



Research Article

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# Diversity of Malacofauna on *Marrubium Vulgare* L (Lamiaceae) and *Juniperus Oxycedrus* L (Cupressaceae) in the Mount of Tlemcen (Oranie, Algeria)



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## Abstract

The region of Tlemcen is located in the North-West of Algeria, whose climatic impact is reflected in the degradation of the forest into matorral, an open formation made up of plant species such as: Cistaceae, Lamiaceae (horehound, stoekade lavender) and the juniper. We propose to carry out an approach of the diversity of the malacofauna found on 2 plant species namely *Marrubium vulgare* (Lamiaceae) and *Juniperus oxycedrus* (Cupressaceae). The malacological richness is estimated at 9 for oxycedar juniper and 7 for horehound. It is divided into 3 families: Milacidae, Helicidae and Subulinidae. Two species of Milacidae are found on the oxycedar. The 3rd family comprises a single species, being *Rumina decollata*. Concerning the family of Helicidae, the most diversified has 2 sub-families: those of Helicinae and Helicellinae. The 1st sub-family has 6 species on oxycedar and 5 species on horehound. The 2nd subfamily includes only one species, namely *Helicella terveri* on horehound. 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 plant species and the species that are common to them. Finally, the vertical distribution of gastropods is given.

**Keywords:** Malacofauna; *Marrubium vulgare*; *Juniperus oxycedrus*; Diversity; Mounts of Tlemcen; Oranie, Algeria

## Introduction

Mollusks 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 these plants have morphological characteristics allowing adaptation to certain faunal species, we try to study the relationship with gastropods in particular. This study follows on from various works carried out on the Doum [1] on the Diss [2,3] on the Broom [4]. In 2005, [5] showed malacological diversity on 3 xerophilic plants. DAMERDJI, LADJMI and DOUMANDJI the same year, an inventory was made of the malacofauna associated with Rosemary. A study on the malacological fauna on two aromatic plants (Rosemary-Thyme) was carried out by [6]. The composition and structure of gastropods at stations at thyme were studied by [7]. Also, a contribution on the study of gastropods in *Juniperus oxycedrus* stations was made in 2014 by DAMERDJI and MENIRI. Similarly, similar work in *Marrubium vulgare* stations was carried out by [8]. The stations of these two species are very close, which also justifies this work.

## Methodology

### Presentation of the tlemcen region

The Tlemcen region is located in northwestern Algeria. In the mountains of Tlemcen, the climate tends to become arid, which leads to a degradation of the forest in open formation, where plants such as cistus are found (Cistus with sage leaves and Cistus ladaniferous, lamiaceae (Horehound and lavender stoekade), broom (*Calycotome spinosa*). Two plant species are considered: horehound and juniper in the Monts de Tlemcen. The poor distribution of precipitation on the one hand, the summer temperatures on the other hand characterize this mountain range of Tlemcen, located in the semi-arid bioclimatic stage with temperate winter.

### Study of the two host plants

***Juniperus oxycedrus* L (oxycedar juniper):** It is part of the Phylum Spermaphyta, Sub-Division Gymnosperma, Class

Pinopsida, Order Pinales and Family Cupressaceae. *Juniperus oxycedrus* or oxycedar juniper is a glaucous green shrub or shrub that can reach 9 meters. Evergreen foliage is in the form of needles. The latter, with a fine, pungent tip, are arranged in whorls of 3 by 6 rows. Their underside bears two white stripes, which makes it possible to distinguish it from the common juniper (needles with a single white stripe). Cade juniper is a dioecious shrub (male and female flowers) that does not grow on the same plant. The male and female flowers form small cones. The cones, edible fresh, are brown to orange. The female cones gradually take on the appearance of berries, the scales fuse together. These cones mature after about two years. The fruits are reddish brown when ripe, 6 to 9 mm. Pollination is anemogamous. Flowering takes place in spring. Oxycedar is indifferent to the nature of the soil. It appreciates arid rocky places, on limestone or on acid soils, where it is frequently associated with holm oak and kermes oak. They prefer drained soils, even calcareous or dry ones.

