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# CONTRIBUTION TO THE STUDY OF ANTHROPOZOOGENIC GROUPING IN THE REGION OF TLEMCEN : PHYTOSOCIOLOGICAL AND PHYTOECOLOGICAL ASPECTS

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## Abstract

The purpose of this research is to determine the anthropozoic groupings in the region of Tlemcen and the natural and anthropic process that modifies the structure of the carpet plant.

The ecological zoning was conducted thanks to the various comparative studies carried out within the laboratory of Ecology and Management of Natural Ecosystems and also on account of the floristic surveys achieved on the ground.

This zoning helped, at first, to identify the vegetation in the survey area. Approximately 100 floristic statements with an area of 100m2 each were carried out on all the study stations where each survey was implemented in a floristically homogeneous surface according to the GOUNOT minimum area method, (1969).

The 100 floristic records were collected at these three stations, in the region of Tlemcen.

The factorial correspondence analysis carried out highlighted the ecological gradients and confirmed the influence of bioclimatic factors on the installation of toxic and / or thorny species.

***Key words:*** Tlemcen, gradient, anthropozoic, AFC, thorny, bioclimate, toxic.

## Introduction

The study of ecosystem dynamics hinges upon the analysis of data that describe the biotic and abiotic changes which arise over long periods. Analysis of the different stages of plant succession allows the description of the evolution of these changes along dynamic gradients. According to Floret *et al*., 1981, the dynamics of plant structures are carried out in two ways; progressive evolution, or regressive evolution.

The west Algerian ecosystems are subject to several factors of degradation which requires research upstream on all the factors applied directly or indirectly in a process of degradation of natural ecosystems. They mainly seek to know how these factors combine and interact in time and space. Studies of the flora and its diversity in the Tlemcen region have lured many researchers: Aidoud, 1983; Quézel, 2000; Aimé, 1991; Hadjaji, 1995; Hasnaoui, 1998, 2008; Benabadji and Bouazza, 2000, 2001; Stambouli-Meziane, 2010; Hachemi *et al*., 2012; Babali 2014.

The causes of this degradation of natural environments are various, while the importance of each factor differs from one area to another. They are anthropogenic (demographic explosion, extensive and unsuitable production systems, excessive clearing, overgrazing, fires), climatic (drought, decrease and irregularity of rainfall) which have contributed to weakening the ecosystems.

These elements of degradation disturb the balance of the ecosystem severely and result in a significant regression of certain taxa; or even the pure and simple disappearance of certain native plant species and the appearance of toxic and / or thorny anthropozoic groups.

In order to highlight these anthropozoic groupings, three representative stations have been chosen: the first on the coast (BeniSaf), the second in the mountains of Tlemcen (El-Koudia) and the third in the high steppe plains (Ainsfa).

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**Table 1:** Values and inertia rates for the first three axes of the A.F.C.

| Station | Ain sfa | | | El-Koudia | | | Beni Saf | | |
|---|---|---|---|---|---|---|---|---|---|
| Plan | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Value | 6.24 | 2.89 | 1.8 | 6.116 | 3.871 | 3.17 | 8.37 | 3.67 | 2.7 |
| Inertia rates % | 25 | 11.6 | 7.4 | 17 | 11 | 9 | 20.9 | 9.2 | 3.6 |

## Material and Methods

The ecological zoning was conducted thanks to the various comparative studies carried out within the laboratory of Ecology and Management of Natural Ecosystems and also on account of the floristic surveys achieved on the ground.

It has been possible to define three study stations (AinSfa, El-Koudia and BeniSaf). The choice of these three stations rests upon the different criteria of exposure, microtopography, edaphic characters and mainly the anthropic action.

This zoning helped, at first, to identify the vegetation in the survey area. Approximately 100 floristic statements with an area of 100m$^2$ each were carried out on all the study stations where each survey was implemented in a floristically homogeneous surface according to the GOUNOT minimum area method, (1969).

