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Research Article

IMPACT OF CLIMATE CHANGE ON THE FLORISTIC CORTEGE TO *GLOBULARIA ALYPUM* IN THE REGION OF TLEMCEN

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ABSTRACT
This study is focused on the impact of climate change on the procession of floristic *Globularia alypum* L.qui Is well presented in the rocky areas. The impact of the drought on the plant formations is reflected by the desertification of the massive pre-forest, the extension of situations in desert areas of bioclimatic limits is based on the changes and thermal water. Under this constant pressure, forests tend to be transformed into matorral. These are sparse and destroyed in their turn to yield to the thorny species and/or toxic. On the whole of the Monts of Tlemcen, it is found that the degradation of Pistacio-Rhamnetalia Alaterni promotes the installation of matorrals pertaining to the class of Ononido-Rosmarinetea or Cisto-Lavanduletea depending on the nature of the substrate. The degradation of the formations to Cisto-Lavanduletea and Ononido-Rosmarinetea cause a change in the procession and floristic has their towers are replaced by other formations more adapted to these environments generally refer to the class of Thero-Brachypodietea which are generally species therophytiques has rapid growth.
Keywords: *Globularia alypum* L, Tlemcen, matorral, steppe, climate.

INTRODUCTION

The changes in climate as possible within the framework of phenomenon of global changes should not a priori cause rarefactions and even notable disappearances among the phanerophytes Mediterranean; the phenomena of change and even disappearance of mature landscapes will remain more under anthropogenic impacts that any climatic changes. Have the landscape scale, the strategies of adaptation of plants and their diversity allow a temporary resistance and partial plant species. The vegetative structures (Forests- pre-forests, matorrals and steppes) are regressing under the combined action of the man and of climate pejorations. This double action causes changes physionomiques and landscaped at the origin of major overhauls floral, faunal, edaphic etc[1] Hasnaoui, 2008. On the use of forests and matorrals; well beyond their capacity to regenerate; duct has a disappearance quasi-total of wood (deforestation and dematorralisation), and their replacement by herbaceous perennials and then annual. The further degradation of forest formations and pre forestieres promotes the installation of matorrals integrating into the classes of Ononido-Rosmarinetea and/or Cisto-Lavanduletea, these two classes are met has a single by[2], this is the class of the Cisto- Rosmarinetea or still Cisto-Rosmarinea[3] Dahmani, 1989. The present vegetation of the region of Tlemcen emerges from the interaction of a set of factors very diversified under, inter alia, the topography, geology, climatology and especially by a deep action anthropozoogene.[4] Emberger 1952, specifies that ecological data and in particular bioclimatic, dramatically influence the individualization of the vegetation. The summer drought particularly important can disrupt the phenomena of the regenerations bio climate in arid and semi arid and caused significant changes in the distribution of some species[5] Quezel, 2000. His drought that has known the region of Tlemcen, deeply is disturbing the natural vegetation, causing the plants to important phenomena of water stress and adaptation. Under this constant pressure, forests tend to be transformed into matorral. These are sparse and destroyed in their turn to yield to the thorny species and/or toxic as *Globularia alypum* L, *Urginea maritima*, *Asparagus acutifolius*.

MATERIALS AND METHODS

The study area belongs to the Tell Oran, located to the west of the country, in the western part of the Algerian territory; it is limited to the north by the Mediterranean Sea, to the West by Morocco, on the east by the wilaya of Ain-Temouchent and Sidi Bel Abbes and on the South by Chott-El Gherbi (wilaya of Naama). Two stations were chosen that represent our area of study which are Zarifet and Sebdou. Our objective of the study is to better understand the spatio-temporal distribution of *Globularia alypum* L. in the matorrals and the steppes.

