

## Diversity and Approach ecological of malacofauna on two species of Cistaceae (*Cistusladaniferus* L. and *C. monspeliensis* L.) in the Tlemcen region (North-West Algeria)

DAMERDJI Amina

<sup>1</sup>Laboratory of Research: «Valorization of human actions for the protection of environment and application in public health »

<sup>2</sup>Department of Ecology and Environment-Faculty S. N. V/ S. T. U  
University of Tlemcen- (Algeria)  
Corresponding Author

### -----ABSTRACT-----

The region of Tlemcen is located in the Algerian North-West, whose climatic impact results in the degradation of the forest in matorral, open formation constituted by xerophytic plants such: *Cistus* ... We propose to carry out an approach of the diversity of the malacofauna found on 2 species of Cistaceae, namely *Cistusladaniferus* and *C. monspeliensis*. The malacological richness is estimated at 10 species on the *ladaniferus Cistus* and 13 on the Montpellier *Cistus*. These are divided into 4 families: *Milacidae*, *Sphincterochilidae*, *Helicidae* and *Subulinidae*. The 1st, 2nd and 4th families have only one species each. These are *Milaxgagates*, *Sphincterochilacandidissima* and *Ruminadecollata*, respectively. Concerning the *Helicidae* family, the most diverse has 2 sub-families: those of the *Helicinae* and the *Helicellinae*. The 1st sub-family has 8 species on the Montpellier rockrose and 6 species on the gum rockrose. The 2nd subfamily includes 4 species on *Cistusmonspeliensis* and only 2 species on the other Cistaceae. The seasonal distribution according to the specific richness of Gastropods is shown. We are looking for the malacological species specific to each of the two Cistaceae species and the species that are common to them. Lastly, the vertical distribution of gastropods is given.

**KEY WORDS:** Malacofauna - *Cistus ladaniferus* - *C. monspeliensis* - Diversity-Approachecological-Tlemcen region (North –West Algeria).

Date of Submission: 03-08-2024

Date of acceptance: 14-08-2024

## I. INTRODUCTION

Molluscs Predatory gastropods, snails are generally voracious of tender leaves. They use certain plants as a refuge but also as a source of food. Knowing that Cistaceae are pyrophyte species and are known for their medicinal properties, we are trying to study their relationship with gastropods in particular.

Very little faunistic work has been carried out in Cistaceae stations except those of [1] and on malacological fauna [2]on *Cistusmonspeliensis* and those of [3]on the fauna of Invertebrates of *Cistus ladaniferus* then [4] on Orthopteroids and finally those concerning orthoptera [5]. This justifies the present work.

This study follows on from various works carried out on the Doum [6] on the Diss [7]; [8]on the Genêt, [9]. In 2005[10], showed the malacological diversity on 3 xerophilic plants. Damerdji, Ladjmi and Doumandji[11]the same year, an inventory was carried out of the malacofauna associated with Rosemary. A study on the malacological fauna on two aromatic plants (Rosemary-Thyme) was carried out by [12]. The composition and structure of gastropods in thyme stations have been studied by[13]. Recently [14]carried out a malacological inventory on 5 different plants then on 7 plants, [15]. The results concern the malacological diversity of the 2 Cistaceae, the seasonal importance, the common species and the distribution according to the different strata.

## II. METHODOLOGY

### PRESENTATION OF THE TLEMCCEN REGION

The Tlemcen region is located in the Algerian north-west. The climate tends to become arid, which leads to degradation of the open forest, where xerophilic plants such as doum (*Chamaeropshumilis*), diss (*Ampelodesma mauritanicum*), broom (*Calycotome spinosa*) are found. Two other species of Cistaceae are considered: the gum rockrose (*Cistusladaniferus*), in the Tlemcen Mountains and the Montpellier rockrose (*Cistusmonspeliensis*) in the Nedroma area. The poor distribution of precipitation on the one hand, and summer

temperatures on the other hand, characterize the Tlemcen region, located in the semi-arid bioclimatic stage with moderate winter.

**Study of the two host plants**

The two plants studied are from the Spermaphytes sub-branch, Angiosperms sub-branch, Eudicots class, Eurosoid subclass, Malvales order, and Cistaceae family.

*Cistus ladaniferus* L.