According to Guinochet, (1973), it is significant that the surface of the surveys is sufficient to understand almost all of the species present on the underlined surface, of floristically homogeneous vegetation

### Description of the study stations

The 100 floristic records were collected at these three stations, in the region of Tlemcen (Fig. 1).

This station is located between Sebdou and Sidi Djilali, after the village of AinSfa. It is characterized by the following geographic features: 1° 1° 31'02' west longitude and 34°28'52' north latitude, at an altitude of 1462m, with a slope of 20%. This station consists of a matorral with the presence of *Chamaerops humilis* and *Urginea maritima*; the recovery rate varies between 40% and 50%. On the floristic level, the presence of the relics of *Quercus ilex* and *Juniperus oxycedrus*; *Ulex boivinii*; *Rosmarinus officinalis*; *Thymus ciliates* is noticeable.

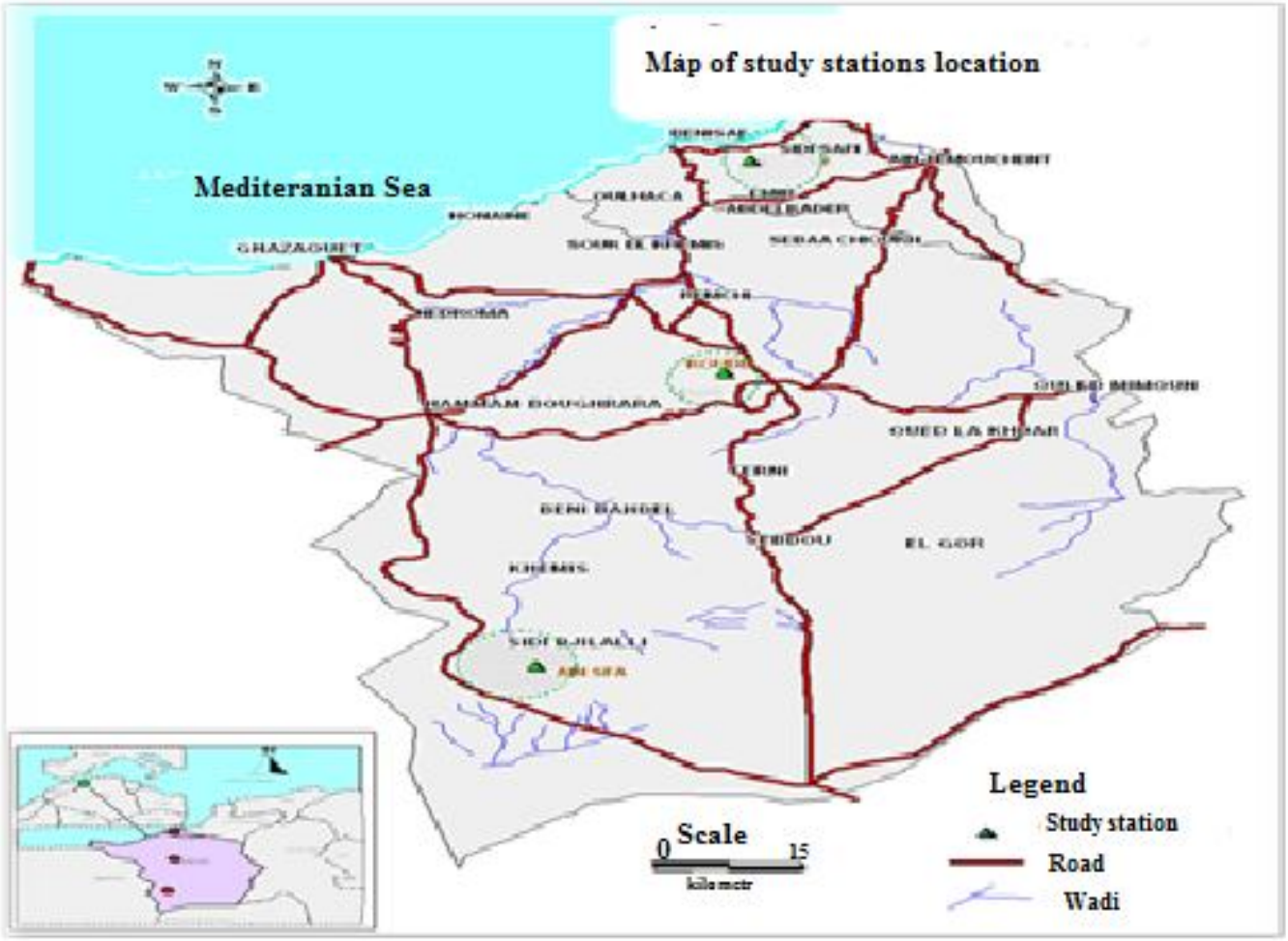


**Fig. 1:** Map of geographic location.

**Station 2. El Koudia:**

It is located just next to the town of Tlemcen, with a northwest orientation. Its central coordinates are as follows: 34°54'35' north latitude, 1°21'66' west longitude, an altitude of 704 m and a recovery rate of 40 to 50%. This station is characterized by the low presence of *Quercus coccifera*. This is due to the degradation effects that the region has known (strong urbanization, the presence of quarries and soil erosion).

**Station 3: BéniSaf**

This station belongs to the west coast of the wilaya of AinTémouchent. It is located around 1°18' west longitude and 35°14' north latitude. The recovery rate is between 50 and 60%, the main taxa are: *Pinus maritima*, *Olea europaea*, *Ceratonia siliqua* and *Pistacia lentiscus*, as well as the presence of anthropozoic species such as *Urginea maritima*, *Asphodelus microcarpus*, *Ferula communis* and *Thapsia garganica*.

