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RESEARCH ARTICLE

CONTRIBUTION TO A KINEMATIC STUDY OF THE PHYTODIVERSITY IN TLEMCEN REGION (NORTHWEST ALGERIA).

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Abstract

The Tlemcen region is characterized by considerable Mediterranean phytodiversity. This importance does not reflect the quantity since the majority of plant taxa are into a rare state at the study area where the concept of characteristic species. This study was developed to elucidate the kinematics of the flora between two periods (1963 and 2013) based on the degree of abundance and rarity. To do this, we had to ask the following questions: What are the factors that influence the evolution of phytodiversity? In what state is? What solutions and perspectives can be drawn to protect and preserve this plant diversity? The analysis showed a change in phytodiversity translated by an extreme regression of the vegetation whose the census reveals 257 taxa. The grasses were minor during the old period (1963) while they became abundant during the new period (2013). Unlike the tree layer was abundant during the old period (1963) while it has become rare in the new period (2013). A rational management of phytodiversity expressed by protected sites as well as awareness remains an indispensable procedure to undertake to fight against the erosion of our plant heritage.

INTRODUCTION

The Mediterranean region is characterized by high species richness and deep originality since about 50% of some 25,000 species (1), or 30,000 species and subspecies (2), present in the Mediterranean climatic zone (3).

Mediterranean forests present an certain interest from the point of view of their species richness, as far as in level of species that constitute than species participating in the procession of habitats they individualize (4, 5).

Thus, these forests consist of nearly 290 tree species whose 201 exclusive or preferential widely of these forests against 135 in European Region (6), with 14 genera which are peculiar to it. A significant number of these phanerophyts are currently rare, vulnerable or endangered, over 60 if one refers to the balance sheets recently published by International Union of preservation (U.I.C.N.) (7) and supplemented by (6). What could be the future of the biodiversity of these forests over the coming decades according to on global climate change?

In Algeria, on the 3139 species (5402 taxa counting subspecies, varieties and forms) and described by (8) in the new flora of Algeria and southern desert regions, (9) lists 289 enough rare species, 647 rare, 640, 35 very rare and 168 rare endemic. Species distribution between families and between genera shows that 7 families with more than 100 species each. They are Asteraceae, Fabaceae, Poaceae, Brassicaceae, Caryophyllaceae, Apiaceae and Lamiaceae with respectively 433, 411, 289, 171, 142, 142, 132 species. Then come the Liliaceae, Scrophulariaceae, Boraginaceae, Chenopodiaceae, Cyperaceae, Ranunculaceae and Cistaceae containing between 50 and 78 species. In

flora, 36 families are represented only by one genus and one species (Oxalidaceae, Polygonaceae, Callitrichaceae), seven (07) genera present between 30 and 58 species (*Helianthemum, Linaria, Centaurea, Ononis, Trifolium, Astragalus, Silene*). The counting results to 1.07% (34) rare species, 20.23% (642) of very rare species and 19.23% (609) of rare species. It thus appears that 40.53% (1,286 species) of the Algerian flora is rare to very rare.

Reflecting the urgency of conservation action. (10) reported 700 endemic species in the Algerian flora; we counted 653 on the basis of the flora (8). The rate of endemism in Algeria is 12.6%. Among the endemic species, we can distinguish 165 endemic North African, 270 endemic Algerian. Moreover, the specific endemism in Sahara is particularly high, with 162 endemic species, representing 25% of the Saharan flora (11).

(12) notes that, the floristic inventory conducted in forest of Boutaleb (Setif, Eastern Algeria) has led to the constitution of an overall floristic list of 367 taxa, whether 11.7% of the flora of Algeria estimated at 3139 (8). These taxa are distributed in 226 genera and 56 families of vascular plants, representing approximately 24.5% of genera and 43% of inventoried families in Algeria. The same author reports that, the analysis of the floristic diversity of the forest of Boutaleb shows that the specific richness represents 11.7% of the flora of Algeria, whether 367 species, among which dominate therophyts and hemicryptophyts. This flora includes 32 endemic species and 37 rare and/or endangered species divided into 19 families whose19 enough rare, 14 rare and 2 very rare. These rare taxa represent 9.5% of the flora of Boutaleb and 1.9% of the rare flora of Algeria. These rare taxa, threatened and endemic constitute a local red list; the protection and conservation of this flora are needed more than ever of a rigorous protection.

The Oran phytogeographical sector home alone about 1,780 plant species, about 57% of the Algerian flora, but still 95% of the Maghreban Mediterranean flora (the last count 1865 species according to estimates of (13).

The flora of the Tlemcen region counting 322 species whether 10.26% of the Algerian flora. They belong to the sub branch of gymnosperms and angiosperms; with 62 families and 193 genera. This represents almost 42.18% of the existing families in the flora of Algeria with 18% of the genera. Gymnosperms constitute 1.55% of the region unlike angiosperms which dominate. The latter constitute 98.45% of the scrub with 84.21% of Eudicots and 13.93% of Monocots (14).

Methodology

The biological material “plant species” (Table 1).

The floristic analysis method is a key factor to better determine the current status of a given region. Among the various statement methods of vegetation currently known, we thought that the method said phytosociological or stigmatiste (5) is the most appropriate to identify the problem and achieve the objectives of the study. It allows a full study of vegetation and its biogeographical distribution using the technical statement.

Indeed the location of the statement is chosen subjectively so that it is homogeneous, for it represents the plant communities. The surface to be sampled is true according to the type of vegetation and recovery; it is greater than or equal to the minimum area and defined by the species-area curve.