Table 1: Geographic Data of stations of studies

Station	latitude	longitude	altitude
Zarifet	34°51'N	1°22'N	1115 m
Sebdou	34°38'N	1°20'W	720m

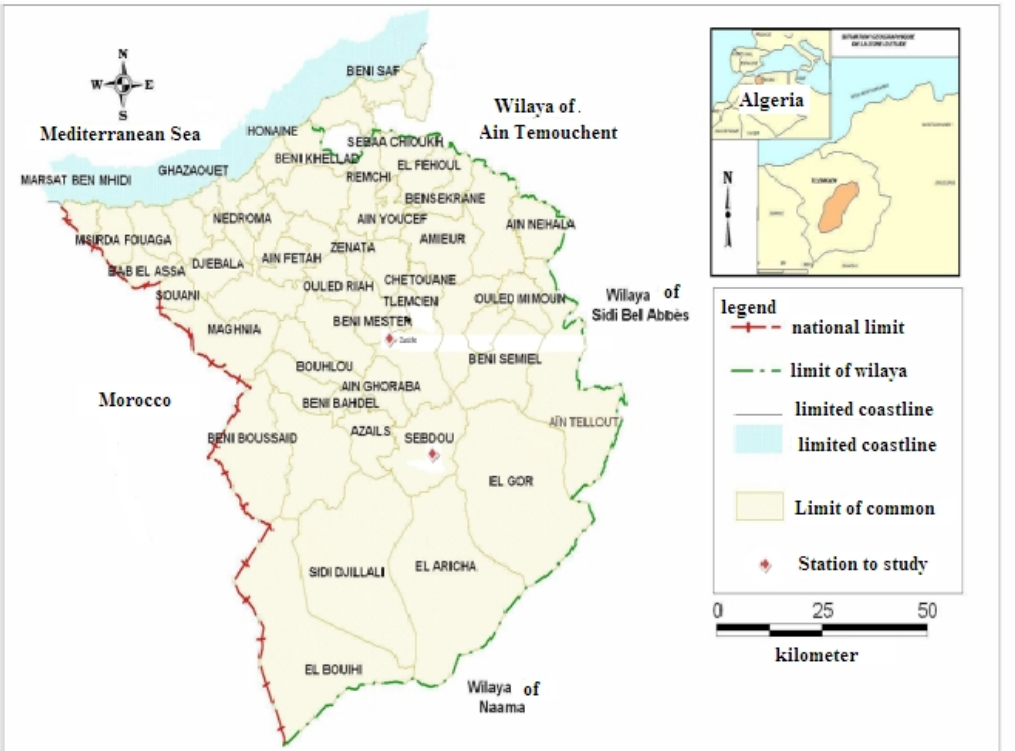

Figure 1: geographical location of stations

The study of plant communities on the ground is essentially using the method of the readings, which is to choose locations also typical as possible while noting the conditions of the environment. The readings are done with the help of a MSDS sheet complete which allows you to collect the environmental data of the site:

*Geographical location of the station;
*Geology, pedology, topography (slope, exposure)
*Structure of the plant community (recovery, stratification, height, density).
*Situation surrounding;
*Influence human and animal (action anthropozoogene)
*Ecological Variable descriptive.

RESULTS AND DISCUSSION

The main biological types of species that we have encountered in nature are: Phanerophytes, Chamephytes, Geophytes, Hemicryptophytes and Therophytes. In our study, we adopted the classification developed by[6] Raunkiaer 1904. The structure of the flora of a station can be characterized by its biological spectrum that indicates the rate of each of these biological types in the region studied. The following table shows the distribution of the biological types in these plant formations between the stations is not homogeneous.

Table 2: percentages of the biological types

	Phanerophytes		Chamephytes		Hemicryptophytes		Geophytes		Thérophytes	
Stations	nb	%	nb	%	nb	%	nb	%	nb	%
Zarifet	12	6.85	42	24	17	9.71	24	13.71	80	45.71
Sebdou	3	5.55	13	24.07	3	5.55	4	7.40	31	57.40
Study area	14	6.86	48	23.52	20	9.80	26	12.74	96	47.05

Sebdou Station

It presents the type: TH >CH >GE >HE = PH; with a percentage high of Therophytes (57.40 %).[7-9] presented the therophytie as being a form of resistance to drought, as well as to the high temperatures of the drylands and ultimate degradation stage[5] Quézel, 2000. This degradation becomes further with the installation of species more adapted to stressful environmental conditions such as *Glaubularia alypum* L.