Regarding climate data, we had access to weather stations closest to our study stations and for reliable results, an observation period of at least 20 years was spent. The period obtained from the office National meteorological office ONM is of (1980-2011).

• For this period, at the two stations, the annual rainfall varies between 300.5 mm in Sebdou and 371 mm in Béni-saf.

• Annual temperatures vary between 24°C in Sebdou and 18°C in Béni-saf.

• This type of climate has an impact on the carpet plant on the one hand and, the action on the other.

• According to the scale P = 2T, the ombrothermal curves determine two periods; one wet and the other dry. Analysis of the different diagrams allows to visualize a rainy period which generally extends from October to the end of April and a dry period for the rest of the year.

However, the months of June, July and August remain the driest months for the two periods and all of the stations taken into consideration. Furthermore, the current dry period is longer than the old one for all the study stations (Fig. 2).

As for the dry period, in addition to the length of the bad season, the spring rains show a great decrease. The vegetation, therefore, spends a very hard season marked by physiological disturbances.

For the calligram of EMBERGER, it shows a recovery of an under storey and sometimes even a storey for all stations, from the sub humid to the semi-arid and from the semi-arid to the arid (Fig. 3).

♦ BENI SAF goes from sub humid to medium semi-arid

♦ SEBDOU goes from medium semi-arid to higher arid.

To wrap it up, the climate tends to be arid, therefore affects the vegetation cover.

