Journal of Advanced Zoology

***ISSN**: 0253-7214*

*Volume **45** Issue **-1** **Year 2024** Page 471**: 481***

Inventory Of Aranea Fauna In Two Agricultural Fields At Bouira Region (Algeria)

Mahdi Khadidja[1,2], Hansali Hanane[1], Belkassam Salma[1], Benlameur Zahia[2,3], Guerzou Ahlam[4]

[1]*Department of Agronomy, University of Bouira – Algeria*
[2]*Laboratory:Botechnologies and Protection of Agricultural and Natural Ecosystems,University of Bouira*
[3]*Higher Normal School of Bouzareah – Algeria*
[4]*Ziane Achour University of Djelfa – Algeria*

[*]***Corresponding Author:** Mahdi Khadidja*
[*]*Department of Agronomy, University of Bouira – Algeria, Kh.mahdi@univ-bouira.dz*

Article History

Received: 16 February 2023
Revised: 11 September 2023
Accepted: 01 January 2024

ABSTRACT

This work is a study of spider's biosystemsmatic in two vegetable growing stations: Red Crete and El-Asnam at Bouira region. The spiders are trapped by two methods: Barber traps and capture by hand. 630 individuals of spiders were identified, 204 of them were sampled by hand capture and 226 captured by the Barber pots. Trapped spiders are classified into 20 families. The results show the abundance of the Lycosidae family at both stations, with AR% = 63.77% in Red Crete and AR% = 41.61% in El-Asnam. At the Red Crete, the Lycosidae are followed by the Salticidae with AR % = 17.95%, and the Gnaphosidae with AR %= 11.97%. At El-Asnam the Gnaphosidae are represented with AR% = 21.84%, they are followed by Salticidae and Clubionidae with AR% = 11.18%. The study of various indices shows that the climatic conditions, in particular the temperature are the main factors influencing the abundance of the populations of spiders in the two study stations.

***Keywords**: Biosystematic, aranea,* Barber traps, capture by hand, Bouira.

RESUME

Ce travail est une étude de la biosystémique des araignées dans deux stations maraîchères : la Crète rouge (Bechloul) et El-Asnam dans la région de Bouira. Les araignées sont piégées par deux méthodes : les pots Barber et la capture à la main. 630 individus d'araignées ont été identifiés, 204 d'entre eux ont été prélevés à la main et 226 capturés par les pots Barber. Les araignées piégées sont classées en 20 familles. Les résultats montrent l'abondance de la famille des Lycosidae dans les deux stations, avec AR% = 63,77%. à la Crète rouge et AR% = 41,61% à El-Asnam. Au niveau de la crête rouge les Lycosidae sont suivis des Salticidaes avec A.R. % = 17,95%, et des Gnaphosidae avec AR %= 11,97%. A El-Asnam les Gnaphosidae sont représenté avec AR% = 21,84%, ils sont suivis des Salticidaes et des Clubionidae avec AR% =11,18%. L'étude de différents indices montre que les conditions climatiques, notamment la température, sont les principaux facteurs influençant l'abondance des peuplements d'araignées dans les deux stations d'étude.

Mots clés : Biosystematique, aranea, *pots Barber, capture à la main, Bouira*

INTRODUCTION

About 50,000 species of spiders have been described and it still so many others waiting to be discovered (Jensen *et a.l* 2014). At the Museum of Natural History in Paris Rollard and Canard (2015) consider spiders as animals full of surprises. We can find them in all ecosystems and perform a large-scale ecological function (Filho and Rinaldi 2011; Soualah-alila *et al*. 2013; James 2014; Canard and Rollard 2015; Lecomte 2015). They have the reputation of being redoubtable predators according to Rollard (1992), they feed mainly on insects, at all stages of their life. According to Lee and Kim (2001) they help in regulation density of harmful insects.

Nowadays an important interest is brought to the spider and its silk, because of their extraordinary characteristics and secrets; they have been the subject of several researches around the world (Darrigrand *et al*. 2008). Among the oldest works in this subject those of Simon (1899, 1926, 1929, 1932, 1937), recently many studies have been carried out on the systematics, ecology, biological control, characteristics of silk, we can site works of: Alderweireld (1989) in the Netherlands**,** Yan (1995) in Australia, Chen (1999) in Taiwan, Jager and Ono (2000); Su *et al*. (2011) in Japan, Lee and Kim (2001), Ho (2012); Lee *et al*. (2014) in South Korea, Huber (2003) in South Africa; Peng and Li (2003) in Vietnam, Peng et al. (2004) in China, Ambalaparambil et al. (2005) in India, Taylor and Persons (2005); Hoebeke *et al*. (2015) in the United States, Gillespie and Rivera (2007) in Hawaii, Maddison (2015) in Canada and Anton *et al.* (2016) in Russia.

In Algeria, there is just few studies in this subject: Kherbouch-Abrous (2006) in Djurdjura mountain, Braguebouragba (2007) in the semi-arid region of Djelfa, Alioua *et al*. (2012) and Berretima (2016) these last two works are the only ones realized at the Sahara in the palm groves region of Ouargla and Biskra and Touggourt. It should be noted that the spiders at Bouira region are very poorly known, especially in systematic, which justifies the objective of our study, which is to establish first inventory of spiders present at our region of study.