The Chamephytes are also present with a rate of (24.07 %), Geophytes with (7.40 %), the Hemicryptophytes and the phanorophytes (5.55 %) present with the same percentage.

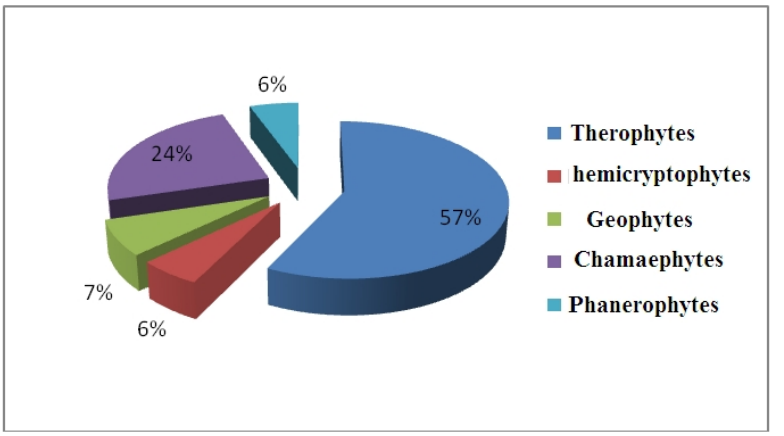

Figure 2: Biological types of Sebdou Station

Zarifet Station

It characterized by the type TH>CH>GE>HE>PH; still is dominated by therophytes with a percentage of 45.71 %, followed by the Chamephytes (24 %), Geophytes (13.71 %), the Hemicryptophytes to the percentage (9.71 %) and finally the Phanerophytes (6.85 %). In this station the appearance of the sylvatic atmosphere exists and persists still. This atmosphere tends to change by invasion of species Agdal.

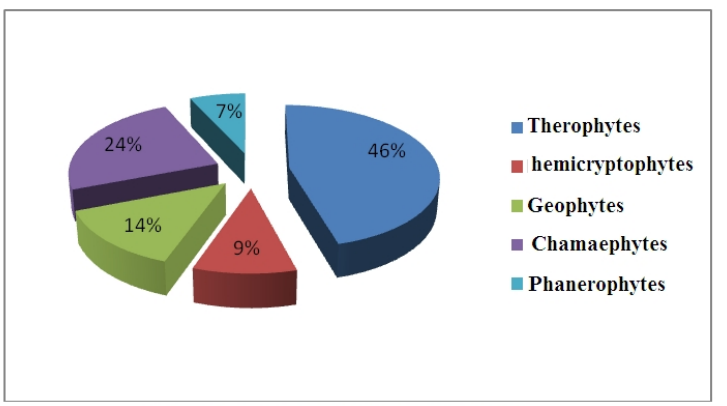

Figure 4: Biological types of Zarifet station

The Study Area

It follows the pattern:Th>Ch >Ge>He>Ph. In our study area, the therophytes dominate (47.05 %), followed by the Chamephytes (23.52 %) and followed by the Geophytes. The Therophytes have the highest rate, which is from (47.05 %); this dominance reflects extensive overgrazing in our region.[10], report that more a system is influenced by human (overgrazing, culture), more the therophytes take importance. This biological analysis allowed us to say that this category of species constitutes the most important range and that are resistant to drought, which extends for several months during the annee.les species most resistant are:

-Bromus rubens
-Chrysanthemum grandiflorum
-Atractylis humilis
-chrysanthemum grandiflorum
-Aegilops triuncialis

The dominance of the chamephytes in an arid environment shows their high adaptation to climate stress (arid and low temperature). Among the species, we have:

-Calycotome intermedia
-Daphne gnidium
-Ampelodesma mauritanicum
-Chamaerops humilis
-Cistus salvifolius

