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Inventory of spiders in the region of Mellah Lake (Northeast of Algeria) and studying of monthly dynamics of abundance and species richness

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Abstract

Spiders are fearsome predators. These arthropods of the Arachnid class contribute to the regulation of populations of insects and other invertebrates. Several studies focus on the study of bio-ecology, the behavior and systematic of spiders. The inventory of these arachnids is still incomplete because several species remain to be identified.

Spiders in Algeria remain little studied because of the difficulties associated with their identification, and few researchers are interested in studying them.

Our work has focused on the inventory and identification of spider species in the Mellah Lake area of El Kala National Park in northeastern Algeria, and study of monthly dynamics of abundance and species richness.

In one sampling year, we have listed 164 individuals from 10 families, 15 genera and 17 species. The analysis of the specific richness shows a dominance of the Family Lycosidae with four species. The families Clubionidae, Gnaphosidae and Linyphiidae are represented by two species each. The least represented are the family Araneidae, Sicariidae, Philodromidae, Salticidae, Tetragnathidae and Theridiidae with one species for each.

Keywords: Mellah Lake, species, spiders, families, Algeria

1. Introduction

The biological inventory of all species existing in nature either animals or plants is always incessant, Science records the discovery of new species every day, as well as the disappearance of others because of the negative influence of anthropogenic factors leading to a natural imbalance. The biological inventory is very important to know the specific biodiversity of the planet.

In the wild, the existence of spider populations is very important, they play a very important ecological role in the regulation of insect populations by limiting their proliferation. Spiders play a role in regulation of insect and other invertebrate populations [1-3].

Spiders are ecological indicators [4]. There are now 113 families with 4073 genera and 47164 species worldwide [5] and remains a lot to describe.

Spiders are an important component of most terrestrial ecosystems. They have conquered all environments, they are found in forests, desert regions, open environments, in bodies of water, under stones and on the ground, on bushes and in burrows or caves. The spiders live in the gardens and even the houses. In a Washington Post article, Platnick Norman [6] (the American Museum of Natural History) says: "If spiders disappeared, we would face famine. They are primary controllers of insects. He adds, without spiders, all of our crops would be consumed by those pests.

In Algeria, few studies have been carried out on spiders, we can cite the study of Lucas [7], Which made a scientific exploration of Algeria during the years 1840, 1841, 1842. The studies of Simon [8, 9] which published a reasoned catalog of the Arachnids of North Africa. Taxonomic studies of Bosmans & Beladjal [10], Bosmans & Abrous [11], Bosmans & Chergui [12]. And recently we have the study of Alioua [13] In the basin of Ouargla. And also Alioua [14] who studied the settlement of spiders in Sebkhet El Mellah located north of the Algerian Sahara.

Our present work aims to inventory and identify all species of spiders that live in the area of Mellah Lake located in El Kala National Park in northeastern Algeria. It consists of the collection of the species by capture on the ground, and then in the laboratory we make the identification of the species according to the keys of identification available.

The monthly dynamics of abundance and species richness have also been studied throughout the year. Finally, by this study, we hope to contribute modestly to the knowledge of the araneofauna of the northeastern zone in Algeria.

2. Materials and Methods

2.1 Study area

Mellah Lake (figure 1) is located in the extreme northeast of Algeria. The lake is included in the National Park of El Kala. It is a coastal lake (Longitude: 8° 20'E Latitude: 36°53' N) Is spread over an area of 8600000 m2 and with a maximum depth of 6 meters. Communicating with the sea through a

channel of 900 meters long and 20 meters wide.

This natural pond located at the mainland-sea interface receives continental water flows and marine flows, is characterized by brackish water. Located in a natural site covered with a dense forest, surrounded by a thick dune cordon, it is a representative example of a rare natural wetland, even unique, of the Mediterranean region.