***Marrubium vulgare* L (Horehound):** It belongs to the Phylum Spermaphyta, the sub-Division Angiosperma, the Class Magnoliopsida, the subclass Asteridae, the order Lamiales and the Family Lamiaceae. *Marrubium vulgare* L. (Horehound): Herbaceous perennial thyme-scented when crushed, covered with white down, with erect stems, often with many short shoots and sterile. Height of 40 to 60 cm. In general, fragrant plant stem quadrangular, with opposite leaves without stipules, flowers pentamers, usually hermaphrodite, axillary cymes together in more or less often contracted simulating whorls, or condensed at the top of the stems and simulating ears, lower lip forming a plane landing insects and thus to insect pollination. The Horehound prefers sunny places, growing on dry sandy fields and roadsides. This plant grows naturally in scrubland the djebels and wasteland. Since antiquity, horehound was already known for its therapeutic properties.

### Description of stations

The description of the *Marrubium vulgare* and *Juniperus*

### Diversity of Malacological Species Collected on Horehound and Oxycedar

**Table 1:** Edaphic and botanical data of the 3 stations surveyed for *Marrubium vulgare*.

Stations Studied	Slope	Altitude	Humidity	Recovery Rate	Plant Species Present
Station n°1 Ain Baghdad	10-12%	1189 m	70%	30 à 50%	<i>Marrubium vulgare</i> (Lamiaceae), <i>Cistus salvifolius</i> (Cistaceae), <i>Cytisus triflorus</i> (Fabaceae), <i>Quercus suber</i> (Fagaceae), <i>Asparagus acutifolius</i> (Liliaceae) et <i>Daucus carotta</i> (Apiaceae).
Station n°2 Canton Zarifet	8-10 %	1187m	70%	50 à 60%	<i>Marrubium vulgare</i> (Lamiaceae), <i>Cistus salvifolius</i> (Cistaceae), <i>Quercus suber</i> (Fagaceae), <i>Asphodelus microcarpus</i> (Liliaceae), <i>Ampelodesma mauritanicum</i> (Poaceae), <i>Asparagus acutifolius</i> (Liliaceae) et <i>Calycotome spinosa</i> (Fabaceae).
Station n°3 Canton Boumediene	10-12 %	1032 m	70%	60 à 70 %	<i>Marrubium vulgare</i> (Lamiaceae), <i>Reseda alba</i> (Resedaceae), <i>Calycotome spinosa</i> (Fabaceae) <i>Daphne gnidium</i> (Thymeliaceae) et <i>Pinus halepensis</i> (Pinaceae).

Based on the classification of [9,10] a systematic list of the species of Gastropods found has been established. The results

*oxycedrus* stations is given respectively in the following Tables.

### Sampling Materials and Methods

#### In the field

To carry out this work, we prospected 3 stations for each of the two plant species with a fairly high recovery rate. The experimental protocol carried out is the same for the two species. The techniques used are 100 m<sup>2</sup> quadrats, trap pots and hand picking. Sampling is carried out for 5 months (February to June) 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

The live samples are put in jars filled with water for 48 hours that is to say until their complete death. They are then removed to be placed in alcohol at 70° for their final conservation. Beforehand, we remove the interesting individuals for the dissection and of course to isolate the genital organs 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, the anatomical characters with in particular the genital apparatus are also determining criteria for the identification of the species. The morphological description is taken from the biosystematic study of terrestrial pulmonate gastropod molluscs in the Tlemcen region (DAMERDJI, 1990). Indeed, the identification was made by us from the conchological characters.

### Results

The results relate to the malacological diversity on the 2 plants encountered (horehound and oxycedar) in the Monts de Tlemcen, on the seasonal and monthly importance, on the common and specific species and lastly on the vertical distribution.

obtained are given in the following (table 1).

