Bioecology of the Caelifera (Orthoptera) in the area of Maghnia (Tlemcen, Algeria)

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ABSTRACT

The study of wildlife Orthopterological the area of Maghnia helped to better understand the species that exist in this area. Research on the bio-ecology of Caelifera in the three stations Maghnia (Tlemcen, Algeria) have identified 14 species arranged in three families: Acrididae, Pamphagidae, Pyrgomorphidées. We tried to treat our results by ecological indices and correspondence analysis which provides information on habitats frequented by Caelifera. The study morphological, ecological and biological Caelifera each species encountered, shows that most species of locust attending many sunny places and grassy recovery means.

Key words: Bio-ecology, Caelifera, Orthoptera, Maghnia, Tlemcen. Algeria.

INTRODUCTION

The locusts inhabit every continent, the Arctic Circle to the equator, sea shores to the highest mountains. Their economic importance is due to their ravages, which generally exceeds the economic threshold bearable.

These locusts are the insect group most importantly, they are medium and large size, with smaller adults does not exceed 7 mm long, while the largest reach 12 cm. The body of locusts is rather cylindrical, swollen and narrowed at the end.

The variations between species are very numerous and diversified, they are both on the general shape of the body, as the color (DURANTAN and *et al*, 1982)

MATERIAL AND METHODS

Selection of study sites

According BEN HALIMA in 1983, knowledge of vegetation as habitat structure and a food is essential to any understanding of the distribution and dynamics of locust populations.

To represent the physiognomy of the vegetation, we deem it necessary to plant transects for each station. This requires determining a sampling area of $500m^2$ to identify plant species that exist.

To study the fauna of the area Orthopterological of Maghnia, we chose three sites that differ in morphology, it is;
´   The station Aounia
´   The station M'zaida
´   The station of Sidi Belkheir.

Working methods Orthoptera
La method of quadratic

The principle of this technique is a precise count of the number of individuals of Orthoptera existing surface well determined by transferring $100m^2$.

The count must make several times as many plots to obtain a satisfactory estimate of population density, the plot is veering 9m ².

Methods used in the laboratory
Preservation of samples

Individuals brought to the laboratory are stunned with ethyl acetate, then spread and fixed with entomological pins, at the pronotum. However, large species, such as species *Pamphagus caprai* are emptied using tweezers and then filled with cotton carded.

The wings and elytra are held in a horizontal position, with labels identifying each individual case. Insect Protected said the insecticide para dichlorobenzene are placed last in a collection box.

Species identification

The identification is based on several morphological characteristics, the color of membranous wings, the shape of pronotum and shape of the hind legs. The Orthoptera captured are identified using the key Orthoptera of North Africa by Chopard (1943). We note that the majority of species have been determined by Mr. MESLI and Mlle.MEKKOUI, reviewed by DEFAUT (1994).

RESULTS

Orthopterological species present in the area of Maghnia are classified according to the classification of LOUVEAUX and BENHALIMA, (1987).

Our sorties flown on the field during six months of work (March-August) showed the presence of fourteen species distributed in the three study sites: scrubland, fields, matorral closed (Fig. 01).

Analyses ecological and statistical results

According Amedegnato and Descamps (1980), a locust population can be defined by various parameters which are the main density and
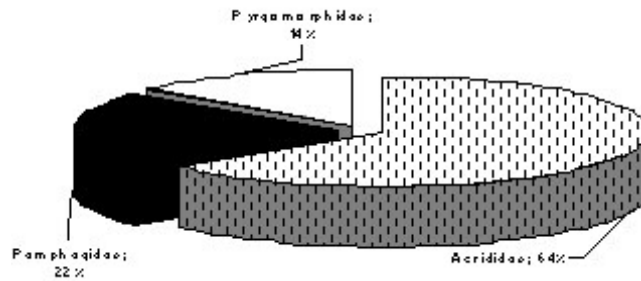