The shores of the lake are reduced. Woody vegetation consisting of bushy vegetation of *Pistacia lentiscus*, *Myrtus communis*, *Calycotum villosa*, *Cistus salvifolis*, *Quercus coccifera*, *Quercus suber* and *Quercus faginea* settled very near the limit of the waters of the lake DGF [15].

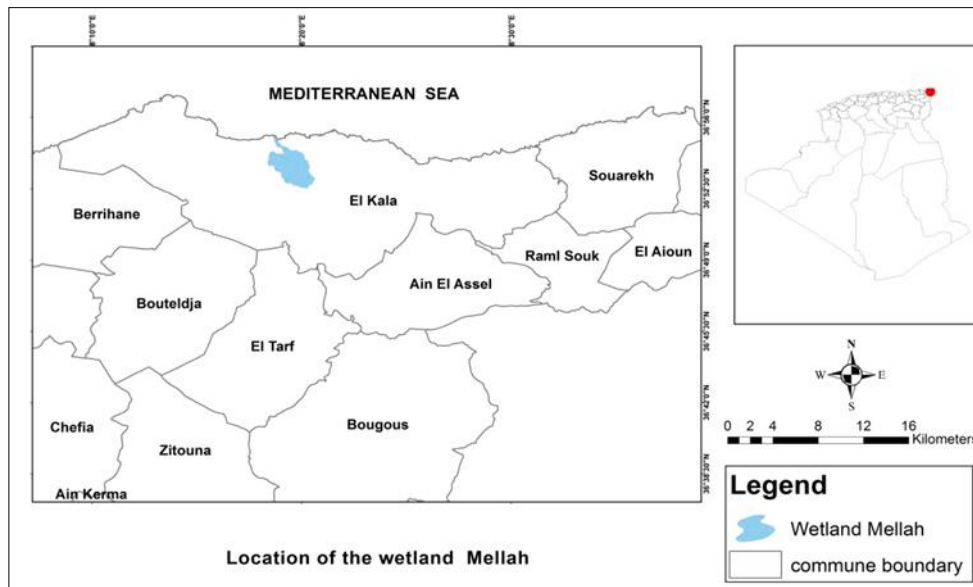


Fig 1: Location of Mellah Lake in the extreme northeast of Algeria

2.2 Sampling method, conservation and identification of species

Before identifying the spiders, it was compulsory to collect the specimens, they were caught by the use of two sampling methods, the first being the installation of Barber traps, which are containers embedded in the Ground, filled to 1/3 of a liquid (vinegar). The second method was the random spotting and catching of all spiders encountered under stones, on the ground or on different herbaceous strata.

To preserve the samples they were immersed in alcohol tubes (70 ° ethanol), the spiders kept very well but their color deteriorated.

The identification was carried out by an individual binocular examination according to the identification keys of Roberts [16] and Nentwig *et al* [17].

2.3 Data analysis

Specific diversity (H') calculated from the Shannon and Weaver index using the following equation:

$$H' = - \sum_{i=1}^n Pi \log_2 pi$$

Pi is the relative frequency of the number of individuals of species i in a settlement, n is the number of species found.

Equitability (E) is the ratio of observed diversity H' to maximum diversity (H' max). H' max = log2 S. E = H' / H' max

3. Results

During our work, we captured 164 individuals of spiders. Ten (10) families were identified, including seventeen (17) species that characterize the shores of Lake Mellah. The richest of these is the Lycosidae family with four species. The families Clubionidae, Gnaphosidae, Linyphiidae and Tetragnathidae

are less represented with two (2) species for each. The Araneidae, Sicariidae, Philodromidae, Salticidae and Theridiidae reveal their presence by one species for each family (Figure 2).