The statement includes a list of all species with for each of them with the notation of the abundance-dominance. The analysis of floristic richness of different groups, of their biological and chronogical characters allows to highlight their floristic originality, their state of conservation and their heritage value (6).

The purpose of this analysis is to know the scale of the station, the diversity and vegetation dynamics. This study is based primarily on statements that include the general characters of each station. A well done statement must be a true portrait of the group (8).

In order to have a wide knowledge on the diversity of plant community, we conducted a large number of floristic statements and each of these statements has the general characters associated with the station. These are: the place and date, altitude, exposure, slope, the nature of the substrate, geomorphology, the surface of the statement, the recovery and the physiognomic type of vegetation.

The author precise that the surface of statements must be sufficient to understand almost all of the species present on the surface considered of vegetation floristically homogeneous that match to the concept of minimal area (13) This minimum area varies depending on the number of annual species when of execution and therefore the vagaries of rainfall and operating conditions (7).

In this subject, (10) adds that to control the representation of sample (statements) the most common procedure is that of curve "species-area". Indeed, this method consists to list the species on a plot of 1 m2 then it will be doubled and are then added the new species which appear (Figure 1). By successive duplication, it is supposed to happen to a surface (1 +2 +3 + ... + n) from which there are more new species appears (11).

In our case, the minimum area for Zarifet and Ghazaouet stations is 128 m2 when for Beni-Saf station is 64 m2 (Figure 2 and 3).

Figure 1 Experimental device to determine the curve area/species.

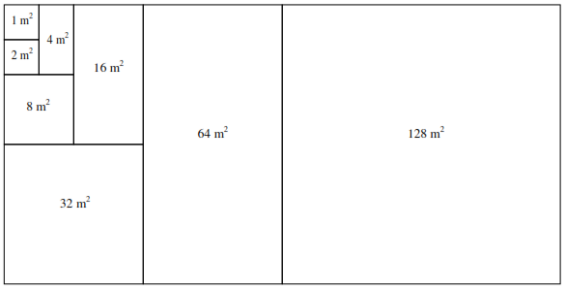


Figure 2 Curve of the minimum area of Beni-Saf station.

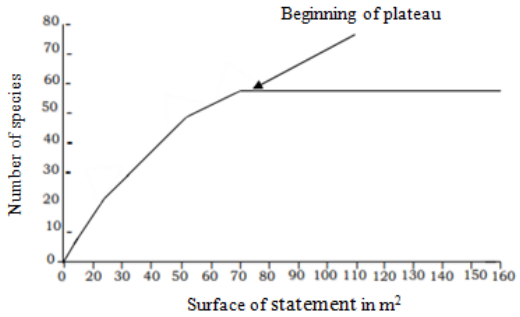
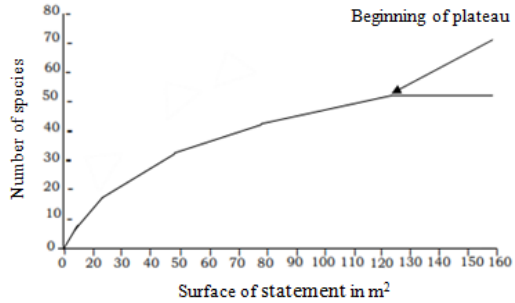


Figure 3 Curve of the minimum area of Zarifet and Ghazaouet station.



Abundance is the relative proportion of individuals of a given species and dominance is the area covered by this species. The two concepts are very similar. They are integrated into a single number which varies from 1 to 5 according to (5):

+: rare or very rare individuals with very low recovery;
1: abundant enough individuals with low cover less than 5%;
2: any number of individuals with recovery of 5 to 25% of the surface;
3: any number of individuals with a recovery of 25-50% of the surface;
4: any number of individuals with a recovery of 50-75% of the surface;
5: any number of individuals with a recovery above 75% of the surface.

Results

After our analysis (Figure 4 and 5) and (Table 1), we can mention the following points:

For the old period (1963)

The percentages of different degrees of inventoried plant taxa are as follows:

[CCC-CC (Ab_4)]: 42.59%;
[C (Ab_3)]: 20.19%;
[AR-AC (R_2)]: 18.61%;
[R (RR_1)]: 12.30%;
[RR-RRR (RRR_+)]: 6.31%.

For the new period (2013)

The percentages of different degrees of inventoried plant taxa are as follows:

[CCC-CC (Ab_4)]: 0.74%;
[C (Ab_3)]: 6.19%;
[AR-AC (R_2)]: 20.30%;
[R (RR_1)]: 30.45%;
[RR-RRR (RRR_+)]: 42.33%.

Figure 4 Percentages of abundance and rarity of plant species (The study area: old period 1963). Scale of (Quezel and Santa, 1962-1963): CCC: Particularly prevalent; CC: Very common; C: Commun; AC: Fairly common; RRR: Extremely rare; RR: Very rare; R: Rare; AR: Enough rare. Our scale: Ab_4: Very abundant; Ab_3: Abundant; R_2: Enough abundant; RR_1: Rare; RRR_+: Very rare (Extremely rare).