*Cistus ladanifère* or Ciste à gomme is a woody pyrophyte shrub with young shoots and glutinous leaves. It can reach 1 to 2 m in height. This shrub appreciates heat, sun and light, well-drained soils. It is quite rustic and tolerates minimum temperatures of -5°C. *Cistus ladaniferus* presents strongly aromatic leaves (ladanum), sessile, very elongated. In the pharmacopoeia, it was considered to be stimulating and expectorant. It is also used in the parapharmaceutical industry.

The classification is as follows:

Genus-species. *Cistusladaniferus* subsp *africanus*

Vulgar name. *Cistus ladanifère*, Ledon, *Cistus* gum

Arabic name Kastousse

*Cistusmonspeliensis* L. (Ciste de Montpellier) (Rockrose of Montpellier)

This cistus is known as a shrub with very vigorous vegetation, forming a beautiful very compact pyramid, which can reach a height of 0.5 to 1.2m and a width of 1.5m. The leaf is lanceolate, linear, without petiole, sticky due to the presence of resin, dark green on the top and light on the reverse. They only last a day but they are numerous and renew for almost 6 weeks. The white flowers are very fragrant and pollinate attracts insects and mainly butterflies. The fruits of *C. monspeliensis* are dehiscent oval capsules with 5 valves. It tolerates the seaside and dry, poor terrain very well, prefers very sunny places and does not like very strong winds. The Montpellier cistus is very common and grows in forests, undergrowth and in low limestone soils. This cistus is also used for its medicinal properties.

Genus-species. *Cistus monspeliensis*

French name. Montpellier cistus or flower for a day

Description of stations

The description of *C.ladaniferus* and *C.monspeliensis* stations is given respectively in the following tables.

Surveyed stations	Altitude	Slope	Humidity	Rate of recovery
iStation 1 (Koudiat Hafir)	1321 m	12%	60%	45-50%
Station 2 (Sour El-Hammam)	1078 m	8-10%	60%	50-60%
Station 3 (Zarifelt)	1060 m	8-10%	70%	60-70%

Table1. Edaphic and botanical data of the 3 prospected stations of *C. ladaniferus*

Surveyed stations	Altitude	Slope	Exposure	Rate of recovery
Station 1 (Zaouia de Sidi Amer)	525m	30-35%	Sud-ouest	60-70%
Station 2 (Mkhalfa 1)	514m	30-35%	Est	50%
Station 3 (Mkhalfa 2)	587 m	35-40%	Est	70-75%

Table2. Edaphic and botanical data of the 3 prospected stations of *C.monspeliensis*

**Sampling equipment and methods**

**In the field**

To carry out this work, we prospected 3 stations for each of the two Cistaceae species with a fairly high recovery rate. The experimental protocol carried out is the same for the two species of Cistaceae. The techniques used are 100 m2 quadrats, trap pots and hand picking. Sampling is carried out for 5 months with 2 samples per month. The samples are brought back to the laboratory where we separate the living individuals from the empty shells. These are put in plastic bags; small species are kept in plastic or glass tubes.

**In the laboratory**

Live samples are placed in jars filled with water for 48 hours, that is, until their complete death. They are then removed to be placed in 70 ° alcohol for their final storage. First, we remove the individuals of interest for the dissection and of course to isolate the genitals which represent an essential criterion of determination for

Gastropods. The shape, size, coloring and ornamentation of the shell are morphological differences that can help us in the determination. In addition, anatomical characters, particularly the genital system, are also decisive criteria for the identification of species. The morphological description is taken from the biosystematic study of terrestrial Pulmonous Gastropod Molluscs in the Tlemcen region [16]. In fact, the identification was made by us from the shellfish characters.

### III. Results and discussion

The results relate to the inventory of Gastropods collected on the 2 Cistaceae and on species common to the two plants.

#### Diversity of malacological species collected from the two Cistaceae

By basing ourselves on the classification of (Germain, 1969 a and b)[17 and 18] a systematic list of the species of Gastropods found was established. The results obtained are given in the following table.