MATERIALS AND METHODS

Sampling are realized at two agricultural field: Red Crete (Bechloul) and El-Asnam located in Bouira region, department in the north-central region of Algeria. (36 ° 22'15.98"N.3 ° 54'05.63"E) (fig. 1). For this study we used two methods: Barber traps described by BENKHLIL (1991). and capture by hand. After collection, spiders are put directly in tubes containing ethanol (70 °). The determination of specimens is made at Plant Protection Laboratory, SNVST faculty, U.A.M.O. We used a stereo-loupe and various identification keys: Ledoux and Canard (1981), Duck and Rollard (2015).

Figure 1: . ***Map showing the location of the study area in the Bouira region. (Google earth)***

RESULTS

In this study about 630 spiders are captured, classified into 20 families at Red Ceast (Bechloul) and Asnam stations. The families captured in both regions are in the order of World Spiders Catalog (2017): Agelenidae, Amaurobiidae, Clubionidae, Dictynidae, Dysderidae, Filistatidae, Gnaphosidae, Lexoscelidae, Linyphiidae,

Lycosidae, Oxyopidae, Palpimanidae, Philodromidae, Pisauridae, Prodidomidae, Salticidae, Sparasidae, Theridiidae, Thomisidae, Zoropsidae.

Part I: Systematics and description of spider families inventoried in two market gardening stations in the region of Bouira

1- Lycosidae family or wolf spiders (SUNDEVALL, 1833)

It is the most abundant family in our study regions with 309 individuals, (146 males, 139 females and 27 juveniles). Spiders of this family have a pear-shaped cephalothoracic portion, the latter carries 8 eyes of different size, including 4 small and 4 large arranged in three lines, at the level of lower one has four small ones. At the other two side lines, two larger. They can be measured from 4, 7 to 8 mm or even larger for giant individuals, most spiders founded measure 5mm with a jaw leg only 2mm (Fig. 2). The Spiders of this family are present almost all the year, especially during the hottest months of the year because of the presence of their food (insects).

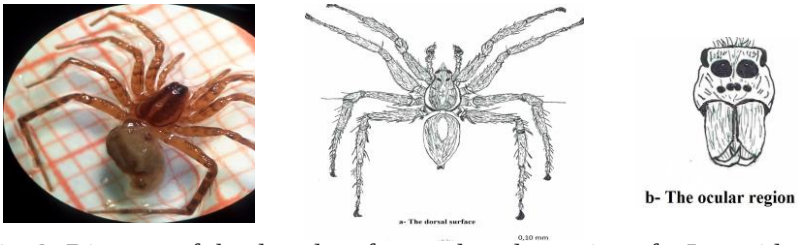


Fig. 2: Diagram of the dorsal surface and ocular region of a Lycosidae .

2- Gnaphosidae family (POCOCK, 1898)

At the study stations it represents the second most abundant family with 69 individuals, including 41 males and 28 females. It's 6mm long spiders, the eyes are arranged in two straight, recurred or slightly procured wipes, characterized by six cylindrical dies characteristic to this family. The species of this wandering family present nocturnal mores. During the day they refuge under stones (fig. 3).

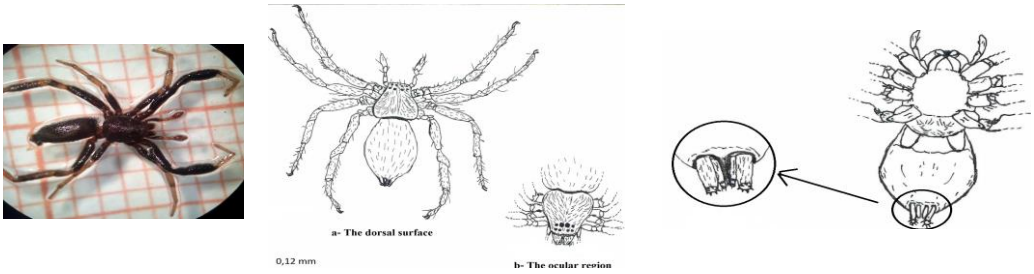


Fig. 3: Diagram of a Gnaphosidae .

3- Salticidae family or jumping spiders (BLACKWALL, 1841)

It represents the third family with a total of 59 individuals including 31 males and 28 females.

They measure 6mm long or less, pedipalpes of 1 to 2 mm. This family is characterized by the rectangular shape of the cephalothorax and by their two large anterior medial eyes (MA) or the main eyes that occupy the entire width of the forehead, the other four lateral ones (AL.PM.PL), the posterior eyes arranged in rectangle, the posterior medians are very little visible. Their anterior paws more small as the posterior (are jumping spiders). According to our observations the salts are extremely colored, and these pigments are keys to the determination of genera and species (fig. 4).

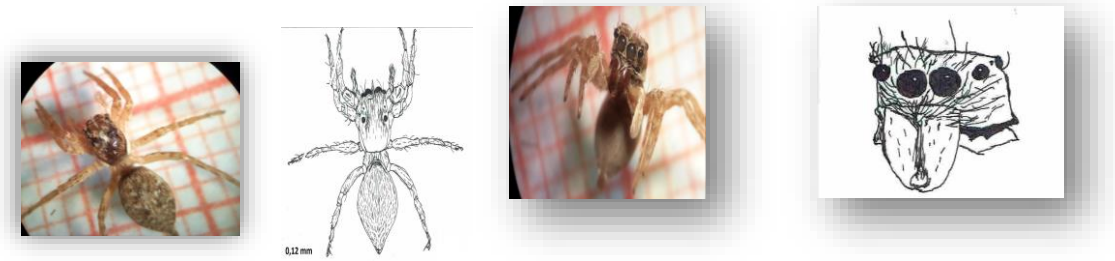


Fig. 4 Diagram of a Salticidae .