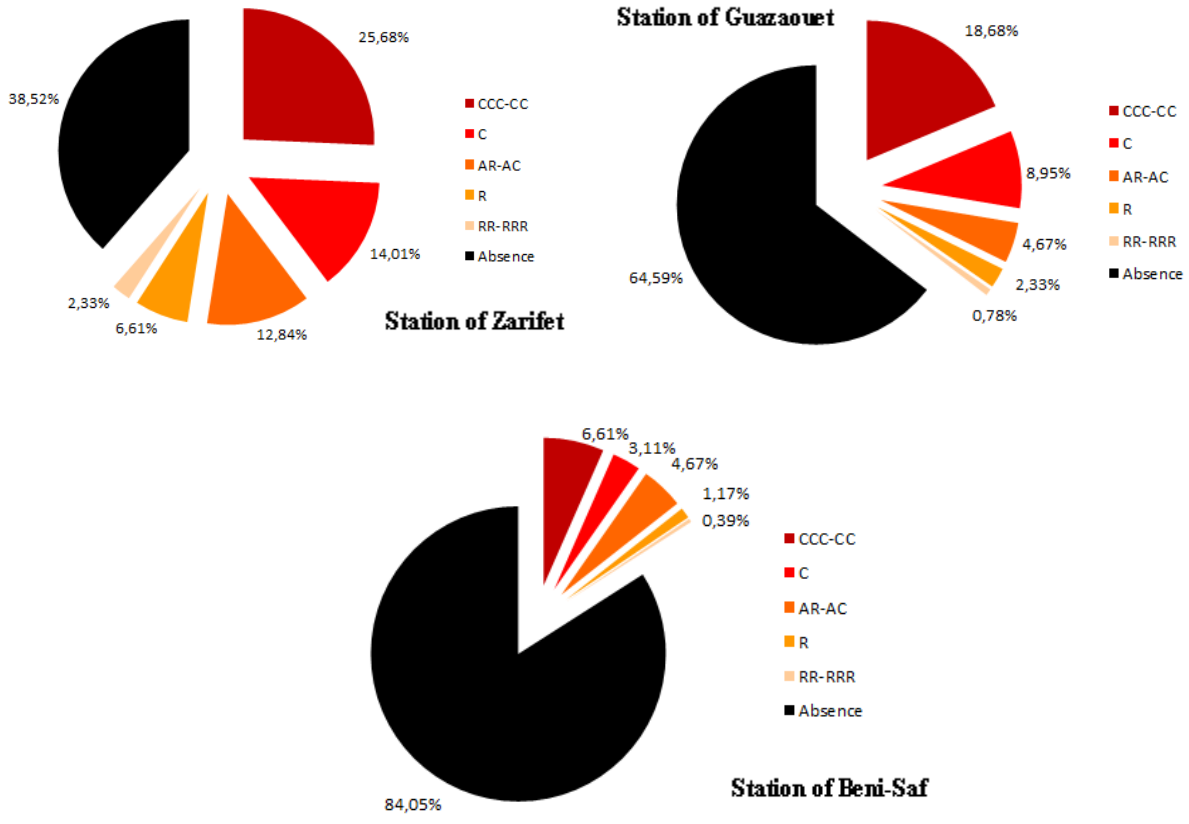


Figure 5 Percentages of abundance and rarity of plant species (The study area: new period 2013). Scale of (Quezel and Santa, 1962-1963): CCC: Particularly prevalent; CC: Very common; C: Commun; AC: Fairly

common; RRR: Extremely rare; RR: Very rare; R: Rare; AR: Enough rare. Our scale: Ab_4: Very abundant; Ab_3: Abundant; R_2: Enough abundant; RR_1: Rare; RRR_+: Very rare (Extremely rare).