Embr	Class	sub-Class	Order	Families	sub-Families	Malacological species	Rubber tree (10 species)	Rockrose of Montpellier (13 species)	
M O L L U S C O P O D A	G A S T R O P O D A	P u l m o r p h o r a	S t y l o m a t o p h o r a	Milacidae		<i>Milax gagates</i>	-	+	
				Sphincterochilidae		<i>Sphincterochila candidissima</i>	+	-	
				Helicidae	Helicinae	<i>Helix (Cryptomphalus) aspersa</i>	-	+	
						<i>Macularia hieroglyphicula</i>	-	+	
						<i>Macularia jourdaniana</i>	+	+	
						<i>Archelix punctata</i>	+	+	
						<i>Archelix lactea</i>	+	-	
						<i>Archelix zapharina</i>	-	+	
						<i>Archelix polita punctatiana</i>	+	+	
						<i>Eobania vermiculata</i>	+	+	
						<i>Euparypha pisana</i>	+	+	
						Helicellinae	<i>Helicella (Cernuella) virgata</i>	+	+
							<i>Helicella pyramidata</i>	-	+
							<i>Helicella (Xeromagna) terveri</i>	+	+
							<i>Helicella breveti</i>	-	+
Subulinidae		<i>Rumina decollata</i>	+	-					

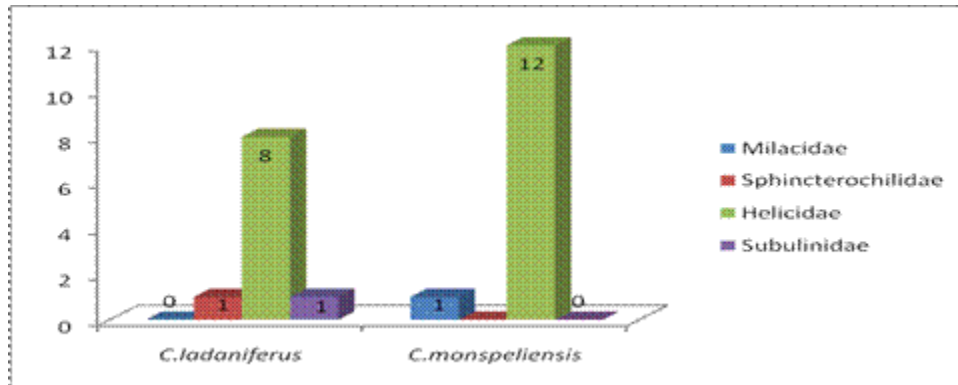
+: Presence

Table3. Malacological species found on two Cistaceae species

In total, 16 species of Gastropods are inventoried on the 2 Cistaceae. In increasing order, the Montpellier cistus is slightly more populated in Gastropods with 13 species, followed by the ladaniferous cistus with 10 species. The Helicidae family, the richest specifically comprises 13 species, that of Milacidae, Sphincterochilidae and Subulinidae are represented by one species each (Table 3).

**Distribution of the different malacological families collected on the 2 plants**

The results concerning the distribution of the different malacological families are given in the following figure.



**Fig1.** Importance of the different families on the 2 Cistaceae

The Helicidae family is the most important specifically for the 2 Cistaceae. It has 12 species on *C. monspeliensis* and 8 species on *C. ladaniferus*.

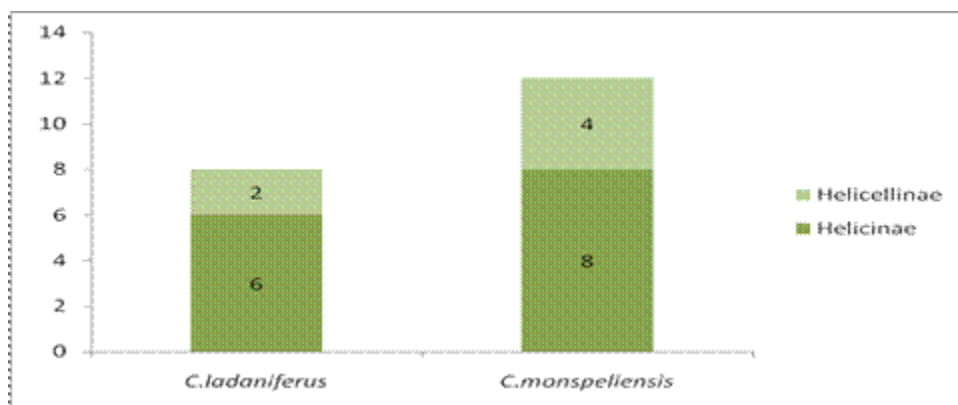
The Milacidae family is represented only by *Milaxgagates* on *Cistusmonspeliensis*.

On the other hand, that of Sphincterochilidae with *Sphincterochilacandidissima* is found on the gum rockrose as well as that of Subulinidae represented by *Ruminadecollata*.

A single species of Helicidae differentiates them; it is *Archelxlactea* found only in stations with *Cistusladaniferus*.