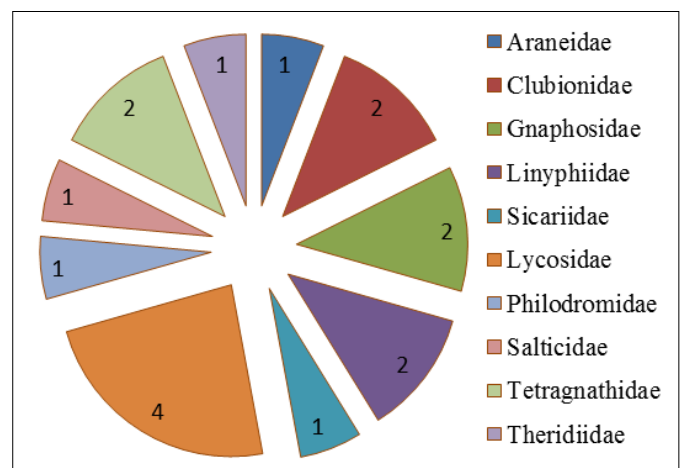


Fig 2: Specific composition of spider families in the shores of Lake Mellah (Northeast Algeria)

3.1 Distribution of abundances

The presence of the species *Pardosa sp1* is the most recorded in the study area, and to a lesser extent *Drassodes sp1*. A remarkable abundance is also reported for *Araneus diadematus* and *Tetragnatha montana*. The least abundant species are *Leptothrix sp1* with 2 individuals and *Vesubia sp1* represented by a single individual (Figure 3).

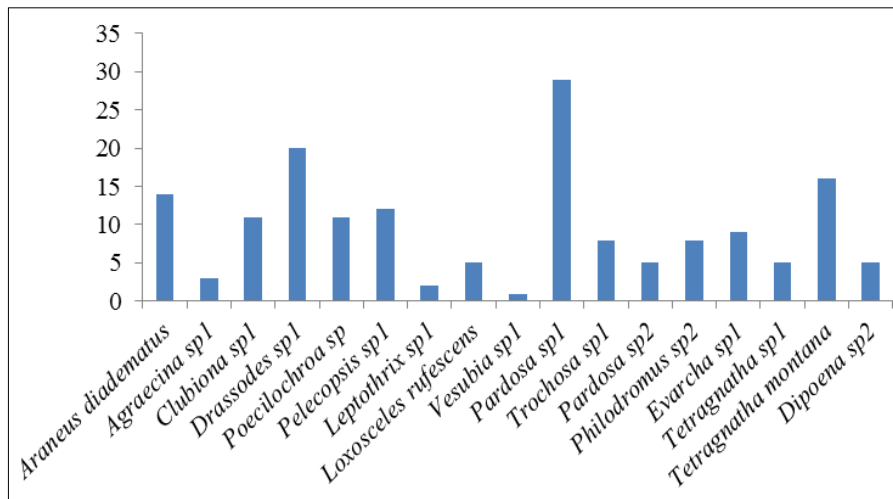


Fig 3: Distribution of abundance of spider settlement in the Mellah Lake area of (Northeastern Algeria)

3.2 Monthly dynamics of abundance

The study of the monthly dynamics of abundance shows us a great abundance in the months of April, May and June. On the

other hand, there is a fall in numbers in the July, August and September seasons (Figure 4).