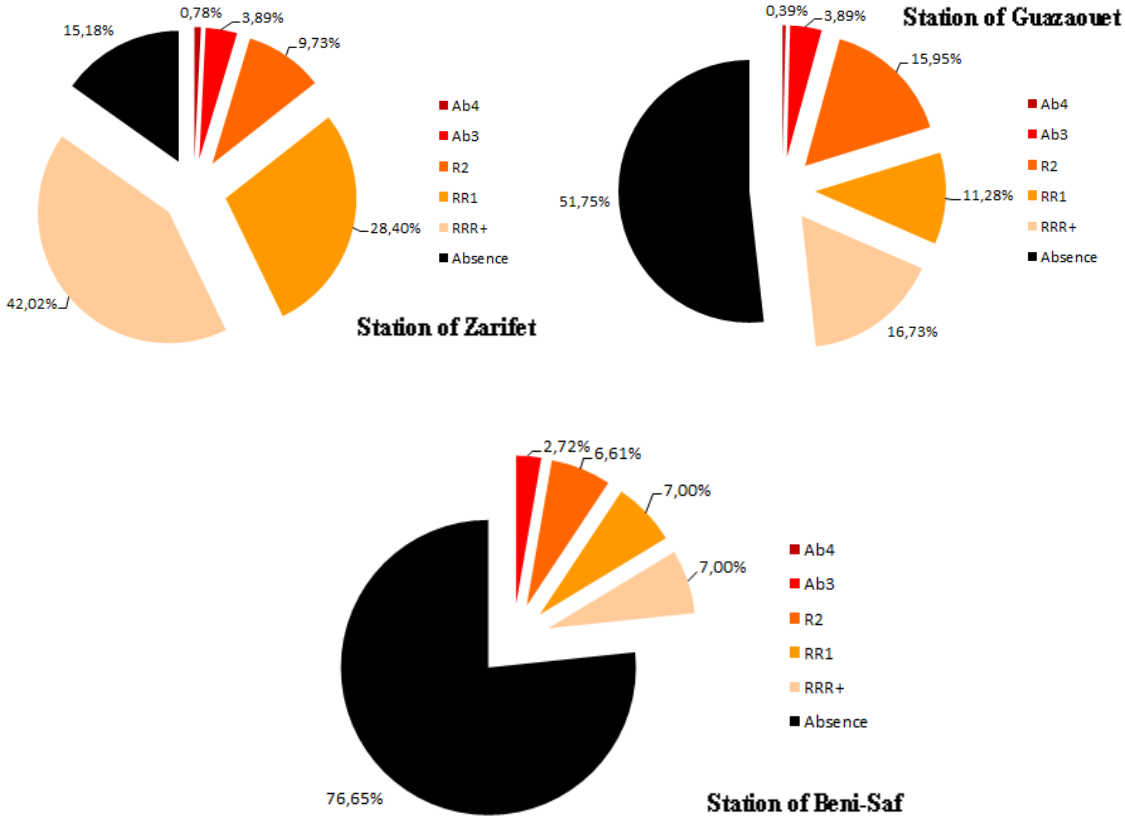


Table 1 The inventory of taxa with abundance and rarity degrees in the study area.

Study sites						Genus/Species
Zarifet		Ghazaouet		Beni-Saf		
AP	NP	AP	NP	AP	NP	
.	RRR_+	.	.	.	.	*Allium sub-hirsutum*
C	RRR_+	C	RR_1	.	.	*Allium nigrum*
.	RRR_+	.	.	.	.	*Allium roseum*
CC	R_2	.	.	.	.	*Asphodelus microcarpus*
.	R_2	.	R_2	.	.	*Aegilops truncialis* subsp. *eu-ovata*
C-AR	RR_1	.	.	.	.	*Aegilops truncialis* subsp. *ventricosa*
AR	RRR_+	.	.	.	.	*Ajuga iva*
C-R	RR_1	.	.	C-R	RR_1	*Anthyllis tetraphylla*
.	RRR_+	.	.	.	.	*Anthyllis vulneraria*
.	RR_1	.	.	.	.	*Aristolochia longa*
.	RR_1	.	.	.	.	*Aristolochia baetica*
CC	RR_1	CC	R_2	CC	R_2	*Ammoïdes verticillata*
CC	Ab_3	CC	R_2	.	.	*Ampelodesma mauritanicum*
CC	RRR_+	.	.	.	.	*Asperula hirsuta*
CC	R_2	CC	R_2	.	.	*Avena sterilis*
CC	RRR_+	CC	RRR_+	.	.	*Arbutus unedo*

.	.	.	.	.	R_2	*Anagallis arvensis*
CC	RRR_+	CC	RRR_+	.	.	*Anagallis arvensis* subsp. *phoenicea*
C	RRR_+	C	RRR_+	.	.	*Anagallis arvensis* subsp. *latifolia*
.	.	.	.	.	RRR_+	*Anagallis monelli*
.	RR_1	.	R_2	.	RR_1	*Asparagus stipularis*
CC	RRR_+	CC	R_2	.	.	*Asparagus acutifolius*
C	RRR_+	.	.	.	.	*Asparagus albus*
AR	RRR_+	AR	RRR_+	.	.	*Asparagus officinalis*
CCC	R_2	CCC	R_2	CCC	R_2	*Asteriscus maritimus*
C-R	RRR_+	.	.	.	.	*Acanthus mollis*
.	RR_1	.	RRR_+	.	RR_1	*Arisarum vulgare*
CC	RR_1	CC	RR_1	.	.	*Atractylis humilis*
CC	RR_1	.	.	.	.	*Atractylis gummifera*
.	RR_1	.	.	.	.	*Atractylis macrophylla*
CCC	RR_1	CCC	RR_1	.	.	*Atractylis cancellata*
C	RR_1	C	RR_1	.	.	*Adonis dentata*
AC	RR_1	.	.	.	.	*Adonis annua*
.	.	.	.	C	RRR_+	*Astragalus lusitanicus*
.	.	.	.	AC	RRR_+	*Antirrhinum orontium*
AR	RRR_+	.	.	.	.	*Biscutella raphanifolia*
.	Ab_3	.	Ab_3	.	Ab_3	*Bromus rubens*
.	Ab_3	.	.	.	R_2	*Bromus madritensis*
CC	RRR_+	CC	RRR_+	.	.	*Brachypodium distachyum*
.	RR_1	.	R_2	.	.	*Bellis annua*
.	RRR_+	.	.	.	.	*Bellis sylvestris*
AC	RRR_+	.	.	.	.	*Ballota hirsuta*
R	RRR_+	.	.	.	.	*Brassica nigra*
.	.	CC	RRR_+	.	.	*Biscutella didyma*
.	.	AR-RR	RRR_+	.	.	*Bupleurum rigidum*
CC	R_2	.	.	.	.	*Catananche lutea*
CC-R	R_2	CC-R	RRR_+	.	.	*Catananche coerulea*
CCC	Ab_3	CCC	Ab_4	.	.	*Cistus monspeliensis*
AC	RR_1	AC	R_2	.	.	*Cistus albidus*
.	Ab_4	.	Ab_3	.	.	*Cistus villosus*
AC	Ab_4	AC	Ab_3	.	.	*Cistus ladaniferus*
CC	Ab_3	.	.	.	.	*Cistus salvifolius*
CC	Ab_3	CC	R_2	.	.	*Chamaerops humilis*
.	RRR_+	.	RRR_+	.	RR_1	*Convolvulus althaeoïdes*
.	R_2	.	.	.	.	*Cupressus sempervirens*
CC	RR_1	.	.	.	.	*Chrysanthemum coronarium*
CC	R_2	CC	RR_1	.	.	*Chrysanthemum grandiflorum*
CC-AR	RR_1	.	.	.	.	*Chrysanthemum myconis*
CCC	RR_1	CCC	R_2	CCC	R_2	*Centaurea pullata*
.	RRR_+	.	.	.	.	*Centaurea solstitialis*
C	RRR_+	.	.	.	.	*Centaurea dimorpha*
AR	RRR_+	.	.	.	.	*Centaurea parviflora*
.	R_2	.	RRR_+	.	.	*Centaureum umbellatum*
.	RR_1	.	.	.	.	*Cerinthe major*
C	Ab_3	C	Ab_3	.	.	*Calycotome villosa* subsp. *intermedia*
AR	RRR_+	.	.	AR	RRR_+	*Cephalaria leucantha*
R	RRR_+	R	RRR_+	.	.	*Cephalaria syriaca*
.	RRR_+	.	RRR_+	.	.	*Chenopodium album*