4- Clubionidae family (WAGNER, 1887)

With 51 individuals at both stations, including 30 males and 21 females. The length of body is different depending on the species, usually males have 8mm in long. These spiders have brilliant eyes, which means that they have nocturne mores. The species in this family have slightly longer chelicera, they have a cephalothorax with a thoracic streak (fig. 5).. As the Gnaphosidae are characterized by contiguous conical anterior dies, are legged spiders anterior forwards .

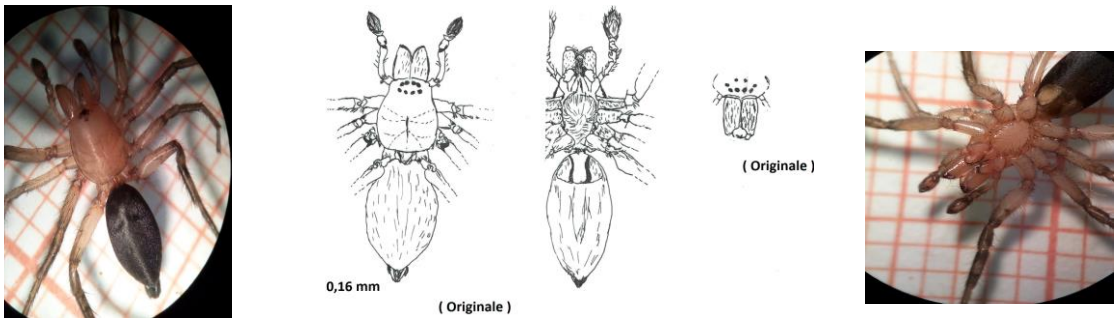


Fig. 5: Diagram of a Clubionidae .

5- Pisauridae family (SIMON, 1890)

Pisaurids are present in both stations with a total of 30 individuals, 19 of which are males and 11 are females. They have about 7mm in long, their abdomen measured 4mm. their posterior lateral eyes distant from each other more twice the distance between the posterior medians. They have long legs (fig. 6).. Represent the skater spiders that move very quickly on the ground.

Fig. 6: Diagram of a Pisauridae

6- Linyphiidae family (BLACKWALL, 1859)

In both stations we caught 25 individuals: 5 males and 20 females. The spiders of this family have 7 mm in long, legs with thorns (fig. 7).. They weave horizontal webs under which they move.

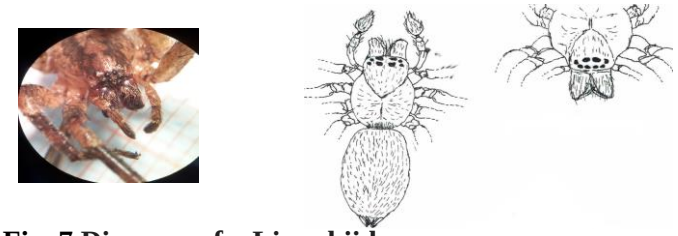


Fig. 7 Diagram of a Linyphiidae

7- Theridiideas family (SUNDEVALL, 1833)

23 individuals corresponding to this family are identified in the two stations, which are all females, the Theridiideas have a domed abdominal part with pigmentations and its very important than the thoracic, characterized by thin legs: the anterior longer 10mm and the posterior 7mm, the third pair of paw is the shortest with 6mm for an individual that have 5mm in long, they have also a pair of very small jaw legs size (1mm) Theridiideas are weaver spider's irregular webs. Generally in this family the females are larger than the males (fig. 8)..

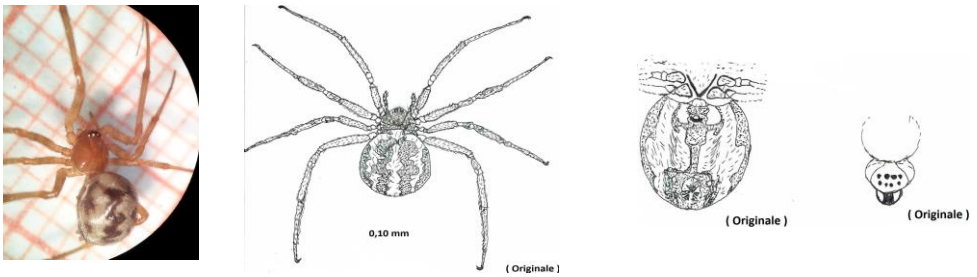


Fig. 8 Diagram of a Theridiidae .

8- Thomisidae family or crab spiders (SUNDEVALL, 1833)

Crabs spiders or thomises are present in the two study stations with a total of 18 individuals, including 05 males and 13 females. individuals of this family have very small size about 4mm in long, their forelegs are longer than the hind legs, which allows them to hunt prey easily (fig. 9).. Thomisidae have small eyes.In this family can find abdomen-shaped spiders triangular. There are certain species that can camouflage themselves to chase insects.

Fig.9: Diagram of a Thomisidae .

9- Agelenidae family (C. L. KOCH, 1837)

With a total of 5 individuals (03 males and 02 females) in both stations, they measure about 9mm long .Generally the individuals of this family are characterized by their forelegs very long than the anterior ones; their four middle eyes are arranged in shape rectangle that rises from the other side eyes (fig. 10)..

Fig. 10: Diagram of an Agelenidae

10- Dictynidae family (PICKARD, 1871)

6 individuals are captured in both stations; among them we found 4 males and 2 females. Some species in this family have 8mm in long (fig. 11)..