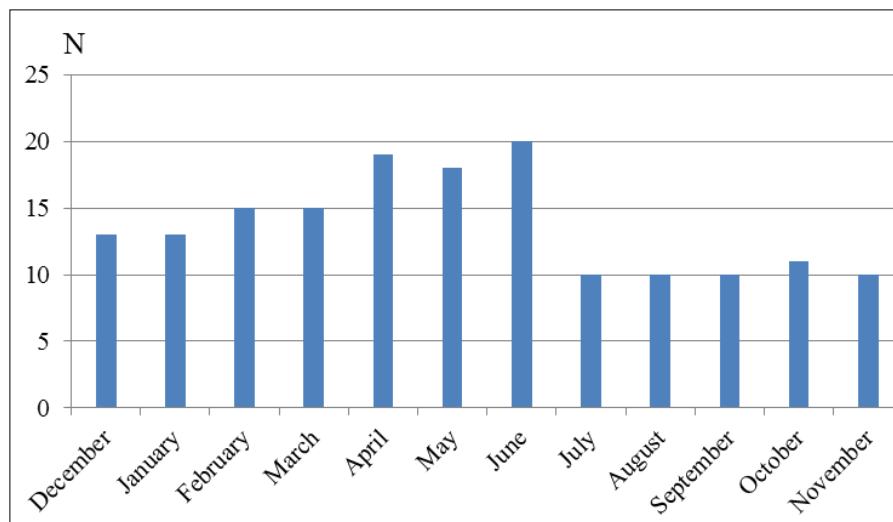


Fig 4: Monthly dynamic of abundance (N) in the population of spiders in the area of Mellah Lake (Northeastern Algeria)

3.3 Monthly dynamics of species richness

The highest number of species is recorded in January with 13 species and the lowest richness is recorded in August with 6

species. In March, April and May recorded a high specific richness 11 to 12 species (figure 5).

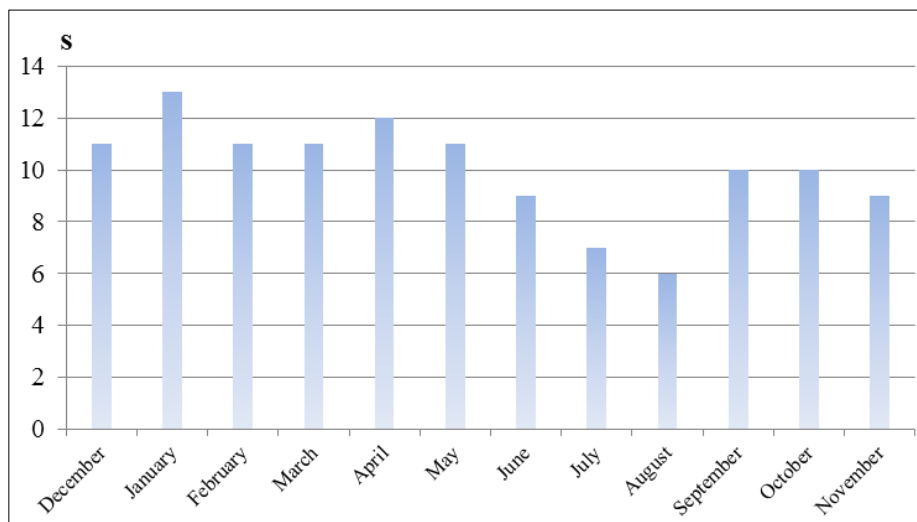


Fig 5: Monthly changes in species richness (S) at Mellah Lake (Northeastern Algeria)

4. Discussion

The Mellah lake spider settlement is composed of 10 families, 15 genera and 17 species.

High richness was recorded with 17 species of spiders and a fairly balanced distribution of abundance, which gave a high value of diversity ($H' = 3.73$ bit), reflecting a high degree of complexity and maturity of the Settlement in the Mellah Lake area. And by the same token, the complexity of the factors involved in the environment according to Benyacoub [18]. The value of the equitability (E) is (0.91) means a settlement in equilibrium and that the environment provides the conditions favorable to the good development of the species of the spiders.

In comparison, Alioua [14] identified 13 species belonging to 13 genera and 9 families in the Sebket El Melah region of Northern Sahara, Algeria. In Egypt, El-Hennawy [19] cited that the number of species recorded in Egypt is 376 species identified. In the list of Egyptian spiders revised in (El-Hennawy 2006) [20] spiders recorded in Egypt are 40 Families, 193 genera and 385 species.