C-RR	R_2	.	.	.	.	*Clematis flammula*
R	RRR_+	R	RRR_+	.	.	*Cytisus triflorus*
C	RR_1	C	R_2	.	.	*Crataegus oxyacantha*
.	RRR_+	.	R_2	.	.	*Calendula arvensis*
AR	RRR_+	.	.	AR	RRR_+	*Ceratonia siliqua*
.	.	.	.	AR	RR_1	*Catananche caespitosa*
.	.	.	.	AC	RRR_+	*Centaurea melitensis*
.	.	.	.	CC	R_2	*Calycotome spinosa*
.	.	.	.	R	RRR_+	*Crepis patula*
.	.	.	.	AR	RRR_+	*Carthamus pectinatus*
.	.	.	.	.	RRR_+	*Carduus pycno-cephalus*
C	RR_1	C	RRR_+	C	Ab_3	*Dactylis glomerata*
C	RR_1	C	RRR_+	.	.	*Daphne gnidium*
.	RRR_+	.	.	.	.	*Diatus serrulatus*
R	R_2	R	R_2	.	.	*Daucus carota*
AC-R	RR_1	AC-R	RR_1	.	.	*Delphinium peregrinum*
.	.	.	.	R	RR_1	*Daphne laureola*
.	RRR_+	.	R_2	.	.	*Eryngium tricuspidatum*
C	RRR_+	C	RRR_+	C	RR_1	*Eryngium maritimum*
RR	RRR_+	.	.	.	.	*Eryngium campestre*
.	RRR_+	.	RR_1	.	R_2	*Echium vulgare*
R	RR_1	.	.	.	.	*Echium parviflorum*
R	RRR_+	.	.	.	.	*Euphorbia amarygdaloïdes*
.	RRR_+	.	RR_1	.	.	*Euphorbia helioscopiae*
AC	RRR_+	AC	RRR_+	.	.	*Euphorbia peplis*
RR	RRR_+	.	.	.	.	*Euphorbia dendroïdes*
RR	RRR_+	.	.	.	.	*Euphorbia nicaeensis*
.	RRR_+	.	.	.	.	*Euphorbia paralias*
CC	RR_1	CC	RR_1	CC	R_2	*Erodium moschatum*
R	RR_1	R	RRR_+	.	.	*Evax argentea*
.	R_2	.	R_2	.	.	*Echinops spinosus*
C	RRR_+	C	RRR_+	.	.	*Erica arborea*
.	.	CC	RRR_+	.	.	*Erica multiflora*
.	.	.	.	RR	RRR_+	*Euphorbia akenocarpa*
CC	RRR_+	CC	RR_1	.	.	*Fumana thymifolia*
CC	RR_1	CC	RRR_+	.	.	*Fedia cornucopiae*
C	RRR_+	.	.	.	.	*Fumaria capreolata*
C	R_2	C	RR_1	C	R_2	*Fagonia cretica*
CC	RR_1	CC	RR_1	CC	RR_1	*Ferula communis*
.	RRR_+	.	.	.	.	*Fraxinus ornus*
AR-RR	RRR_+	.	.	AR-RR	RRR_+	*Galium verum*
.	RR_1	.	.	.	.	*Geranium robertianum* subsp. *purpureum*
C	RR_1	.	.	.	.	*Geranium sylvaticum*
.	RRR_+	.	Ab_3	.	.	*Globularia alypum*
.	RRR_+	.	RRR_+	.	.	*Genista tricuspidata*
C	RR_1	.	.	.	.	*Gladiolus segetum*
.	.	CCC	RRR_+	.	.	*Galactite tomentosa*
.	.	.	.	AC	RRR_+	*Gnaphalium luteo-album*
CC	RRR_+	CC	R_2	.	.	*Helianthemum helianthemoïdes*
AC-RR	RRR_+	.	.	.	.	*Halimium halimifolium* subsp. *halimifolium*
AR	RRR_+	.	.	.	.	*Helianthemum apertum*