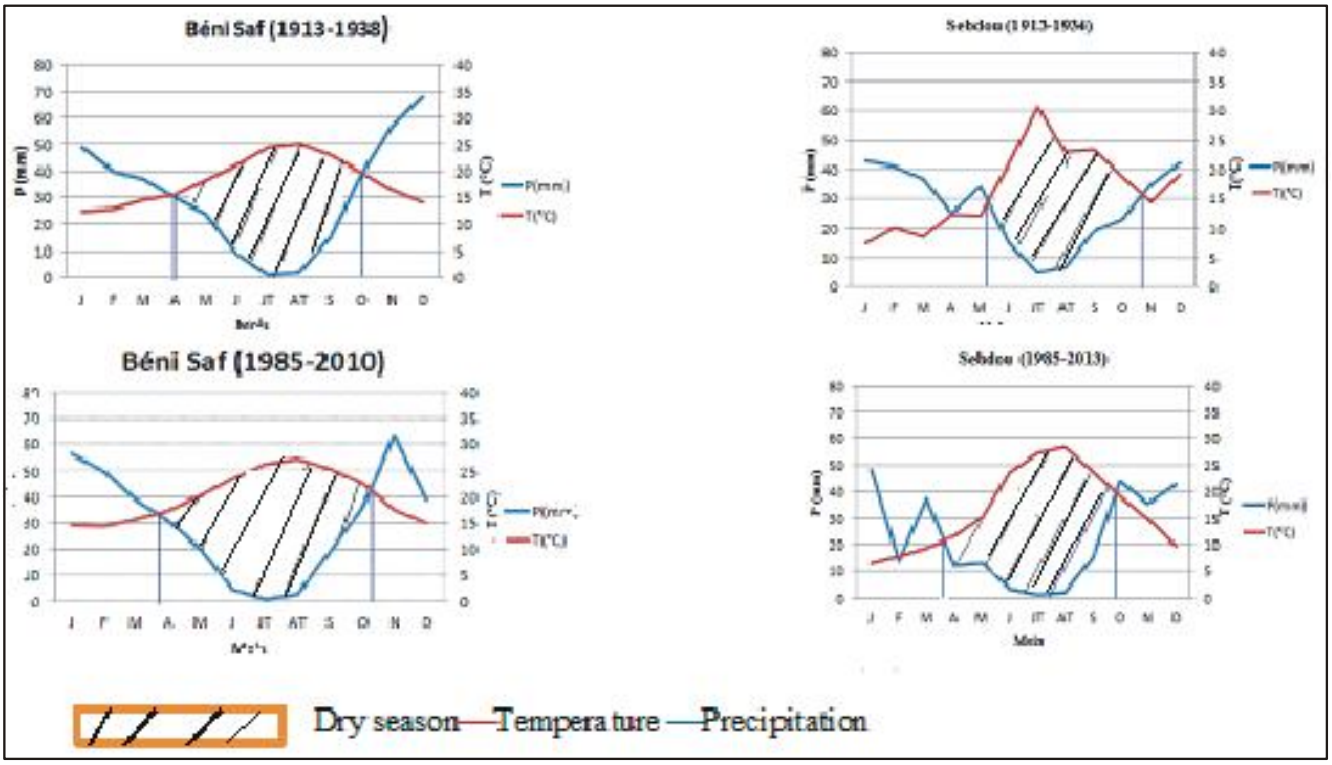


**Fig. 2:** Ombrothermal diagrams of Bagnouls and Gaussen.

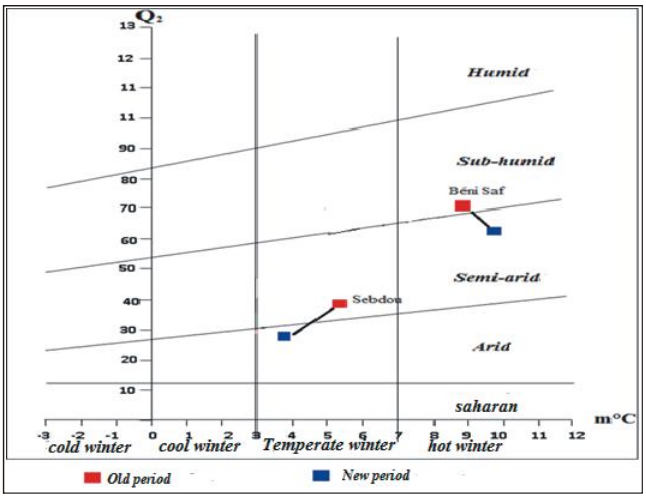


**Fig. 3:** Climagram of the Emberger Rain Quotient (Q2).

## Result and Discussion

Multivariate statistical analyzes are a privileged tool for analyzing the composition of plant communities and relating it to environmental factors (Allen and Starr, 1982; Jongman *et al.*, 1987 and TerBaak, 1987). Among the multivariate analyzes that are very significant in the field of vegetation study is the factorial correspondence analysis (A.F.C).