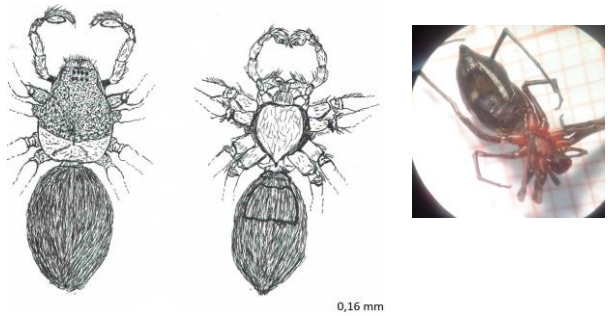


Fig. 11: Diagram of an Dictynidae

11- Palpimanidae family (THORELL, 1870)

With only 3 individuals who are all females, this family is present only in the resort of Red Creast. The species of this family characterized by their large front legs (like a ravishing leg), the median legs whose most small and thin .the shape of their cephalothorax is ovoid, they are 6 mm long, their eyes are all black, their eyes small and a little larger (fig. 12)..

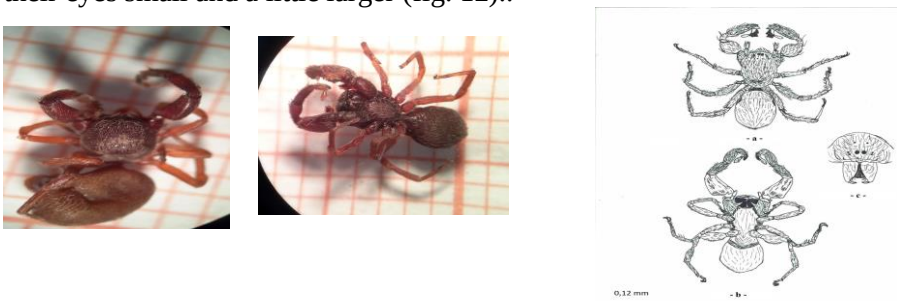


Fig. 12: Diagram of a Palpimanidae .

12- Oxyopidae family or Spiders-Lynx (THORELL, 1870)

They are only found in the resort of Red Creast with strength of 02 individuals that are all males; they have about 7 mm in size, characterized by the shape of their cephalothorax which rises forward. They have 8 eyes, of which 6 are arranged in shape hexagon (fig. 13)..

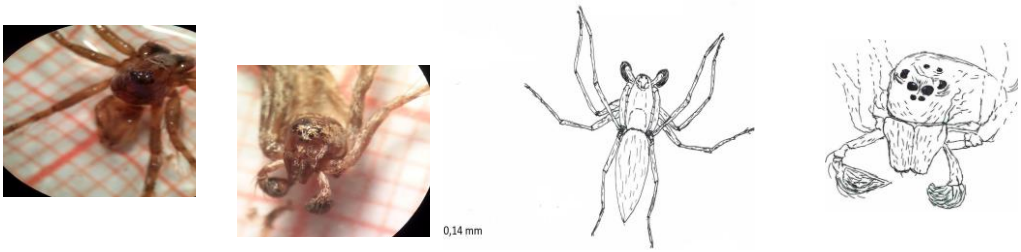


Fig. 13: Diagram of an Oxyopidae .

13- Lexoscelidae family

It present only in the station of Red Creast, where we found 2 males, the species of this family have 5 mm in body size with long legs, two-sided claws, they present chelicera reduced less than one mm, the cephalothorax wider than the abdomen, has a characteristic shape it presents a thoracic streak, the ocular region presents 3 parts or two pairs of separated eyes, the bulb copulator of males have about 3mm in long. Resemble scorpion sting in some species (fig. 14). Among the most poisonous spider families for humans.

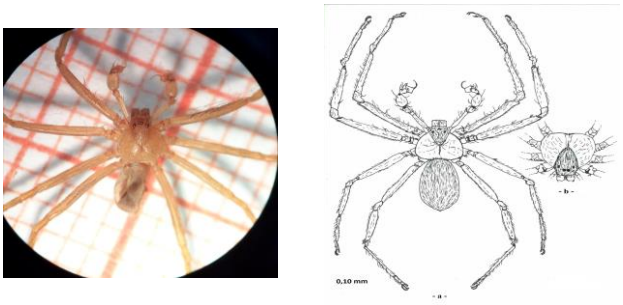


Fig. 14: Diagram of a Lexoscelidae

14- Filistatidaes family (AUSSERER, 1867)

8 females are captured in both study stations, measure about 6 mm long. At the level of cephalothorax there is a recurved thoracic stria (curved towards the back), their pedipalp resembles a paw, the latter has 3 mm in long, posterior legs have 10mm in long. Spiders in this family characterized by a free labium ventral, ocular region with condensed eyes (fig. 15).

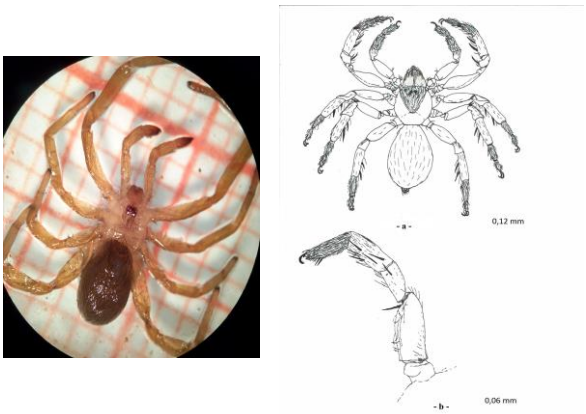


Fig. 15: Diagram of a Filistatidae

15- Dysderidae family (C. L. KOCH, 1837)

For this family we have found only 2 females of genus *Dysdera*, at the El-Asnam station. They have about 6 mm in body size (varies according to the species), they are wandering nocturnal. They have 6 eyes arranged in the shape of a half circle arched backwards, powerful and proclive chelicers. The cephalothorax has an almost oval, on the ventral side of the latter, there is an extension of sternum between the hind hips, The abdomen of variable shape according to the species; it can be oval (fig. 16).. The individuals of this family are characterized by their glabrous different colors and their legs which are more or less fine.