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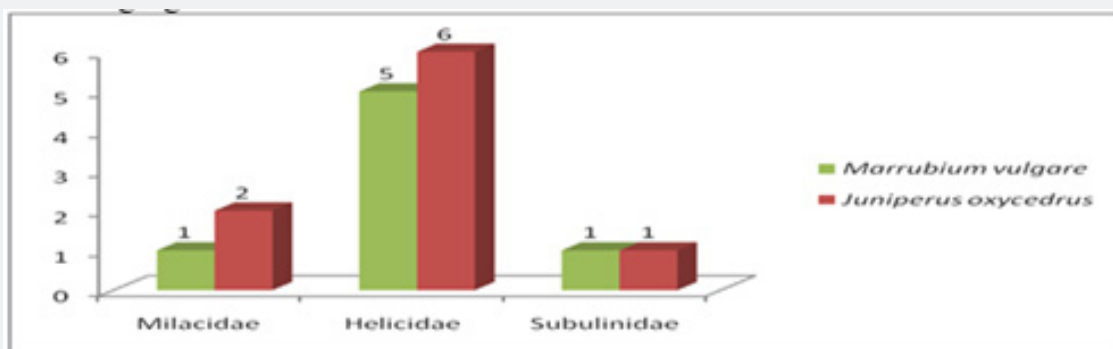


Figure 1: Importance of the different families present on the 2 plants.

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### Diversity of malacological species collected on horehound and oxycedar

Based on the classification of [9,10] a systematic list of the species of Gastropods found has been established. The results obtained are given in the following table. The Helicidae family is the most important specifically for Juniper with 6 species. It has 5 species on horehound. Two species of Milacidae (*Milax nigricans* and *M.gagates*) are represented on *Juniperus oxycedrus*. On *Marrubium vulgare*, we find only one species of slugs being *M. nigricans*. The Subulinidae family is respectively represented on both plants by a single species. This is *Rumina decollata*, a species truncated at its apical end.

### Distribution of the Helicidae subfamilies collected on the 2 plants

**Given the importance of the Helicidae family, we try to break it down into 2 subfamilies:** That of the Helicinae and that of the Helicellinae. The results are given in figure 2. The Helicidae family is the most important specifically for Juniper with 6 species. It has 5 species on horehound. Two species of Milacidae (*Milax nigricans* and *M.gagates*) are represented on *Juniperus oxycedrus*. On *Marrubium vulgare*, we find only one species of slugs being *M. nigricans*. The Subulinidae family is respectively represented on both plants by a single species. This is *Rumina decollata*, a species truncated at its apical end.

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### Species specific to each of the two plants

*Milax gagates* (Milacidae), *Helix aspersa*, *Archelix polita punctatiana*, *Archelix lucasii* and *Eobania vermiculata* (Helicinae) are found on oxycedar. On the other hand, *Archelix Juilleti*, *Euparypha pisana* (Helicinae) and *Helicella terveri* (Helicellinae) are found only in the Horehound stations (Lamiaceae).