In our work it was revealed that the Lycosidae family is the most represented in the area of Lake Mellah with 43 individuals belonging to 4 species. All spiders in this family are wandering, mostly living at ground level, sometimes hunting in low-lying plants [16]. These spiders are excellent hunters, occupying almost every terrestrial habitat [21]. This remarkable presence of the Lycosidae in the Mellah Lake region is linked to several factors, including the less dense vegetation cover on the shores of the lake, which provides an open environment with low vegetation, providing a favorable space for wandering species Family who prefer to hunt in large numbers on sunny days. In addition, the Barber pots were used as sampling methods alongside the visual hunting method in a random and exhaustive manner in this region. The installation of these Barber pots also allows the capture of wandering spiders (Lycosidae) as sedentary spiders. *Pardosa sp1* (Lycosidae) is the most abundant species with 29 individuals.

The Clubionidae family is represented by two species: *Agraecina sp1* and *Clubiona sp1*. The spiders of this family are nocturnal predators who stand in a cell underneath a stone or among vegetation [16], the individuals of these two species have been captured either under a stone between the tufts of a tree, Grass and between tufts of rushes and the individual is always held in a cocoon. In the family Gnaphosidae we find *Drassodes sp1* which resembles a little *Clubiona* but the Gnaphosidae possess cylindrical dies with the anterior pair that is a little longer than the rest. We also find *Poecilochroa sp*, this species shows a well contrasted design with white silks. This species has been found under the stones and in the tufts of grass.

The large family of Linyphiidae is present here by two species, *Pelecopsis sp1* and *Leptothrix sp1*, both species are caught on their canvas woven of rushes and on low vegetation. Tetragnathidae a family also present in the area of Mellah Lake, represented by the genus *Tetragnatha*, elongated with long chelicerae which makes them easily recognizable on the ground. *Tetragnatha montana* is often caught near water on low plants and on grasses where it hides perfectly.

The high abundances of the global stand of spiders in the Lake Mellah region are recorded in April, May and June, which corresponds to the spring season in this Mediterranean climate zone. The ambient temperature and humidity in this season favors the development of insects (flies and

mosquitoes) and other arthropods, which provide more trophic resources for spiders that, are a formidable predator of insects and small arthropods.

In July and August it is the summer season in the region, and it is characterized by high temperature values. What detracts from the presence of prey for spiders is why there is low specific wealth in this season. In addition the very high salinity of the lake is an unfavorable condition for the installation of certain species of insects around the lake as well as their main predators which are the spiders.

The shores of the lake are open spaces with a less dense vegetation cover which offers less favorable condition from the point of view micro-habitats and trophic resources for the spiders. The vegetation architecture plays an important role in the species composition found in a habitat [22]. Spider communities have been shown to be more directly influenced by vegetation architecture than vegetation species composition [23].

5. Conclusion

Few studies are interested in the study of spiders in Algeria, and I hope that by this study, to enrich the scientific knowledge on spiders in Algeria. This study revealed that the lake Melleh area has a population of spiders rich in species, we registered the presence of 10 families, 15 genera and 17 species. With a high value of diversity ($H' = 3.73$ bit) reflecting a high degree of complexity and maturity of the Settlement in the Mellah Lake area.

The analysis of the specific richness shows a dominance of the Family Lycosidae with four species. *Pardosa sp1* (Lycosidae) is the most abundant species with 29 individuals. These spiders are excellent hunters who prefer to hunt in large numbers on sunny days. The families Clubionidae, Gnaphosidae and Linyphiidae are represented by two species each. The least represented are the family Araneidae, Sicariidae, Philodromidae, Salticidae, Tetragnathidae and Theridiidae with one species for each.