Geophytes remain in third position with a rate of (12.74 %). They are represented by *Urginea maritima,* and *Asparagus acutifolius.* The Hemicryptophytes with a percentage of (9.80 %) remain poorly represented in the study area, there are:

- Inula Montana
- Centaurea dimorpha
- Echinops spinosus

Despite their low participation of these Phanerophytes (6.86 %); they dominate their biomass, especially in the resort of Zarifet. These are generally the species *Quercus ilex* that dominate:

-Quercus ilex
-Quercus suber
-Arbutus unedo
-Olea europea
-Phillyrea angustifolia

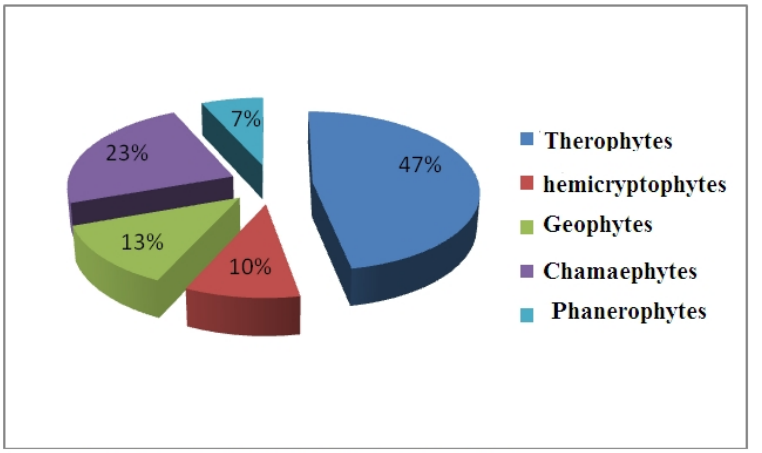

Figure 5: Biological types of the study area

Morphological characterization

The morphological type leads to the natural shape of the plant. The specific aspect of the obtained form is dependent on changes in the environment.

Table 3: Percentage of morphological types

Stations	Zarifet		Sebdou		Study area	
Morphological types	nb	%	nb	%	nb	%
Herbaceous annual (H.A)	98	56.32	31	57.40	115	56.65
Herbaceous perennials (H.P)	48	27.58	18	33.33	56	27.58
Woody perennial (W.P)	28	16.09	5	9.26	32	15.76

We note that there is a fairly large dominance of herbaceous annual in comparison with the other morphological types encountered in our study area. The increase in herbaceous annual is due to invasion of therophytes, which are generally herbaceous annual. For[11,12], there is a good correlation between biological types and many morphological characters. Beside this thérophytisation process, essentially linked to structures planted, it should be noted that there is another type of degradation just as prevalent, affecting the Matorral and especially the steppes, where the action of man and his flocks; increasing in North Africa led in these environments to identical situations but compounded by the explosion of toxic species or non-palatable[5] Quézel (2000).

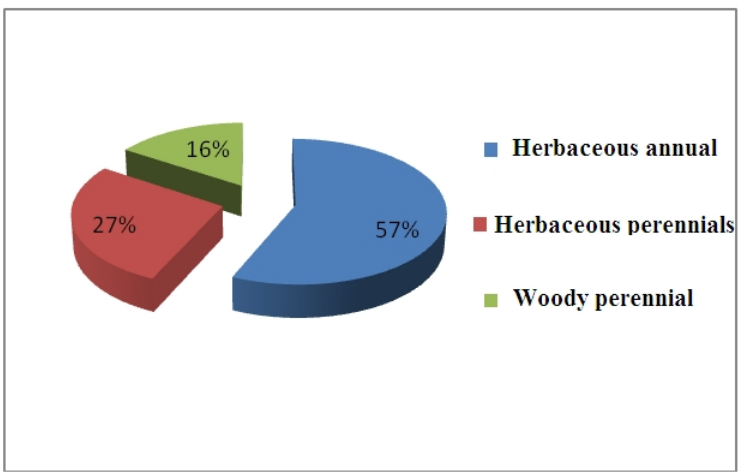

Figure 6: The morphological types of the study area.