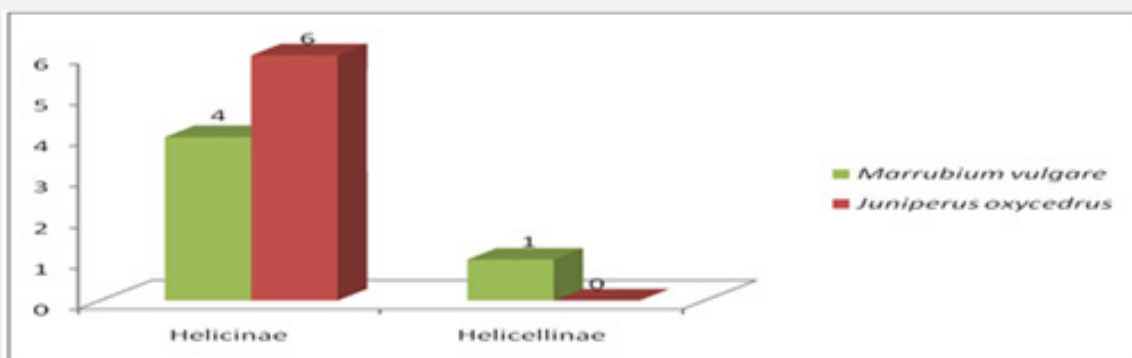


Figure 2: Importance of the Helicidae subfamilies present on the 2 plants.

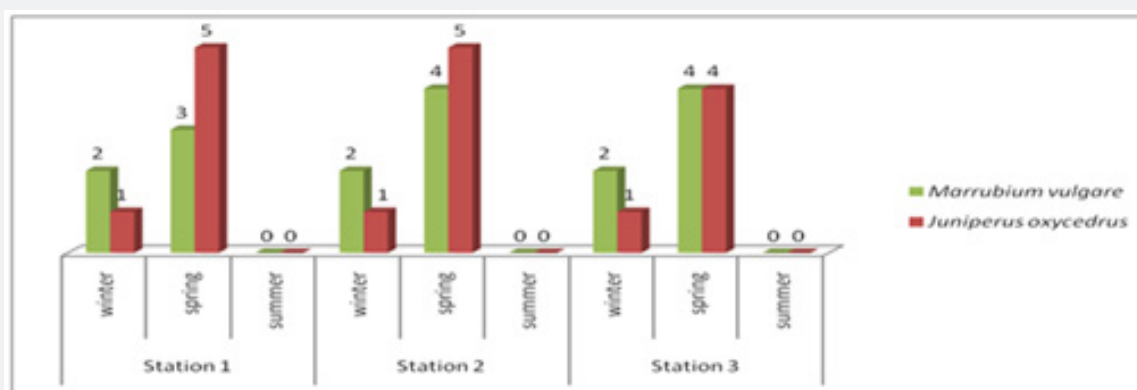


Figure 3: Seasonal importance of gastropods on the 2 plants.

Table 2: Edaphic and botanical data of the 3 stations surveyed for *Juniperus oxycedrus*.

Stations Studied	Slope	Altitude	Humidity	Recovery Rate	Plant Species Present
Station n°1 Aïn Baghdad	13-15%	993 m	60%	50%	<i>Juniperus oxycedrus</i> (Cupressaceae), <i>Pinus halepensis</i> (Pinaceae), <i>Ampelodesma mauritanicum</i> (Poaceae), <i>Calycotome spinosa</i> (Fabaceae), <i>Asparagus acutifolius</i> (Liliaceae).
Station n°2 Canton Zarifet	12%	1005 m	60%	60 à 70%	<i>Juniperus oxycedrus</i> (Cupressaceae), <i>Ampelodesma mauritanicum</i> (Poaceae), <i>Pinus halepensis</i> (Pinaceae), <i>Urginea maritima</i> (Liliaceae), <i>Calycotome spinosa</i> (Fabaceae), <i>Calandula arvensis</i> (Asteraceae).
Station n°3 Canton Boumediene	11-13%	1032 m	70%	50 à 60%	<i>Juniperus oxycedrus</i> (Cupressaceae), <i>Pinus halepensis</i> (Pinaceae), <i>Urginea maritima</i> (Liliaceae), <i>Ampelodesma mauritanicum</i> (Poaceae), <i>Quercus ilex</i> (Fagaceae), <i>Thymus ciliatus</i> (Lamiaceae).

### Malacological species common to both plants

*Milax nigricans* (Milacidae), *Macularia hieroglyphicula*, *M. jourdaniana* (Helicinae, Helicidae) and *Rumina decollata* (Subulinidae) are the 4 species common to the 2 plants.

