report the abundance of *Gerbillus gerbillus* with 30.5%. This allows us to note that the results mentioned in this observation are in agreement with those highlighted by [20] in Belbachir and Beni Abbes, while disagreeing with those recorded in Hassi El Garra.

Concerning the diversity of the study sites, it should be noted that the highest is noted for the sand dunes (1.09 bits) followed by that of the palm grove (0.66 bits). [18] at the level of the dunes of El Mostakbel in Touggourt, the diversity index equals 0.31 bits, a value lower than those resulting from our study. In 3 palm groves of Souf, [1] declare a diversity fluctuating between 2.16 bits and 2.39 bits. Our values are lower compared to that of [1]. In Djelfa a slightly higher value advanced by [28] equal to (1.81 bits). It should be noted that the equitability values obtained in this research do not coincide with those of [18] in the dunes of El Mostakbel. It is important to note that [28] in Djelfa found an equitability value equal to 0.60 and which is very close to those obtained in our observation. According to research conducted in three date palm plantations in Oued Souf, [1] report equitability results varying between 0.79 and 0.83.

5. Conclusions

In the sand dunes, the palm date and the storage place of Touggourt, we have used a B.T.S. traps (Bait Trap System) which are placed randomly in each sites. The traps give to this observation the possibility to demonstrate the differences and similarities in terms of species. It can be noted that the species identified are divided in two distinct subfamilies: Gerbillinae and Murinae. The gerbil's are the only species exist in the dunes, of which *Gerbillus nanus* and *Gerbillus gerbillus* occupied the first place. In the palm date and the warehouse, the Murines are the most frequent species. We note that in the palm grove site

only *Rattus rattus* and *Mus spretus* are contacted. On the other hand, in the warehouse, *Rattus rattus* is the only species sampled.

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