This type of (statistical) analysis has shown its relevance in phytosociology and in plant ecology as well, therefore allows to study the possible relationships which are established between discontinuous and non-quantitative variables Cornier, (2002).

This type of computer processing with the Minitab 16 program constitutes a crucial phase which facilitates the identification of homogeneous areas and permits to see the relationship between the inventoried species and their environments that they occupy. Indeed, the climatic and edaphic conditions are among the ecological factors that most influence vegetation.

The reference A.F.C. was carried out on a matrix in the absence / presence of 181 species per 100 records, for the three investigated stations. To facilitate the graphic representation of each taxon, a code has been assigned,

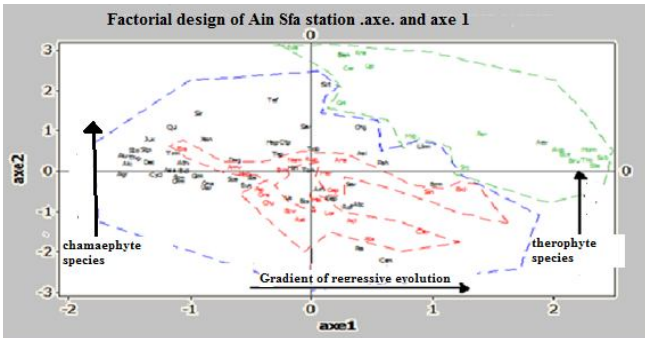


**Fig. 4:** Factorial design of species (axe1-axe2).

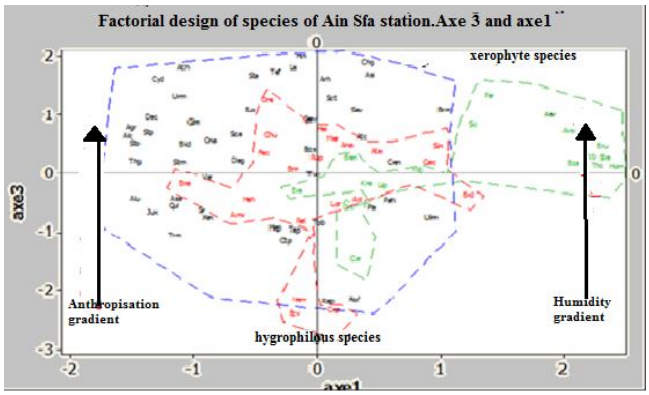


**Fig. 5:** Factorial design of species (axe1-axe3).

to make it easier to read on factorial plans. Without let or hindrance here are Taxa and codes: *Ammoides verticillata* (Amv), *Atractylis cancellata* (Atc), *Brachypodium distachyon* (Brd).

The interpretation was made on the first two factorial axes because the inertia rate of the third axis is less than 10% and the clouds are poorly structured in the factorial design.

♦ Interpretation and ecological significance of the axes

♦ Station : Ain sfa

Plan 2/1:

• The positive side gathers 40 species, dominated mainly by Chamaephytes and Therophytes such as *Brachypodium distachyon, Schismus barbatus, Rosmarinus officinalis, Bellis annua, Helianthemum pilosum, Bromus rubens, Hordeum murinum, Echinaria capitata* and *Aegilops ventricosa.* These species belong to the class of *ROSMARINETEA OFFICINALIS*.

The abundance of *Micropus bombycinus* indicates an environment dominated by Therophytes.