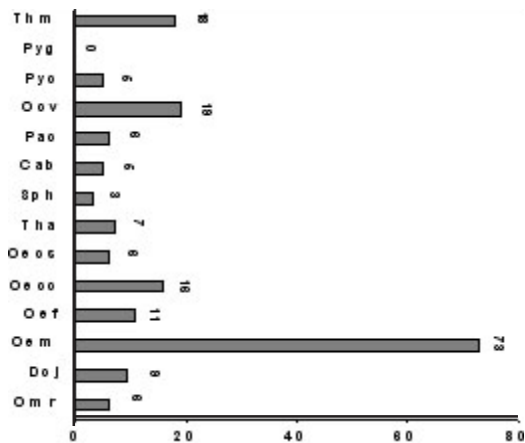**Fig. 1: Percentage of families of Caelifera (Orthoptera) in the study area**

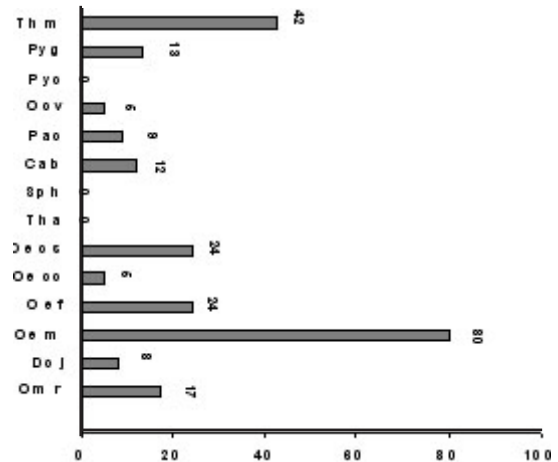**Fig. 2: The specific richness in the station 01**
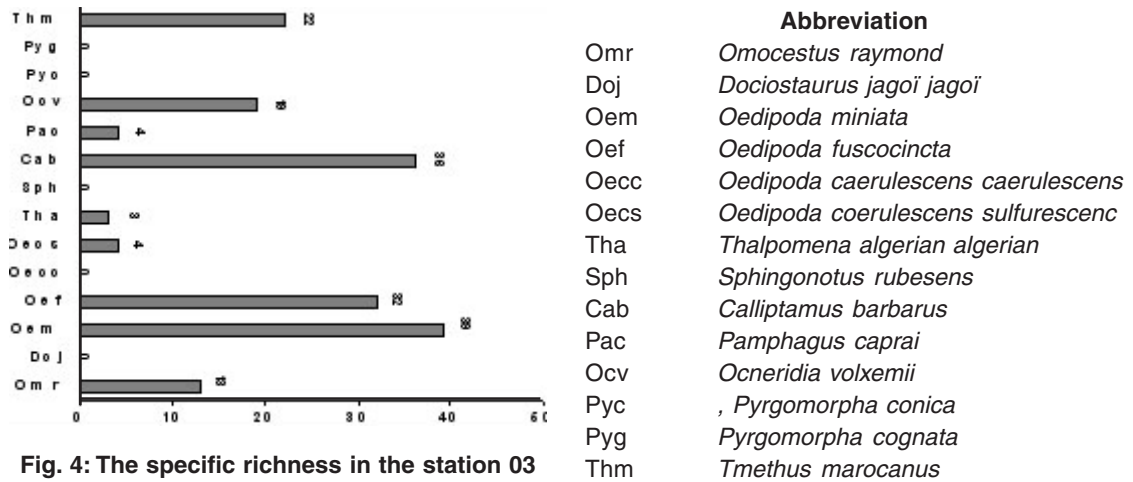

Fig. 3: The specific richness in the station 02
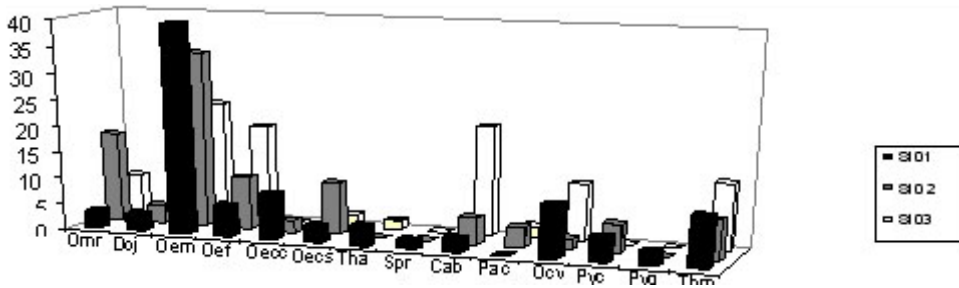
Fig. 4: The specific richness in the station 03