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7. References

1. Riechert SE. Thoughts on ecological significance of spiders. *BioScience*. 1974; 24:352-356.
2. Wise DH. Spiders in ecological webs. Cambridge, Cambridge University Press, 1993.
3. Russell-Smith A. The spiders of Mkomazi Game Reserve. in: Coe, M., Mc William, N., Stone, G. & Parker, M. (eds.). Mkomazi: the ecology, biodiversity and conservation of a Tanzanian Savanna. Royal Geographic Society, London. 1999, 197-222.
4. Blandin P. Bioindicateurs et diagnostic des systèmes écologiques. *Bull Ecol*. 1986; 17:215-307.
5. WSC. (World Spider Catalog). Natural History Museum Bern, <http://wsc.nmbe.ch> version, 2017.
6. Platnick N. The case for spider conservation: They keep pests from devouring humans' food supply. In *The Washington Post* By Brian Palmer, 2014. https://www.washingtonpost.com/national/health-science/the-case-for-spider-conservation-they-keep-pests-from-devouring-humans-food-supply/2014/07/21/07b0a21e-0b8c-11e4-8341-b8072b1e7348_story.html. 18 August 2016.

7. Lucas H. Histoire naturelle des animaux articulés. In : Exploration scientifique de l'Algérie pendant les années 1840, 1841, 1842 publiée par ordre du Gouvernement et avec le concours d'une commission académique. Sciences physiques, Paris, Zoologie. 1846; 1:89-271.
8. Simon E. Liste des arachnides recueillis en Algérie par MP Lesne et description d'une espèce nouvelle. Bulletin du Muséum d'Histoire naturelle de Paris. 1899; 82-87.
9. Simon E. Catalogue raisonné des arachnides du nord de l'Afrique, (1^{re} partie). Annales de la Société entomologique de France. 1910; 79:265-332.
10. Bosmans R, Beladjal L. Une douzaine de nouvelles espèces d'Harpactea Bristowe d'Algérie avec la description de trois femelles inconnues (Araneae, Dysderidae). Revue Suisse de Zoologie. 1991; 98:645-680.
11. Bosmans R, Abrous O. Studies on North African Linyphiidae VI. The genre *Pelecopsis* Simon, *Trichopterna kulczynskiana* Ouedia gen. n. Bull Br Arachnol Soc. 1992; 9:65-85.
12. Bosmans R, Chergui F. The genus *Mecopisthes* Simon in North Africa (Araneae, Linyphiidae, Erigoninae) Studies on North African Linyphiidae. Bulletin et annales de la société entomologique de Belgique. 1993; 129:341-358.
13. Alioua Y. Bioécologie des araignées dans la cuvette de Ouargla. Thèse de magister, Université de Ouargla, Algérie, 2012.
14. Alioua Y, Bissati S, Kherbouche O, Bosmans R. Spiders of Sebket El Melah (Northern Sahara, Algeria) Review and new records. Serket. 2016; 15(1):33-40.
15. DGf Direction générale des forêts. Fiche descriptive sur les zones humides Ramsar. Réserve intégrale du Lac El Mellah Wilaya d'El Tarf Algérie, 2005.
16. Roberts JM. Guide des araignées de France et d'Europe. Delachaux et Niestlé SA, Paris. 2009, 383.
17. Nentwig W, Blick T, Gloor D, Hänggi A, Kropf C. Spiders of Europe www.araneae.unibe.ch, 2017.
18. Benyakoub S. Ecologie de l'avifaune forestière nicheuse de la région d'El-Kala (nord-est algérien). Thèses de doctorat Univ Bourgogne, 1993.
19. El-Hennawy HK. The Egyptian arachnids. Publication of National Biodiversity Unit, N O 12, Egypt. 2002, 109.
20. El-Hennawy HK. A list of Egyptian spiders. Serket. 2006; 10(2):65-76.
21. Barrion AT, Litsinger JA. Riceland Spiders of South and South East Asia. Publ. CAB International, UK & IRRI, Philippines. 1995, 716.
22. Scheidler M. Influence of habitat structure and vegetation architecture on spiders. Zool Anz. 1990; 5:333-340.
23. Gonzalo DR, Jose AC, Miryam PD. Do Spider diversity and assemblages change in different contiguous habitats? A Case Study in the Protected Habitats of the Humid Chaco Ecoregion, Northeast Argentina. Environ. Entomol. 2008; 37(2):419-430.