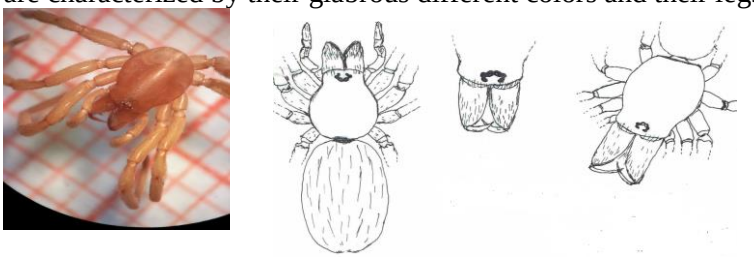


Fig. 16: Diagram of a Dysderidae

16- Prodidomidae family (SIMON, 1884)

11 individuals among them 8 males and 3 females are captured at both stations. The individuals in this family have 4mm in size, with long legs, opposite ventral have a broad sternum. Prodidomidae have 8 eyes arranged in shape arched semi-circle forward (fig. 17).

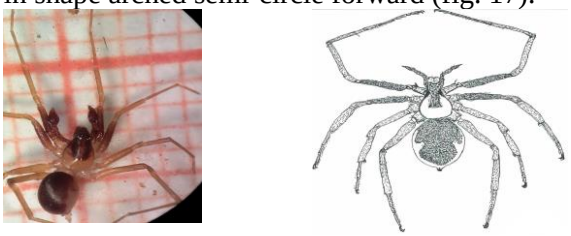


Fig. 19 : Diagram of a Prodidomidae

17- Sparasidae family (BERTKAU, 1872)

It is present by total number of 5 males reported in Red Creast and El-Asnam. In general they are large spiders, up to 21 mm in length, while the legs reach up to 30 mm, median legs are shorter with 19 mm (fig. 18).. There is a resemblance between this family and that of the Philodromidae. These spiders can bite, which causes local pain and small swellings**.**

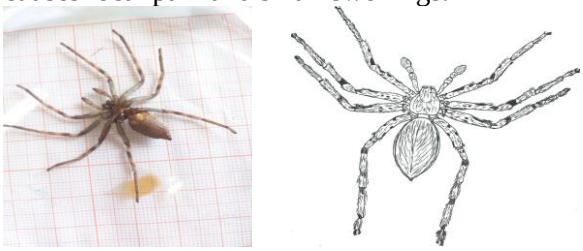


Fig. 18: Diagram of a Sparasidae

18- Philodromidae family (THORELL, 1870)

The Philodromidae family present in both stations with a total workforce of only 4 individuals (one male and three females), they are small spiders by compared to Sparasidae, have a flattened body and with legs almost of the same length. They move very fast.. The individuals in this family are similar to Sparasidae except in the region ocular and size, usually the Sparasidae are the largest.

19- Amaurobiidae family (THORELL, 1870)

In the two study stations we counted 5 individuals including 4 males and one only female. These are nocturnal spiders, of medium size, with a dark coloring. Their anterior median eyes are black, the other eyes are because of the nightlife, white-greyish. Cephalothorax has a cephalic part very distinct from the thoracic part. The chelicera is relatively large. Similar in Agelenidae, however, these species are distinguished by shorter legs and much smaller pathways (fig. 19)..

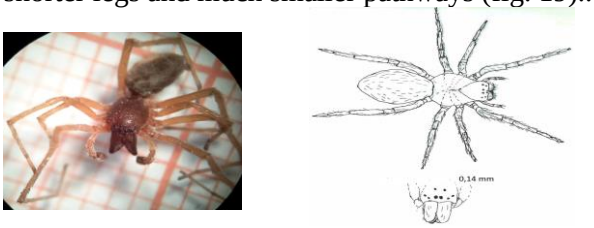


Fig. 19: Diagram of an Amaurobiidae .

20- Zoropsidae family (BERTKAU, 1882)

With a total of 07 individuals who are all females. Those are Wandering spiders are 9mm long Figure 19: Schematic of a Zoropsidae (fig. 20)..

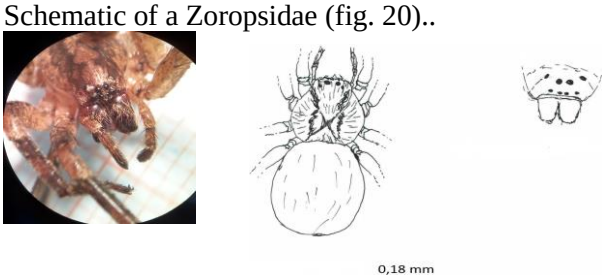


Fig. 20 Diagram of a Zoropsidae .