**Distribution of the Helicidae subfamilies collected from the 2 Cistaceae**

Given the importance of the Helicidae family, we try to separate it into 2 sub-families: that of the Helicinae and that of the Helicellinae. The results are given in figure 2.



**Fig2.** Importance of the Helicidae subfamilies on the 2 plants

The Helicinae subfamily comprises 8 species on the Montpellier rockrose; 6 species on the ladaniferous cistus and that of Helicellinae count 4 species on *C. monspeliensis* and 2 species on the second species of Cistaceae. These are *Helicella virgata* and *H. terveri*.

**Seasonal importance of Gastropods on the two Cistaceae**

The results of the seasonal distribution of Gastropods on the 2 Cistaceae are given in the following figure.

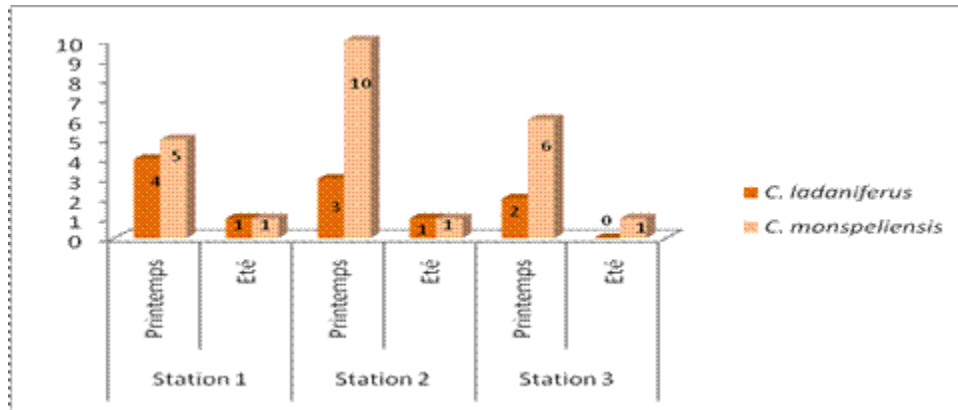


Fig3. Seasonal importance of gastropods on the 2 plants

We notice that station 2 (*Cistusmonspeliensis*) in spring seems the richest in malacological species. In this season, stations 1 and 3 have 5 and 6 species respectively. In summer, the malacological richness is very low, not exceeding 1 in the different stations. In the 3rd station with *C. ladaniferus*, the richness is zero.

Species specific to each of the two plants

*Milaxgagates* (Milacidae), *Macularia hieroglyphicula* and *Archelixzapharina* (Helicinae), *Helicellapyramidata* and *H. breveti* (Helicellinae) are found only in *C. monspeliensis* stations.

*Cistus ladaniferus*, we meet *Sphincterochila candidissima* (Sphincterochilidae), *Archelix lactea* (Helicidae) and *Rumina decollata* (Subulinidae).

Malacological species common to both Cistaceae

*Macularia jourdaniana*, *Archelix punctata*, *A.politapunctatiana*, *Eobaniavermiculata*, *Euparyphapisana* (Helicinae); *Helicella virgata* and *Helicellaterveri* (Helicellinae) are the 7 species common to the 2 Cistaceae.

Vertical distribution of malacological species on the two Cistaceae

The distribution of malacological species according to the strata is given in the following table.

Different strata	Root	Soil surface	Stem	Leaves
Number of species				
On <i>Cistusladaniferus</i>	0	7	4	1
On <i>Cistusmonspeliensis</i>	1	11	5	0

Table 4. Distribution of the malacological species collected according to the strata of the two Cistaceae

The soil surface appears to be the most populated by snail species followed by the stem.

#### IV. DISCUSSION

The biotope of *Chamaerophumilis* L. is the typical biotope of *Leucochroacandidissima*. This low scrubland, developed most often on limestone, arid pitilessly exposed to overgrazing, still characterizes a good part of the arid regions of the western Mediterranean [19]. *Sphincterochilacandidissima* is particularly fond of limestone rocks [16]. On the other hand, *Euparyphapisana* is common throughout the Camargue where its tests are gathered under *Salicorniafruticosa* and harbor numerous invertebrates [20]. According to [21] a large fauna representing the major part of the orders of invertebrates and almost all the orders of insects known in the Camargue, took refuge in the empty shells. Gastropods manufacture their epiphragms to be able to survive in extreme conditions [9]. A spectacular ecoethological phenomenon has been observed: hundreds of individuals belonging to a precise species of molluscs, *Euparyphapisana*, form by grouping on various plants "meetings in height", real "clusters" assembling between 0.30m and 1, 5m, from 15 to 1500 individuals [22]. Thorny species (Thistles, Opuntia) are very often carriers of clusters. The thorns promote the attachment of individuals to the plant. The phenology of the plant regarding *Cistus salvifolius* seems to favor the presence of this malacological species which is *Helix aspersa*. On Diss, 2 species of Helicidae (*Euparypha pisana* and *Eobaniavermiculata*) are considered to be phytophagous [6]. According to [23] the individuals of *Leucochroacandidissima* are consumers of alfa foliage. The Milacidae family is present on Diss and Genêt. That of the Sphincterochilidae is represented on the 5 plants [14]. The Helicidae family has 10 species on *Ampelodesmamauritanicum* and 18 species on *Calycotomespinosa*. The Subulinidae family is represented by a single species in the 7 plants studied