Table 4: floristic Inventory of the study area

Taxons	Families	M T	B T.
Lagurus ovatus	Poacées	HA	TH
Ampelodesma mauritanicum	Poacées	LP	CH
Avena sterilis	Poacées	HA	TH
Avena alba	Poacées	HA	TH
Schismus barbatus	Poacées	HA	TH
Datylis glomerata	Poacées	HP	HE
Briza minor	Poacées	HA	TH
Bromus madritensis	Poacées	HA	TH
Bromus rubens	Poacées	HA	TH
Brachypodium distachyum	Poacées	HA	TH
Agropyron repens	Poacées	HP	GE
Aegilops ventricosa	Poacées	HA	TH
Aegilops triuncialis	Poacées	HA	TH
Hordeum murinum	Poacées	HA	TH
Stipa tenacissima	Poacées	HP	GE
Lygium spartum	Poacées	HA	TH
Echinaria capitata	Poacées	HA	TH
Poa bulbosa	Poacées	HA	TH
Dactlylis glomerata	Poacées	HA	GE
Chamaerops humlis	Palmacées	H P	CH
Globularia alypum	Globulariacées	LP	CH
Arisarum vulgare	Aracées	HA	GE
Arum italicum	Aracées	HP	GE
Juncus maritumus	Juncacées	HP	GE
Asphodelus microcarpus	Liliacées	HP	GE
Anthericum liliago	Liliacées	HP	GE
Urginea maritima	Liliacées	HP	GE
Ornithogalum umbellatum	Liliacées	HP	GE
Muscari neglectum	Liliacées	HP	GE
Asparagus albus	Liliacées	HP	GE
Asparagus stipularis	Liliacées	HP	GE
Ruscus aculeatus	Liliacées	HP	GE
Asparagus acutifolius	Liliacées	HP	GE
Smilax aspera	Liliacées	HP	GE
Allium sub-hirsutum	Liliacées	HP	GE
Allium nigrum	Liliacées	HP	GE
Allium roseum	Liliacées	HP	GE
Tamus communis	Dioscoréacées	HA	TH
Gladiolus segetum	Iridacées	HA	GE
Iris sp	Iridacées	HP	GE
Orchis maculata	Orchidacées	HA	GE
Populous alba	Salicacées	LP	PH
Quercus coccifera	Fagacées	LP	PH
Quercus ilex	Fagacées	LP	PH
Quercus suber	Fagacées	LP	PH
Pinus halepensis	Pinacées	LP	PH
Aristolochia longa	Aristolochiacées	HA	GE
Chenoopodium album	Chénopodiacées	HA	TH
Paronychia argentea	Caryophyllacées	HA	TH
Cerastium dichotomum	Caryophyllacées	HA	TH
Silene coeli-rosa	Caryophyllacées	HA	TH
Silene colorata	Caryophyllacées	HA	TH
Adonis annua	Renonculacées	HA	TH
Adonis dentata	Renonculacées	HA	TH
Ranunculus bullatus	Renonculacées	HP	HE
Papaver rhoeas	Papavéracées	HA	TH
Glaucium flavum	Papavéracées	HP	GE
Biscutella didyma	Brassicacées	HA	TH
Lobularia maritima	Brassicacées	HA	TH
Raphanus raphanistrum	Brassicacées	HA	TH
Sinapis arvensis	Brassicacées	HA	TH
Brassica nigra	Brassicacées	HA	TH
Reseda alba	Résédacées	HA	TH
Reseda luteola	Résédacées	HA	TH
Sedum tenuifolium	Crassulacées	HP	GE
Sedum rubens	Crassulacées	HA	TH
Rosa sempervirens	Rosacées	LP	PH
Crateagus monogyna	Rosacées	LP	PH
Ulex europeus	Fabacées	HP	CH
Ulex boivinii	Fabacées	HP	CH
Ulex parviflorus	Fabacées	HP	CH
Ononis spinosa	Fabacées	LP	CH
Calycotome villosa subsp. Intermedia	Fabacées	LP	CH
Calycotome spinosa	Fabacées	LP	CH