Part II: Exploitation of the obtained results

Abundance relative of Spiders Caught by Both Methods to Red Crest

The abundances relative of spider families counted using the two capture methods and are represented in the following table

Table 1: Relative abundance (%) of spider families found at red Crete and at El Asnam

N	Famillies	Red Crest				El Asnam			
		Barber traps		capture by hand		Barber traps		capture by hand	
		Ni	A.R (%)	Ni	A.R (%)	Ni	A.R (%)	Ni	A.R (%)
1	Agelenidae	3	1,13	2	1,71	1	0,62	-	-
2	Amaurobiidae	-	-	3	2,56	1	0,62	1	1,15
3	Clubionidae	20	7,55	9	7,69	18	11,18	4	4,59
4	Dictynidae	4	1,51	2	1,71	-	-	-	-
5	Dysderidae	-	-	-	-	2	1,24	-	-
6	Filistatidae	1	0,38	3	2,56	2	1,24	2	2,3
7	Gnaphosidae	17	6,42	14	11,97	26	16,15	19	21,84
8	Lexoscelidae	2	0,75	-	-	-	-	-	-
9	Linyphiidae	3	1,13	8	6,84	4	2,48	10	11,49
10	Lycosidae	169	63,77	26	22,22	67	41,61	23	26,44
11	Philodromidae	2	0,75	1	0,85	-	-	1	1,15
12	Oxyopidae	1	0,38	1	0,85	-	-	-	-
13	Palpimanidae	-	-	3	2,56	-	-	-	-

14	Pisauridae	21	7,92	-	-	-	-	-	-
15	Prodidomidae	7	2,64	3	2,56	3	1,86	-	-
16	Salticidae	11	4,15	21	17,95	18	11,18	9	10,34
17	Sparasidae	-	-	2	1,71	-	-	3	3,45
18	Theridiidae	-	-	8	6,84	12	7,45	3	3,44
19	Thomisidae	4	1,51	5	4,27	5	3,11	4	4,6
20	Zoropsidae	-	-	6	5,13	-	-	1	1,15
T	**20 Families**	**265**	**100**	**117**	**100**	161	100	87	100

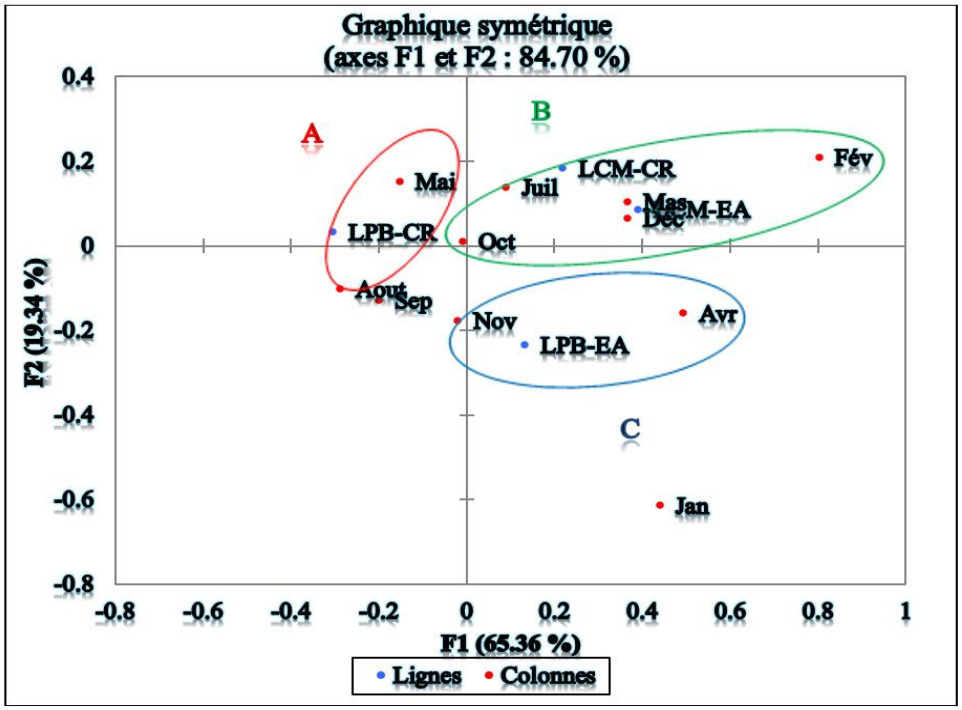
- Relative abundance of Spiders Caught by Both Methods in Red Crest

The abundances relative of spider families counted using the two capture methods and are represented in the following graphs (Fig. 23).

For the Barber traps method 16 families of spiders were recorded in the red cret, in which the Lycosidae family predominates with (N = 169, AR% = 36.77%) followed by Pisauridae (N = 21, AR% = 7.92%) and in third position the Clubionidae family with (N = 20, AR% = 7.55%). Concerning the second method, the capture by hand, among the 16 families sampled is that of Lycosidae (N = 14, AR% = 22.22%) which is the most abundant in number; followed by Salticidae (N = 21, AR% = 17.95) and Gnaphosidae (N = 14, AR% = 11.97%). Five families were captured by hand-catch only, namely: Amaurobiidae, Palpimanidae, Theridiidae, Sparasidae and Zoropsidae, representing relatively more or less relative abundance (1.71 <A.R.% <6, 84). Concerns Agelenidae, Dictynidae, Filistatidae, Linyphiidae, Prodidomidae and Thomisidae captured by the two sampling methods have relative abundance relatively average (1.51 <A.R.% <6.84). Other spider families are less mentioned as Lexoscelidae (A.R. = 0.75%), Oxyopidae (A.R. = 0.38 and 0.85 %) for pots and hand catch respectively and Prodidomidae with (A.R. = 0.75 and 0.85%) for both sampling methods.