[15]. Four malacological species including *Archelixpunctata*, *Alabastrinasoluta* (Helicinae), *Helicellaterveri* and *Cochlicellaacuta* (Helicellinae) are common to 3 plants [15]. *Archelixzapharina* and *Alabastrinaalabastrites* (Helicinae) are represented on 2 plants [15]. In 2012, [24] showed that 10 species are common to *C. salvifolius* and *C. ladaniferus* and only one species is specific to *Cistus*, being: *Helixaspersa*. The malacological inventory shows the absence of three species in *C. monspeliensis* stations: *Sphincterochilacandidissima* (Sphincterochilidae), *Archelixlactea* (Helicidae) and *Ruminadecollata* (Subulinidae) [2].

## V. CONCLUSION

The malacological study carried out in different stations allows us to say: The Montpellier cistus comprises 13 species, 10 species on the ladaniferous cistus. The Helicidae family remains the largest and most diverse of the two Cistaceae. We find 07 species of Helicidae common to these 2 Cistaceae.

## REFERENCE

- [1]. A. Mebarek, "Contribution à l'étude bioécologique de la faune des Invertébrés dans trois stations de Ciste-*Cistus monspeliensis* L. (Cistacées) dans la région de Nédroma (Wilaya de Tlemcen)". Mém. Ing. Ecol. Anim. Dpt. Ecol. et Environnement. Univ. Aboubekr BELKAID.98 p, 2013.
- [2]. A. Damerdji et A. Mebarek, "Diversité taxonomique et structure des Gastéropodes dans les stations à *Cistus monspeliensis* L. (Cistacées) dans la zone de Nedroma (N.O. algérien)". Revue Afrique Science, Vol.10, N°4 (2014) : 232-344,2014.
- [3]. S. Lourmil, "Contribution à l'étude bioécologique de la faune dans trois stations de Ciste-*Cistus ladaniferus* L. (Cistacées) dans la région de Tlemcen". Mém. Ing. Ecol. Anim. Dpt. Ecol. et Environnement. Univ. Aboubekr BELKAID.95 p, 2010.
- [4]. A. Damerdji, K. Hadjouti et S. Lourmil, "Les Orthoptéroïdes sur deux Cistacées (*Cistus salvifolius* L.) et (*Cistus ladaniferus* L.) de la région de Tlemcen". Premier Colloque National sur « Santé Végétale et Environnement ». Faculté des Sciences de la Nature et de la Vie. Université de Mascara. 03-04 Mai 2011,2011a.
- [5]. A. Damerdji, Hadjouti K. et S. Lourmil, "Les Orthoptères sur deux espèces de Cistacées (*Cistus salvifolius* L.) et (*Cistusladaniferus*L.) dans la région de Tlemcen". 2011-AFPP-Neuvième Conférence Internationale sur les Ravageurs en Agriculture. Montpellier 25-26 et 27 Octobre 2011,2011b.
- [6]. A. Damerdji, "La malacofaune associée au Doum : Inventaire – Aperçu bioécologique dans la région de Tlemcen (Algérie). II International Congress of European Malacological Societies, 9 - 13 septembre 2002, Vigo,2002a.
- [7]. A. Damerdji, "Contribution à l'étude bioécologique de la malacofaune du Diss (*Ampelodesmamauritanicum*) dans la région de Tlemcen (Algérie)". II International Congress of European Malacological Societies. 9 - 13 Septembre 2002, Vigo,2002b.
- [8]. A. Damerdji et B. Bouhellou, "Faune des Invertébrés du Doum (*Chamaeropshumilis* L.) : Inventaire – Indices écologiques dans la région de Tlemcen (Algérie)". Deuxième colloque international des chaires U.N.E.S.C.O., Gas Natural sur le développement durable du Maghreb : Diversités biologiques, écologiques, culturelles et environnementales, 28 - 30 avril 2002, Laghouat,2002.