.	RR_1	.	.	.	.	*Helianthemum hirtum*
C	RR_1	C	RRR_+	.	.	*Hippocrepis minor* subsp. *munbyana*
.	Ab_3	.	Ab_3	.	.	*Hordeum murinum*
.	RRR_+	.	.	.	.	*Helianthemum ledifolium*
AR	RRR_+	.	.	.	.	*Iris planifolia*
CC	RR_1	.	.	.	.	*Iris unguicularis*
AC	RR_1	AC	R_2	AC	R_2	*Inula montana*
CC-RR	RR_1	CC-RR	R_2	.	.	*Inula viscosa*
AC	RRR_+	.	.	.	.	*Iris tingitana*
CC	R_2	.	.	.	.	*Juniperus oxycedrus* subsp. *oxycedrus*
CC	R_2	CC	RR_1	.	.	*Jasminum fruticans*
.	.	RR	RRR_+	.	.	*Juniperus phoenicea*
.	.	C	RRR_+	.	.	*Juncus maritimus*
CC	RRR_+	.	.	.	.	*Kundmannia sicula*
CC	R_2	CC	R_2	CC	Ab_3	*Lavandula dentata*
CC	RR_1	CC	RR_1	.	.	*Lavandula stoechas*
AC	RRR_+	.	.	.	.	*Lotus hispidus*
AC	RRR_+	.	.	.	.	*Lavatera maritima*
AC	RR_1	AC	RR_1	.	.	*Lavandula multifida*
AC	RRR_+	AC	RRR_+	AC	RRR_+	*Linum strictum*
.	RRR_+	.	.	.	.	*Lactuca veminea*
CC-RR	RRR_+	CC-RR	RR_1	.	.	*Lonicera implexa*
CC	RR_1	CC	R_2	.	.	*Lobularia maritima*
.	RR_1	.	.	.	.	*Linum usitatissimum*
.	RRR_+	.	.	.	.	*Leontodon hispidulus*
AC	RRR_+	.	.	.	.	*Lupinus hirsutus*
.	RRR_+	.	.	.	.	*Linum tenue* subsp. *tenue*
CCC	RRR_+	.	.	.	.	*Linaria reflexa*
AC	RRR_+	.	.	.	.	*Lonicera biflora*
.	.	.	RRR_+	.	.	*Ligustrum japonicum*
.	.	.	.	C	RR_1	*Lotus ornithopodioïdes*
CC	RR_1	.	.	CC	RR_1	*Lagurus ovatus*
RRR	RR_1	RRR	RRR_+	.	.	*Myrtus communis*
AC	RRR_+	.	.	.	.	*Muscari neglectum*
CC	RR_1	CC	R_2	.	.	*Muscari vulgare*
C	RRR_+	.	.	.	.	*Muscari comosum*
CC	RRR_+	CC	RRR_+	.	.	*Nerium oleander*
.	.	.	RRR_+	.	.	*Nepeta multibracteata*
.	RR_1	.	.	.	R_2	*Oxalis pes-caprae*
R	RRR_+	.	.	.	.	*Orobanche caryophyllacea*
CC	RR_1	CC	R_2	CC	RR_1	*Olea europea*
C	RRR_+	.	.	.	.	*Ornithogalum umbellatum*
.	.	.	.	.	RR_1	*Ononis natrix*
RRR	RRR_+	.	.	.	.	*Pteridium aquilinum*
C	RRR_+	C	RRR_+	.	.	*Papaver rhoeas*
CC	RR_1	.	.	.	.	*Pinus halepensis*
C	RR_1	C	RR_1	.	.	*Paronychia argentea*
CC	RR_1	.	.	.	.	*Plantago ciliata*
CC	RRR_+	.	.	.	.	*Populous alba*
.	R_2	.	R_2	.	Ab_3	*Plantago afra*
CC-RRR	R_2	.	.	.	.	*Plantago albicans*
CC	RRR_+	CC	RR_1	CC	RRR_+	*Prasium majus*

.	RR_1	.	RR_1	.	R_2	*Pallenis spinosa*
CC	RR_1	CC	Ab_3	CC	Ab_3	*Pistacia lentiscus*
CC	R_2	CC	RR_1	CC	Ab_3	*Plantago lagopus*
.	R_2	.	R_2	.	.	*Phillyrea angustifolia*
CC	R_2	.	.	.	.	*Plantago serraria*
AC	RRR_+	AC	R_2	.	.	*Pistacia terebinthus*
.	.	.	.	.	RR_1	*Phagnalon saxatile*
.	.	.	.	CC	RRR_+	*Picris echioïdes*
R	RR_1	.	.	.	.	*Quercus suber*
C-R	RR_1	C-R	R_2	.	.	*Quercus ilex*
C	RR_1	C	RR_1	.	.	*Quercus coccifera*
R	RR_1	.	.	.	.	*Quercus faginea* subsp. *tlemceniensis*
.	RRR_+	.	.	.	.	*Reichardia picroïdes* subsp. *intermedia*
.	RR_1	.	RRR_+	.	.	*Reseda alba*
AC	RRR_+	AC	R_2	.	.	*Rhamnus lycioïdes*
.	RR_1	.	.	.	.	*Rhamnus alaternus*
C	RRR_+	C	R_2	.	.	*Rosa canina*
CC	RR_1	.	.	.	.	*Ranunculus bulbatus*
R	RR_1	.	.	.	.	*Ranunculus repens*
CC	RRR_+	CC	R_2	.	.	*Rubia peregrina*
AC	RRR_+	.	.	.	.	*Rhus pentaphylla*
.	RR_1	.	R_2	.	R_2	*Reseda lutea*
C	RR_1	C	RR_1	.	.	*Rosmarinus officinalis*
R	R_2	.	.	.	.	*Raphanus raphanistrum*
.	R_2	.	RR_1	.	R_2	*Ruta chalepensis*
R	RRR_+	.	.	.	.	*Rosa sempervirens*
.	.	C	R_2	.	.	*Ranunculus arvensis*
AC-R	RR_1	AC-R	Ab_3	AC-R	Ab_3	*Sinapis arvensis*
.	RR_1	.	.	.	.	*Schismus barbatus*
.	RRR_+	.	.	.	.	*Sonchus arvensis*
CC	RRR_+	.	.	.	.	*Satureja rotundifolia*
.	RRR_+	.	RRR_+	.	.	*Silene colorata*
.	RR_1	.	.	.	.	*Salvia verbenaca*
CC	RRR_+	CC	RR_1	CC	RR_1	*Sideritis montana*
.	RRR_+	.	.	.	.	*Scorpiurus muricatus*
C	RRR_+	.	.	.	.	*Scilla lingulata*
.	RRR_+	.	R_2	.	.	*Scabiosa stellata*
CCC	RRR_+	CCC	R_2	.	.	*Senecio vulgaris*
CC-AR	RR_1	.	.	.	.	*Scolymus grandiflorus*
.	RRR_+	.	R_2	.	.	*Sedum acre*
CC	RRR_+	CC	RRR_+	.	.	*Solenanthus lanatus*
CC	RR_1	.	.	.	.	*Smilax aspera* var. *altissima*
CC	RRR_+	.	.	.	.	*Silene galica*
AR	RRR_+	.	.	.	.	*Satureja calamintha* subsp. *nepeta*
R	RR_1	.	.	.	.	*Silene coeli-rosa*
R	RRR_+	.	.	.	.	*Satureja briquetii*
AC	RRR_+	.	.	.	.	*Sedum rubens*
.	.	CC	RR_1	.	.	*Scolymus hispanicus*
.	.	CCC	RRR_+	.	.	*Stipa tenacissima*
.	.	-	RR_1	.	.	*Sanguisorba minor*
.	.	CCC	RRR_+	.	.	*Silybum marianum*