In El Asnam, the relative abundance of the 14 families of spiders recorded in this station by the method Barber traps showed the dominance of families: Lycosidae (N = 67, AR% = 41.61%), Gnaphosidae (N = 26, AR% = 16.15%), Clubionidae and Salticidae (N = 18, AR% = 11.18%). For the method of hand capture, among 14 families sampled Lycosidae (N = 23, AR% = 26.44%), Gnaphosidae (N = 19, AR% = 21.84%) and Linyphiidae (N = 10, AR% = 11.49%) are the most abundant in numbers. three families were captured only by hand capture (that of Philodromidae, Sparasidae and Zoropsidae) represent a low relative abundance (1.15 <A.R. % <3.45). On the other side three others families were captured only using the Barber traps technique: the Agelenidae, Dysderidae and Prodidomidae, they are represented by an abundance relative as low (1.24 <A.R. % <1.86). Other families captured by both sampling methods: Amaurobiidae, Filistatidaes, Pisaurides, Theridiides and Thomisidae have a relative abundance belonging to the interval 1.15 <A.R. % < 8.05.

Exploitation of the results obtained in the two stations by the factorial analysis of the correspondences



The factorial analysis of correspondence, applied to the individuals of Araniédes caught at the two vegetable growing stations, in Bouira, (El-Asnam and Red Crete), has made it possible to highlight certain mechanisms for distributing spider families according to the axes. The contribution to total inertia of spider individuals from both study stations is equal at 63.36% for the F1 axis and 19.34% for the F2 axis (Figure 23) the sum of these rates is equal to 84.70%. the figure shows that the distribution of individuals between the two stations, it is at note 03 groupings: Grouping (A) contains captured individuals only by the Barber traps in Red Crete from August 2016 to May 2017. The grouping (B) encloses the individuals captured at the two stations: Red Crete and El-Asnam, by the capture by hand during the months of July, October, December, February and May. Grouping (C) contains only individuals captured by the Barber traps method in El-Asnam.

Discussion

In the resort of Red Crete 16 families are listed whose family Lycosidae is the most abundant with A.R.% = 63.77% by the Barber traps method and 22.22% by the hand catch respectively. From his side Berretima (2016) in the palm grove of I.t.d.a.s. (Biskra) found 15 families with the dominance of Gnaphosidae (A.R.% = 36%) followed by Zodariidae (A.R.% = 17.7%) and Lyniphiidae (A.R.% = 16.9%). Other spider families are less mentioned as Lycosidae (A.R.% = 5.4%) and Salticidae (A.R.% = 4.3%). In the second station (El-Asnam) we have identified 14 families where Lycosidae occupy the first rank with (A.R.% = 41.61%) by the method of the Barber traps and (A.R.% = 26.44%) by the hand capture. These results are close to that advanced by Berretima (2016) in Touggourt in the station of I.n.r.a.a, this author notes 19 families found where Zodariidae dominate with (A.R.% = 28.3%), followed by Lycosidae (A.R.% = 21.3%), Gnaphosidae (A.R.% = 20.5%) and Lyniphiidae (A.R.% = 8.1%). In the two study stations our results are closer to those noted by Souttou *et al.* (2015) in Chbika (Djelfa) in a pre-Saharan region where they noticed that the families of Gnaphosidae and Lycosidae are the most abundant.
In this study Lycosidae are represented with the largest number of individuals in both study stations, 195 (50%) in Red Crete and 90 (36.3%) in El-Asnam, this number is larger than that put forward by Alioua (2012) in these four stations 59 (36%), 1 (3%), 29 (23%) and 27 (37%) respectively. Whereas in Bechar, Outemzabet *et al.* (2013) comes out with 16 families, the most abundant being Lyniphiidae with 6 genera and 8 species. On their behalf Touchi *et al* (2013) report that the Gnaphosidae family is the most diverse with 18 species. In terms of staffing in two study stations (Red Crete and El-Asnam) Lycosidae and Gnaphosidae are the more abundant (31 and 45 individuals respectively for the two families and the Salticidae (32 and 27 individuals respectively). This result is similar to that of Alioua (2012) mentioned the Gnaphosidae as a second abundant family with a total workforce of 91 individuals followed by Agelenidae with 37 individuals and Aaltisidae with 33 people. Beddiaf *et al.* (2014) in Djanet, note the presence of 5 species of Salticidae and 2 species of Gnaphosidae. Berretima (2016) in the palm groves of Biskra and Touggourt reports the presence of 656 males and 513 females; ALIOUA *et al.* (2012) highlight the presence of 213 males, 205 females. Outemzabet *et al.* (2013) notice 159 adult males (67.08%) and 50 adult females (21.09%), while Mansouri *et al.* (2013) mention 343 males, 185 females.

Bibliography

1. **Huber, B. A. (2003).** Southern African pholcid spiders: revision and cladistic analysis of *Quamtana*gen. nov. and *Spermophora* Hentz (Araneae: Pholcidae), with notes on male - female covariation. *Zoological Journal of the Linnean Society* ,139, 477–527.
2. **Jager, P.et Ono, H .(2000).**Sparassidae of Japan.I.New species of Olios ;*Heteropoda* and *Sinopod* with notes on some known species (Araneae:Sparassidae: Sparassinae and Heteropodinae) . *Acta Aachnologica,Tokyo,Japan,* (49), 41-60.
3. **James ,G.(2014).** Beneficial insects, spiders, and other mini-creatures in your garden: who they are and how to get them to stay **.** U.S.A : Washington State University EXTENSION. 19p.
4. **Jensen, N., Gary, L., Lanier W. and Seibert C. E.(2014).** Spider identification and management, MONTANA State University, 3,4p.
5. **Kherbouche-Abrous, O. (2006).** Les Arthropodes non insectes épigés du parc national du Djurdjura :Diversité et écologie. Thèse Doctorat État, F.s.b, U.S.T.H.B, Bab Ezzouar, 137 p.
6. **Lecomte, P.(2015).** Invertébrés (hors insectes) .In : ADAM, Y ., BÉRANGER,C. ,DELZONS ,O. , FROCHOT,B., GOURVIL,J. et PARISOT-LAPRUN ,M. Paris :Muséum d'histoire naturelle, 135-157.
7. **Ledoux, J.C. et Canard, A.(1981).**Initiation à l'étude systématique des araignées. Paris :Domazan,. 56p.