Cytisus triflorus	Fabacées	HP	CH
Lotus ornithopodioides	Fabacées	HA	TH
Lotus hispidus	Fabacées	HA	TH
Scorpiurus muricatus	Fabacées	HA	TH
Medicago italica subsp italica	Fabacées	HA	TH
Medicago minima	Fabacées	HA	TH
Psoralea bituminosa	Fabacées	LP	CH
Trifolium tomentosum	Fabacées	HA	TH
Trifolium angustifolium	Fabacées	HA	TH
Trifolium arvense	Fabacées	HA	TH
Trifolium stellatum	Fabacées	HA	TH
Anthyllis tetraphylla	fabacées	HA	TH
Anthyllis vulneraria	Fabacées	HA	TH
Vicia sicula	Fabacées	HA	TH
Coronilla minima	Fabacées	LP	CH
Erodium guttatum	Géraniacées	HA	TH
Erodium moschatum	Géraniacées	HA	TH
Oxalis corniculata	Oxalidacées	HA	GE
Linum strictum	Linacées	HA	TH
Linum usitatissimum	Linacées	HA	TH
Ruta chalepensis	Rutacées	HP	CH
Euphorbia dendroides	Euphorbiacées	LP	CH
Euphorbia peplis	Euphorbiacées	HA	TH
Euphorbia nicaensis	Euphorbiacées	LP	CH
Euphorbia paralias	Euphorbiacées	LP	CH
Euphorbia exigua	Euphorbiacées	HA	TH
Rhamnus lycioides	Rhamnacées	LP	PH
Ziziphus lotus	Rhamnacées	HP	CH
Althaea hirsuta	Malvacées	HA	TH
Malva sylvestris	Malvacées	HA	TH
Lavatera maritima	Malvacées	HV	CH
Daphne gnidium	Thymelaeacées	HV	CH
Thymelea hirsuta	Thymelaeacées	HP	CH
Eryngium maritimum	Apiacées	HA	CH
Eryngium tricuspidatum	Apiacées	HP	CH
Daucus carota	Apiacées	HA	TH
Ammoides verticillata	Apiacées	HA	TH
Ammi visnaga	Apiacées	HA	TH
Thapsia garganica	Apiacées	HP	HE
Cistus Ladaniferus	Cistacées	LP	CH
Cistus villosus	Cistacées	LP	CH
Cistus salvifolius	Cistacées	LP	CH
Cistus monspeliensis	Cistacées	LP	CH
Tuberaria guttatae	Cistacées	HA	TH
Helianthemum helianthemoides	Cistacées	HA	TH
Helianthemum hirtum	Cistacées	HP	CH
Helianthemum ledifolium	Cistacées	HA	TH
Helianthemum opertum	Cistacées	HA	TH
Arbutus unedo	Ericacées	LP	PH
Erica arborea	Ericacées	LP	CH
Anagalis arvensis	Primulacées	HA	TH
Jasminum fruticans	Oléacées	HP	PH
Olea europea var.Oleaster	Oleacées	LP	PH
Phillyrea angustifolia	Oléacées	LP	PH
Convolvulus althaoeides	Convolvulacées	HA	TH
Cerinthe major	Boraginacées	HA	TH
Echium vulgare	Boraginacées	HA	HE
Borago officinalis	Boraginacées	HA	TH
Cynoglossum cheirifolium	Boraginacées	HA	TH
Cynoglossum clandestinum	Boraginacées	HA	TH
Anchusa azurea	Boraginacées	HA	TH
Ajuga chamaepitys	Lamiacées	HA	TH
Salvia officinalis	Lamiacées	HP	HE
Salvia verbenaca	Lamiacées	HP	HE
Teucrium fruticans	Lamiacées	LP	CH
Teucrium polium	Lamiacées	HP	CH
Lavandula multifida	Lamiacées	HP	CH
Lavandula stoechas	Lamiacées	LP	CH
Sideritis montana	Lamiacées	HA	CH
Marrubium vulgare	Lamiacées	HA	HE
Prasium majus	Lamiacées	LP	CH
Thymus ciliatus subsp coloratus	Lamiacées	HP	CH
Satureja calamintha	Lamiacées	HA	HE
Satureja graeca	Lamiacées	HA	TH
Ballota hirsuta	Lamiacées	HA	HE
Rosmarinus officinalis	Lamiacées	HP	CH