	Abbreviation
Omr	*Omocestus raymond*
Doj	*Dociostaurus jagoï jagoï*
Oem	*Oedipoda miniata*
Oef	*Oedipoda fuscocincta*
Oecc	*Oedipoda caerulescens caerulescens*
Oecs	*Oedipoda coerulescens sulfurescenc*
Tha	*Thalpomena algerian algerian*
Sph	*Sphingonotus rubesens*
Cab	*Calliptamus barbarus*
Pac	*Pamphagus caprai*
Ocv	*Ocneridia volxemii*
Pyc	*, Pyrgomorpha conica*
Pyg	*Pyrgomorpha cognata*
Thm	*Tmethus marocanus*

Fig. 5: Frequencies centesimal annual Caelifera species in the three stations
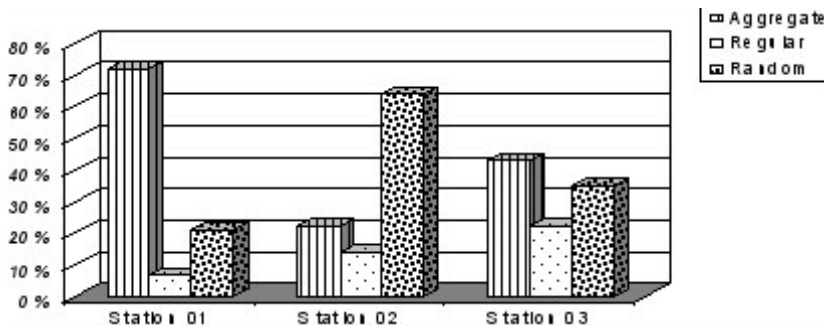
Fig. 6: Type Caelifera distribution in the three stations

Fig. 7: Shannon Weaver index for each study station
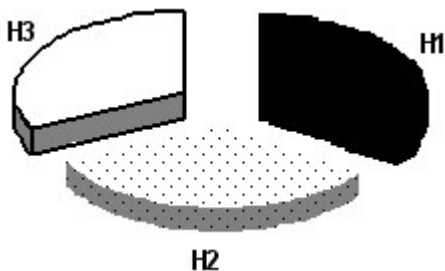
The index of Shannon Weaver and fairness:

Results: Results are shown in Fig 07.

$H = 3.322 (Log_2N - 1/N \, ÓP_iLog_2P_i)$

$E = H/(3.322Log_2N)$

Pn: total number of species n.

N: total number of individuals for each station.

Station n°1 : $N_1=184$ $Log_2184=7.52$. $H_1=9.95$ $E_1=0.39$

Station n°2 : $N_2=239$ $Log_2239=7.9$. $H_2=9.72$ $E_2=0.37$

Station n°3 : $N_3=172$ $Log_2172=7.43$. $H_3=9.23$ $E_3=0.37$

spatial distribution of individuals. In this section, the results will be examined through ecological indices followed by a correspondence analysis.

The total wealth and average
Factor analysis the AFC

The factorial correspondence analysis identifies three groups.

The first group consists of *Omocestus raymondi, Calliptamus barbarus, , Oedipoda fuscocincta, Tmethus marocanus, Oedipoda miniata, Oedipoda caerulescens sulfurescens* and *Ocneridia volxemii* is a grouping plastic that can easily changed environment, so he attended the three stations.

The second group consists of *Dociostaurus jago¿ jago¿, Oedipoda caerulescens caerulescens, Pyrgomorpha cognata* and a group who lives between the first station and second station; these species away from forest formations.

Pyrgomorpha conica and *Sphingonotus rubesens* are two species that frequent the resort scrubland.

T.algeriana other hand is a specific species for station two and three.

Pamphagus caprai is located in the third station.

Table 1: The results are reported

	Station1	Station2	Station3
	(Garrigue)	(Field)	(Matorral closed)
Total number of records N	6	6	6
Total richness	13	11	9
Average richness	2.16	1.83.	1.50

Table 2: The densities (D) species of Caelifera in the three stations

		Station1	Station2	Station3
		(Garrigue)	(Field)	(Matorral closed)
Density	(ind / m²)	1.84	2.39	1.72
Density	(ind/ha)	18400	23900	17200

DISCUSSION

Inventory of wildlife Orthopterological

The inventory of the fauna Orthopterological in the area of Maghnia is composed of fourteen species belonging to three families: Acrididae, Pyrgomorphidae and Pamphagidae.