- [9]. A. Damerdji et A. Djeddid, "Diversité et aperçu bio-écologique de la faune malacologique associée au Genêt (*Calycotomespinosa*) dans les environs de Tlemcen (Algérie)". Bull. Mus. Hist. Nat. de Marseille. Mésogée. Volume 64/ 2008. pp. 47-57.(2008).
- [10]. A. Damerdji, "Diversité malacologique sur 3 plantes xérophiles (diss, doum et genêt) dans la région de Tlemcen. Forum Scientifique de S.N.V. Ecol. et Env.17- 18 mai 2005.
- [11]. A. Damerdji, L. Ladji et S.E. Doumandji, "Malacofaune associée à *Rosmarinusofficinalis* L. (Labiatae) : Inventaire et aperçu bioécologique près de Mansourah (Tlemcen, Algérie)". Revue Sciences et Technologie. Constantine C. N° 23. pp.11 – 20,2005.
- [12]. A. Damerdji, "La faune malacologique sur deux plantes aromatiques (Romarin-Thym) dans la région de Tlemcen". Journée Internationale de Produits Naturels. Université Aboubekr BELKAID- Tlemcen. 20 Mai 2009.
- [13]. A. Damerdji, "Composition et structures des Gastéropodes dans les stations à *Thymusciliatus* Desf. (Labiatae) dans les alentours de Tlemcen, en Algérie". Revue Afrique Science Vol. 6 N°1 (2010), [http : //www.afriquesciences.info/document](http://www.afriquesciences.info/document), 2010.
- [14]. A. Damerdji, "Diversité et répartition de la faune malacologique sur différentes plantes dans la région de Tlemcen (Algérie)". ATSB. 22ème Forum International des Sciences Biologiques. Hôtel Vinci Nour Palace- Mahdia Tunisie- 28-31 Mars 2011,2011a.
- [15]. A. Damerdji, "Diversité et répartition de la faune malacologique sur différentes plantes dans la région de Tlemcen (Algérie)". Actes CIRA. AFPP-Neuvième Conférence Internationale sur les Ravageurs en Agriculture. Montpellier (France) - 25-26 et 27 Octobre 2011. 10p,2011b.
- [16]. A. Damerdji, (1990), "Contribution à l'étude biosystématique des Mollusques Gastéropodes Pulmonés terrestres de la région de Tlemcen". Thèse Magister, Inst. Biol. Univ. Tlemcen, 205 p,1990.
- [17]. L. Germain, "Mollusques terrestres et fluviatiles". Ed. Kraus, Nendeln, Liechtenstein, 21, 477 p,1969a.
- [18]. L. Germain, "Mollusques terrestres et fluviatiles" Ed. Kraus, Nendeln, Liechtenstein, 22, 240 p, 1969 b.
- [19]. C.F. Sacchi, (1971), "Ecologie comparée des Gastéropodes Pulmonés des dunes méditerranéennes et atlantiques". Natura, Milan, 62. pp. 277-358,1971.
- [20]. P. Aguesse. et L., Bigot "Complément à l'inventaire de la faune camarguaise : les Mollusques terrestres et des eaux douces et saumâtres", (5<sup>ème</sup> note). Rev. la Terre et la vie, (1) : 82- 90,1962.
- [21]. L. Bigot., "Un microclimat important de Camargue: les coquilles vides de Mollusques". Rev.Terre et vie, (2-3) : 211- 230,1957.
- [22]. L.Bigot., "Recherche sur les groupements de Gastéropodes terrestres : la constitution des « grappes". Vie et Milieu, 18, C, 1-27, 1967.
- [23]. M.A. Khelil, "Contribution à l'inventaire des Arthropodes de la biocénose de l'Alfa (*Stipatenacissima* L., Graminées) dans la région de Tlemcen (Algérie)". La défense des végétaux, (257): 19-24,1989.
- [24]. A. Damerdji, "Diversité de la malacofaune sur deux espèces de Cistacées (*Cistus salvifolius* L., *C. ladaniferus* L.) dans la région de Tlemcen (Nord- ouest Algérie)". Rev. Ivoir. Sci. Technol., 19 (Juin 2012). pp.102-113,2012.