Veronica persica	Scrofulariacées	HA	TH
Linaria reflexa	Scrofulariacées	HA	TH
Pistacia atlantica	Anacardiacées	LP	PH
Antirrhinum majus	Scrofulariacées	LP	CH
Antirrhinum orontium	Scrofulariacées	HA	TH
Bellardia trixago	Scrofulariacées	HA	TH
Plantago serraria	Plantaginacées	HA	HE
Plantago albicans	Plantaginacées	HA	HE
Plantago lagopus	Plantaginacées	HA	HE
Plantago psyllium	Plantaginacées	HA	TH
Rubia peregrina	Rubiacées	HA	HE
Gallium verum	Rubiacées	HA	TH
Gallium verticillatum	Rubiacées	HA	TH
Gallium aparine	Rubiacées	HA	TH
Asperula hirsuta	Rubiacées	HA	TH
Vibernum tinus	Caprifoliacées	HP	CH
Lonicera implexa	Caprifoliacées	LP	PH
Fedia cornucopiae	Valérianacées	HA	TH
Cephalaria leucantha	Dipsacées	HP	CH
Scabiosa stellata	Dipsacées	HA	TH
Bellis sylvestris	Astéracées	HA	TH
Bellis annua	Astéracées	HA	TH
Micropus bombicinus	Astéracées	HA	TH
Evax argentea	Astéracées	HA	TH
Inulla Montana	Astéracées	HP	HE
Pallenis spinosa	Astéracées	HP	CH
Senecio vulgaris	Astéracées	HA	CH
Calendula arvensis	Astéracées	HA	TH
Calendula bicolor	Astéracées	HA	TH
Chrysanthemum grandiflorum	Astéracées	HA	TH
Chrysanthemum coronarium	Astéracées	HA	CH
Echinops spinosus	Astéracées	HP	HE
Carlina racemosa	Astéracées	HA	TH
Atractylis concellata	Astéracées	HA	TH
Atractylis gummifera	Astéracées	HP	CH
Atractylis humilis	Astéracées	HP	CH
Carduus pycnocephalus	Astéracées	HA	TH
Centaurea parviflora	Astéracées	HP	HE
Centaurea pungens	Astéracées	HP	HE
Centaurea dimorpha	Astéracées	HP	HE
Centaurea involucrata	Astéracées	HA	TH
Centaurea pullata	Astéracées	HA	TH
Centaurea melitensis	Astéracées	HA	TH
Carthamus caeruleus	Astéracées	HP	HE
Hypochoeris radicata	Astéracées	HP	HE
Taraxacum officinalis (ovatum)	Astéracées	HA	TH
Sonchus arvensis	Astéracées	HP	CH
Reichardia picroides	Astéracées	HA	CH
Reichardia tingitana	Astéracées	HA	TH
Asteriscus maritimus	Astéracées	HA	CH
Catananche coerulea	Astéracées	HA	TH
Catananche lutea	Astéracées	HA	TH

CONCLUSION

To conclude, we can say that the results obtained from faunal surveys show an extreme variety of plant species accompanying *Globularia alypum*. This taxon has an ecological value very significantly. The family of Globulariacees plays a vital role in the study area. It's presence induces no doubt a regression of the erosion of the phylogenetic heritage. The comparison of the different biological spectra shows the importance of therophytes which confirmed without doubt the therophytisation announced by several authors[13]. Their frequency reflects a good adaptation to the aridity. The existence of therophytes is a consequence some of purely grazing extensive. Their number increases to the determinant of the other types that are in regression continue (example: the phanerophytes). The unfavorable conditions (climate, the action anthropozoogene) promote the development of this type of plants to short cycle which are especially the herbaceous annual.

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