The family Acrididae is by far the largest and consists of three subfamilies: Gomphocerinae, Oedipodinae and Calliptaminae.

The Oedipodinae are best represented as they comprise six species and with an abundance of such Oedipoda. While Gomphocerinae occupy the second position with two species: *Omocestus raymond* and *Dociostaurus jagoï jagoï* that are long considered locust pest in the Mediterranean. The Calliptaminae represented by only one species *Calliptamus barbarus.*

Secondly, we find the family Pamphagidae, represented by a single-family Pamphaginae involving three species, and *Pamphagus caprai Ocneridia volxemii, Tmethus marocanus.*

Finally, Pyrgomorphidae considered the most species-poor compared to the previous families, they are presented by a single-family *Pyrgomorpha conica* and *Pyrgomorpha cognata*.

Ecological and statistical analysis results
The total wealth and average

According RAMADE (1984), the total wealth is the average number of species present in a sample of the biotope, the surface has been fixed arbitrarily. This parameter is real wealth. It gives each species a weight proportional to its probability of occurrence.

According to this author, the average wealth is calculated from the ratio of the sum of the numbers of different species recorded in the output number at each station.

From Table 01, we can say that the total wealth of the population Orthopterological station scrubland is the highest, with an average wealth of 2.16.

As to the second station, it is characterized by a total wealth of 11 species and an average wealth of 1.83.

Finally, the third station has a total wealth of 9 species richness and average of 1.50.

The specific resources
Orthopterological composition is relatively uniform

However, we note the presence of seven common species in the three study sites namely: *Ocneridia volxemii, Oedipoda miniata, Oedipoda fuscocincta, Oedipoda coerulenscens sulfurenscens, Omocestus raymond, Dociostaurus jago¿ jago¿, Calliptamus barbarus, Tmethus marocanus.*

Some species are fond of open areas or near cultivated land, as *Dociostaurus jago¿ jago¿*, which are at the station M'zaida and Aounia.

There are species which prefer the scrub as: *Pyrgomorpha conica* and *Sphingonotus rubescens*.

Pamphagus caprai is a species that colonizes the media more or less closed (closed matorral) and fields. It is located at stations and Sidi M'zaida Belkhir.

Density

The analysis results of the density of species Caelifera in the three study sites, we found that the second station is the richest in Orthopteran species with a value of 2.39 ind / m²; comes after the station scrubland characterized by 1.84 ind / m² and the third station by 1.72 ind / m².

The density calculations show that there is not much difference between the station and the station scrub forest. This brings us back to that station has two (field) is the most favourable soil and climatic factors for a successful development of Orthoptera.

The relative frequencies

Stational analysis of the relative frequency of species identified Orthopterological, shows that the first station has a high value of 39.67% of *Oedipoda miniata*, followed by *Ocneridia volxemii, Tmethus marocanus, Oedipoda coerulescens,* which corresponds to the following: 10.32%, 09.78% and 08.69%. Other species are represented by a frequency centesimal estimated at less than 06%. While in the second station, species *Oedipoda miniata, Tmethus marocanus, Omocestus raymond*, have maximum frequencies that are respectively 33.47%, 17.57% et17.11%.

Oedipoda fuscocincta, Oedipoda coerulescens sulfurescenc are represented by the same frequency centesimal 10.04%.

Finally, at the third station, species *Oedipoda miniata, Calliptamus barbarus, Oedipoda fuscocincta, Tmethus marocanus, Ocniridia volxemii* presented respectively by the high percentages following: 22.67%, 20.93%, 18.60%, 12.79%, 11.04%.

Oedipoda caerulescens sulfurescens and Pamphagus caprai mark the same frequency 2.32%.