.	.	.	.	AR	RRR_+	*Setaria glauca*
.	.	.	.	.	R_2	*Sonchus tenerrimus*
.	.	.	.	.	R_2	*Stipa tortilis*
C	RRR_+	C	RRR_+	.	.	*Stellaria media*
C	R_2	.	.	.	.	*Taraxacum obovatum*
.	RRR_+	.	RRR_+	.	.	*Tragopogon porrifolius* subsp. *macrocephalus*
.	RRR_+	.	R_2	.	.	*Teucrium polium*
R	RR_1	R	R_2	.	.	*Teucrium fruticans*
CC	RRR_+	CC	R_2	.	.	*Trifolium stellatum*
C	RR_1	C	Ab_3	C	R_2	*Trifolium angustifolium*
CC	RRR_+	.	.	.	.	*Trifolium campestre*
.	RRR_+	.	.	.	.	*Tulipa sylvestris*
.	RRR_+	.	.	.	.	*Tolpis barbata*
CC	RRR_+	CC	R_2	.	.	*Thapsia garganica*
AC	R_2	.	.	.	.	*Taraxacum laevigatum*
C	RR_1	.	.	C	RR_1	*Thymus ciliatus* subsp. *coloratus*
C-AR	RRR_+	.	.	.	.	*Trifolium tomentosum*
CC	RR_1	.	.	.	.	*Trifolium arvense*
.	.	C	RRR_+	.	.	*Thymus hirtus*
.	.	CC	Ab_3	CC	RR_1	*Tetraclinis articulata*
.	.	CC-R	RR_1	.	.	*Thymus algeriensis*
.	.	.	RRR_+	.	.	*Tuberaria guttatae*
.	.	C-RR	RRR_+	.	.	*Tetragonolobus purpureus*
.	Ab_3	.	RR_1	.	.	*Urginea maritima*
R	Ab_3	R	R_2	R	RR_1	*Ulex parviflorus*
.	.	.	.	CC	RRR_+	*Urospermum picroïdes*
CC	RRR_+	.	.	CC	RRR_+	*Vicia sicula*
RR	RRR_+	.	.	.	.	*Veronica persica*
AC	RRR_+	.	.	.	.	*Vicia altissima*
C	RRR_+	.	.	.	.	*Viola arborescens*
.	RR_1	.	.	.	.	*Vicia faba*
C	RRR_+	.	.	.	.	*Viola odorata*
CC	RR_1	.	.	.	.	*Viburnum tinus*
CC	RR_1	CC	R_2	CC	RR_1	*Withania frutescens*
CC	RRR_+	CC	RR_1	.	.	*Ziziphus lotus*

AP- Ancient period (1963); NP- New period (2003).

Discussion

The inventory of the flora allows us to have 257 plant species in our region characterized by (54 taxa of woody perennial forming the tree layer and 203 herbaceous taxa (67 herbaceous perennial and 136 annual herbs) forming the herbaceous layer.

From the results above, the figures below and appendix tables, the comparing degrees of abundance and rarity of two periods (1963 and 2013) of plant species allows us to advance that we can say that the vegetation cover has changed and has known a regressive kinematics during these fifty years (half century).