8. **Lee, J-H and Kim, S.T.(2001).**Use of spiders as natural enemies to control rice in Korea .Entomology program, school of agricultural biotechnology ,Seoul National University,Suwon,Korea,441-744.
9. **Lee, S. Y., Kim ,S. T., Lee, J-H., Yoo,J. S ., Jung,J. K. et Lim, J.W. (2014).** Two Gnaphosid spiders (Araneae: Gnaphosidae) new to Korean spider fauna. *Open Journal of Animal Sciences,* 4, 139-143.
10. **Mansouri, H., Kherbouche-Abrous, O., Ould Rouis, A. et Ould Rouis ,S .(2013).**Impact des pratiques agricoles sur la distribution et la diversité des peuplements d'Araneae (Arthropodes, Arachnides) dans un agroécosystème d'Oued Smar (Alger). *International Congress of the Populations & Animal Communities "Dynamics and Biodiversity of the terrestrial and aquatic Ecosystems",*19(21),340-346.
11. **Outemzabet, L. et Kherbouche-Abrous, O.(2013)**. Ecologie et importance des haies des cultures pour les communautés d'Aranéides épigés (Arthropodes, Arachnides). *International Congress of the Populations & Animal Communities "Dynamics and Biodiversity of the terrestrial and aquatic Ecosystems",* 19 (21), 372 - 378.
12. **Peng X-J** ., **Li S. and Yang Z-Z.(2004).**The jumping spiders from Dali, Yunnan, China (Araneae: Salticidae). *The raffles bulletin of zoology,* 52(2), 413-417
13. **Peng, X. and Li, S. (2003).** New localities and one new species of jumping spiders (Araneae: Salticidae) from northern Vietnam. *The Raffles Bulletin Of Zoology* , 51(1) ,21-24.
14. **Rollard, C. et Canard, A. (2015).** A la découverte des araignées. Paris : DUNOD.15p.
15. **Rollard, C.(1992).**Insectes associés aux cocons d'araignées.*Insectes* ,3(86), 23-25.
16. **Simon E.(1937).** Les Arachnides de France. Paris :Rosert. 319p.
17. **Simon E.(1932).** Les Arachnides de France. Paris : Rosert.205p.
18. **Simon, E.(1926) .**Les Arachnides de France. Paris : Rosert.223p.
19. **Simon, E.(1899).** Liste des arachnides recueillis en Algérie par M.P. Lesne, et description d'une espèce nouvelle. Bull. Mus. Hist. Nat., 5 : 82-87.
20. **Simon, E.(1929) .** Les Arachnides de France. Paris Rosert239p.
21. **Soualah-Alila, H., Rouag-Ziane, N. et Bouslama, Z. (2013).**Biodiversité des araignées dans le parc national d'El-Kala.*International Congress of the Populations and Animal Communities "Dynamics and Biodiversity of the terrestrial and aquatic Ecosystems"* ,v(n),347-349.
22. **Souttou, K.,Choukri, K., Sekour, M., Guezoul, O., Ababsa, L. et Doumandji, S. (2015).** Ecologie des arthropodes en zone reboisée de Pin d'Alep dans une région présaharienne à Chbika (Djlefa, Algérie). *Entomologie faunistique- FaunisticEntomology*, (68), 159-172.
23. **Storer, N.P. et Hansell, M.H.(1992).** Specialization in the choice and use of spider silk in the nest of the chaffinch (*Fringilla coelebs*) . Australie: Fringillidae –J.Net.Hist ,26pp.
24. **Su, Y-C., Chang, Y-H., Smith, D., Zhu, M-S., Kuntner, M .and Tso, I-M.(2011) .** Biogeography and speciation patterns of the golden orb spider genus *Nephila* (Araneae: Nephilidae) in Asia. *Zoological Society of Japan,* 28(1), 47-55.
25. **Taylor ,A. and Persons ,M.H. (2005).** The effect of perceived predation risk on male courtship and copulatory behavior in the wolf spider *Pardosa milvina* (ARANEAE, LYCOSIDAE). *The Journal of Arachnology* 33,76–81.
26. **Touchi, W., Saadi, A., Bouseksou, S., Idir, N.F., and Kherboucheabrous, O. (2013)**. Bioévaluation de la diversité des Aranéides épigés par l'utilisation de la variante de l'humidité du sol dans la réserve naturelle de Réghaia. *International Congress of the Populations & Animal Communities "Dynamics and Biodiversity of the terrestrial and aquatic Ecosystems",* 19(21) ,379-382.
27. **Yan, A .L.(1995).**Australian spiders: on opportunity for conservation .*Records of the Western Australia Museum,* (52), 39-47.

Thanks

We would also like to thank M^{r}. LAMINE Salim who helped us in the realization of the statistical analysis for this study.