The type of distribution

Most species the first site provides a breakdown of the aggregate type, such as *Omocestus raymond, Dociostaurus jagoï jagoï, Oedipoda miniata, Oedipoda caerulescens caerulescens, Sphingonotus rubesens, Thalpomena algerian algerian, Ocneridia volxemii, Pyrgomorpha cognata, Pyrgomorpha conica, Tmethus marocanus. Pamphagus caprai* is the only species that lives regularly. *Oedipoda fuscocincta, Oedipoda caerulescens caerulescens, Calliptamus barbarus* live randomly

Contrary to the station "1", the second station has a dominance of species randomized. *Thalpomena algerian algerian, Sphingonotus rubensens, Pyrgomorpha conica* live regularly. In the third station the aggregate cash distribution are *Omocestus raymond, Thalpomena algerian algerian, Calliptamus barbarus, Ocneridia volxem, Pamphagus caprai, Tmethus marocanus.*

Species *Dociostaurus jagoï jagoï, Oedipoda caerulescens caerulescens, Sphingonotus rubensens, Pyrgomorpha cognata, Pyrgomorpha conica* live regularly. The remaining species are distributed randomly.

Shannon Weaver index and fairness

Stations that have the diversity index CHANNON-WEAVER highest Aounia is followed by M'zaida and finally Sidi Belkir.

We can explain these results by the abundance and diversity of vegetation and the temperature begins to rise thereby increasing the reproduction and embryonic development.

On the other hand the variation of the index of equitability of a given medium varies between 0et1. When E is less than 0.5 and tends to 0, this reflects that people are out of balance between her within a population or one or two species only multiply the contribution by others. If E is greater than 0.5 and tends to 0, an equilibrium between the different populations comprising this population (Amedegnato and Descamps, 1980)

In our case there is no great difference in equitability among the three stations. According to our results, this Aounia the fairness of which the highest value is 0.39, followed by M'zaida and Sidi Belkhir with the same value 0.37.

These results show that the population studied Orthopterological is unbalanced.

CONCLUSION

Wealth highest total is represented by the first station followed by the second station and finally comes the third. The field is characterized by an intense presence of individuals, unlike Aounia which has fewer species with great diversity, while forest station includes a variety average. We note that the field station is the most dense followed by the station and then scrub matorral closed. The study of the relative frequency we found that the species *Oedipoda miniata* presents the highest frequency in the three study sites. In the three study sites, 43% Grasshopper species live in aggregate, 35% random and 22% of species are regular.

The results of the diversity index Shannon Weaver we find that our three study sites are favourable for the survival of grasshoppers.

REFERENCES

1.   AMEDEGNATO C. and DESCAMPS M., Evolution of populations of grasshoppers of the Amazon in north-western traditional cultures and the secondary formations the 0rigine man. Acrida, **9**: 1-33 (1980).

2.   Ben Halima T., Experimental study of trophic niche *Dociostaurus marocanus* (Thunberg, 1815) in solitary in Morocco. Memory Doc. Ing., Univ.Paris South, 117p (1983).

3.   Chopard L., Orthoptéroides of North Africa. Coll. Fauna of the French empire. Librairie Larose, Paris, T. I, 450p (1943).

4.   Defaut B., The synusia Orthoptera in Paleartic western region. Edi. Association of Naturalists Ariège France, 275p (1994).

5.   Duranton J.F., LAUNOIS M, LAUNOIS-LUONG MH LECOQ & M., Manual of locust survey in tropical sèche.Ed. G.E.R.D.A.T., 1 and 2, 1470p (1982).

6   Louveau A. and Ben Halima T., Catalog of Orthoptera Acridoidea Africa's North West. Bull. Soc. Ent. France. 9 (3-4): 74-95p (1987).

7.   Mekkioui A., Study of Wildlife Orthopterological Region Hafir (Monts de Tlemcen) and identification of *Ampelodesma mauritanica* (EPEC grazed) dns faeces of different species caelifères. Thesis of Magister, Ecolo. Inst. Nat. Bio. Tlemcen, 129p (1997).

8.   Mesli L., Contribution to the bio-ecological study of wildlife Orthopterological Region Ghazaouet. Diet *Calliptamus barbarus* (Coste, 1836) and *Odipoda fuscocincta* (Lucas, 1849). Magister Thesis. Inst. Nat. Bio. Tlemcen, 113p (1997).

9.   Ramade F., Element of basic ecology. Ed Mac. McGraw-Hill, Paris, 397p (1984).