### Vertical distribution of malacological species on the two plants

The distribution of malacological species according to the strata is given in the following (Table 1). The ground surface seems

to be the most populated with snail species. The horehound stem not bear snails. has 2 malacological species. The needle-like leaves of juniper do

**Table 3:** Malacological species found on two species.

Phylum	Class	Sub-Class	Order	Families	Sub-Families	Species Malacological	Marrubium Vulgare (7 Species)	Juniperus Oxycedrus (9 Species)
MOLLUSCA	GASTROPODA	PULMONATA	STYLOMMATOPHORA	Milacidae	Helicinae	Milax gagates	-	+
						Milax nigricans	+	+
				Helicidae		Helix (Cryptomphalus) aspersa	-	+
						Macularia hieroglyphicula	+	+
						Macularia jourdaniana	+	+
						Archelix juilleti	+	-
						Archelix polita punctatiana	-	+
						Archelix lucasii	-	+
						Eobania vermiculata	-	+
						Euparypha pisana	+	-
						Helicella (Xeromagna) terveri	+	-
Subulinidae		Rumina decollata	+	+				

**Table 4:** Distribution of malacological species harvested according to the strata of the two plants.

Different Strata/Number of Species	Root	Surface of Aera	Stem	Leaves
Marrubium vulgare	/	4	2	/
Juniperus oxycedrus	1	9	/	/

### Discussion

The biotope of *Chamaerops humilis* L. is the typical biotope of *Leucochroa candidissima*. This low scrubland, most often developed on arid limestone, mercilessly exposed to overgrazing, still characterizes a good part of the arid regions of the western Mediterranean [11]. *Sphincterochila candidissima* is particularly fond of limestone rocks. On the other hand, *Euparypha pisana* is common throughout the Camargue where its specimens accumulate under *Salicornia fruticosa* and harbor numerous invertebrates [12]. According to [13] an important fauna representing the majority 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 [14]. A spectacular ecoethological phenomenon has been observed: hundreds of individuals belonging to a specific species of molluscs, *Euparypha pisana*, form by grouping on various plants “meetings in height”, real “clusters” assembling between 0.30m and 1, 5m, from 15 to 1500 subjects [15]. Thorny species (Thistles, *Opuntia*) very often carry clusters. The thorns would favor the fixation of the

individuals on the plant. The phenology of the plant with regard to *Cistus salvifolius* seems to favor the presence of this malacological species which is *Helix aspersa*. On the Diss, 2 species of Helicinae (*Euparypha pisana* and *Eobania vermiculata*) are considered phytophagous [1]. According to [16] individuals of *Leucochroa candidissima* are consumers of alfa foliage. The Milacidae family is present on the Diss and the Broom. That of the Sphincterochilidae is represented on the 5 plants. The Helicinae family has 10 species on *Ampelodesma mauritanicum* and 18 species on *Calycotome spinosa*. The Subulinidae family is represented by a single species in the 7 plants studied [17]. Four malacological species including *Archelix punctata*, *Alabastrina soluta* (Helicinae), *Helicella terveri* and *Cochlicella acuta* (Helicellinae) are common to 3 plants. *Archelix zapharina* and *Alabastrina alabastrites* (Helicinae) are represented on 2 plants. In 2012, DAMERDJI showed that 10 species are common to *C. salvifolius* and *C. ladaniferus* and only one species is specific to *cistus*, namely: *Helix aspersa*. The malacological inventory shows the absence of three species in the *C. monspeliensis* stations: *Sphincterochila candidissima* (Sphincterochilidae), *Archelix lactea* (Helicinae) and *Rumina decollata* (Subulinidae) [18-21].

## Conclusion

The malacological study carried out in different stations allows us to say that Juniper has 9 species and Horehound, 7 species. The Helicidae family remains the largest and most diverse of the two Plants. We find 04 species common to these 2 plants. The majority of malacological species found are species belonging to the soil fauna.

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