Different percentages show that during the old period (1963), treed taxa were abundant represented by 21% (*Juniperus oxycedrus* subsp. *oxycedrus, Arbutus unedo, Cytisus triflorus, Crataegus oxyacantha, Erica arborea, Erica multiflora, Lavandula stoechas, Lonicera implexa, Olea europaea, Quercus, suber, Quercus ilex, Quercus coccifera, Quercus faginea* subsp. *tlemceniensis, Rhamnus lycioïdes, Rhamnus alaternus, Rosa canina, Whitania frutescens, Viburnum tinus* and *Ziziphus lotus*) not the case for the new period (2013), they have become rare or very rare except for the case of certain plant species that are abundant in both periods: *Ampelodema mauritanicum, Tetraclinis articulata, Pistacia lentiscus, Lavandula dentata, Globularia alypum, Cistus ladaniferus* subsp. *africanus, Cistus monspeliensis, Cistus villosus, Calycotome villosa* subsp. *intermedia* and *Cistus salvifolius* (Figure 4 and 5) and (Table 1). (26) adds that, the families shows the highest numbers of rare taxa are Brassicaceae,

Fabaceae and Caryophyllaceae with 4 species followed by Asteraceae and Apiaceae with 3, other families were represented by 1 to 2 taxa. Rare taxa are overwhelmingly therophyts (13 taxa) and hemicryptophyts (12 taxa), other biological types (chamaephyts, geophyts and phanerophyts) account from 4 to 3 rare taxa.

The majority of plant species representing the herbaceous layer (79%) were rare during the old period (1963), that is not also the case for the new period (2013), they became abundant or very abundant (*Asparagus stipularis, Anagallis arvensis, Bromus rubens, Calendula arvensis, Eryngium tricuspidatum, Echium vulgare, Echinops spinosus, Raphanus raphanistrum, Hordeum murinum, Oxalis pes-caprae, Pallenis spinosa, Ulex parviflorus, Scabiosa stellata, Ruta chalepensis, Teucrium polium, Tecrium fruticans* and *Daucus carota*) except for the case of certain plant species that are abundant in both periods (*Asparagus acutifolius, Asphodelus microcarpus, Chamaerops humilis, Calycotome spinosa, Dactylis glomerata, Daphne gnidium, Erodium moschatum, Fagonia cretica, Helianthemum helianthemoïdes, Inula montana, Inula viscosa, Lobularia maritima, Marrubium vulgare, Plantago lagopus, Rubia peregrina, Sinapis arvensis, Avena sterilis, Senecio vulgaris, Taraxacum obovatum, Trifolium angustifolium, Trifolium stellatum, Ammoïdes verticillata* and *Thapsia garganica*). Some plant species are rare during the new period (2013): *Ajuga iva, Anthyllis tetraphylla, Anthyllis vulneraria, Aristolochia longa, Asperula hirsuta, Asparagus albus, Atractylis cancellata, Adonis dentata, Adonis annua, Brachypodium distachyum, Biscutella didyma, Centaurea pullata, Chenopodium album, Eryngium maritimum, Fumana thymifolia, Fedia cornucopiae, Fumaria capreolata, Ferula communis, Gladiolus segetum, Hippocrepis minor* subsp. *munbyana, Lavatera maritima, Lavandula multifida, Muscari neglectum, Ononis natrix, Prasium majus, Paronychia argentea, Lagorus ovatus, Phagnalon saxatile, Reseda alba, Ranunculus repens, Rosmarinus officinalis, Salvia verbenaca, Sideritis montana, Solenanthus lanatus, Scolymus hispanicus, Sanguisorba minor, Stellaria media, Thymus ciliatus* subsp. *coloratus, Tuberaria guttatae* and *Vicia sicula* (Figure 4 and 5) and (Table 1).

The combined effects of climate and human pressures that known our region have led to the regression of Quercus ilex and even elimination of certain taxa (4).

The degradation of the order Pistacio-Rhamnetalia alaterni (25) on all of Tlemcen Mountains is certain. It promotes the installation of matorrals enrolling in the class of Rosmarinetea or that of Cisto-Lavanduletea depending on the nature of the substrate.

The anthropogenic impact that suffered these formations often induces a regressive dynamic, evolving towards scrub formations that sometimes appear to be irreversible. These formations are unquestionably related to Rosmarinetea and/or Cisto-Lavanduletea (2). This change is largely due to unsustainable exploitation of these extremely fragile environments. These authors add that, the changes have led to a diversification of the procession flora by promoting the proliferation of certain thorny and/or toxic species that dominate the area, because they occupy larger areas than before; we have: *Calycotome spinosa, Ferula communis, Cistus villosus, Asparagus acutifolius, Ulex boivini, Urginea maritima, Asphodelus microcarpus, Asparagus albus, Atractylis humilis* and *Atractylis carduus*. This regressive evolution explains the replacement of forest species by *Ampelodesma mauritanicum, Calycotome villosa* subsp. *intermedia* and *Chamaerops humilis* subsp. *argentea* (19).

The relative homogeneity of the flora, aggravated by the destructive action of man and his animals is originally of the disappearance of a large part thereof in our region, especially the palatable species. Despite the presence of a shrub stratum, which can make illusion, it is no longer a pre-forest but a degraded scrub and the harvested species clearly confirm (4).

This change is reflected by the therophytisation of natural ecosystems of the study area which is due to several factors such as climate change characterized by the longevity of the dry period during the year and shifting of studies stations a bioclimatic stage to another or even a sub-stage (14, 3); overgrazing; human action and voluntary and/or involuntary repeated fires during this period.

Conclusion

We can conclude that the phytodiversity of Tlemcen region had a strong regressive kinematic which may become irreversible in the near future if we do not consider compliance management to fight against this serious problem. For this, it should be noted that:

This management is summarized by protection, preservation and strict conservation of natural ecosystems in the region against the various factors devastating.

Public awareness against the clearing of the flora which can lead to its extinction and to ensure that the progress of phytodiversity of Tlemcen region which constitutes the future of our next generations.

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