• The negative side gathers toxic Chamephytic species such as: *Ferula communis, Helianthemum*

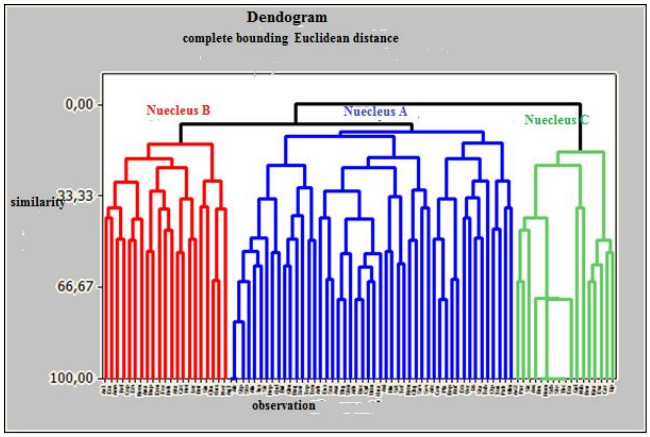


**Fig. 6:** Dendrogram for species of Ain Sfa station.

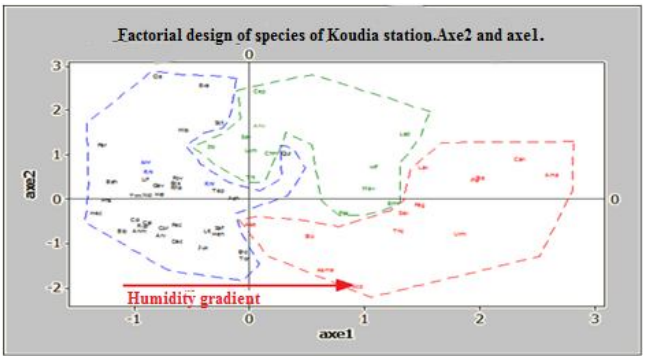


**Fig. 7:** Factorial Plan of species (axe1-axe2).

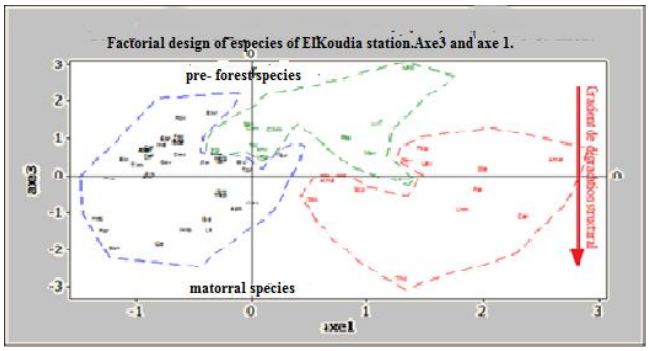


**Fig. 8:** Factorial Plan of species (axe3-axe1).

*helianthemoïdes* and palatable such as *Teucrium fruticans and Thymus ciliatus* subsp. *coloratus*. It is worth noting that there is a presence of a few feet of *Quercus ilex* in relic which characterize the station of AIN SFA.

Plan 2/1 shows a gradient of regressive evolution from chamaephytic species to therophytic species in the direction of the axis.

Plan 3/1:

• The positive side brings together the species indicated by a degraded environment such as *Chamaerops humilis,Urginea maritima*; *Ferula communis*. These latter indicate a strongly anthropized environment, also called anthropozoic species.

The presence of these species like *Stipa tenacissima; Artemisia herba-alba*; *Thymus ciliatus* display an open steppe matorral dominated mainly by xerophyte species.

• The negative side gathers the species of the more or less degraded matorral represented mainly by species such as: *Rosmarinus officinalis, Juniperus oxycedrus, Xeranthemum inapertum and Centaurea pullata.*

The presence of *Teucrium pseudo-chamaepitys, Nepeta multibracteata and Trigonella monspeliaca* indicates a more or less humid environment.

Plan 3/1 shows a gradient of humidity degradation in the direction of the axis.

♦ Station : El-Koudia

Plan 2/1:

• The positive side shows a grouping of species belonging to the degraded matorral domain, based on *Urginea maritima, Ampelodesma mauritanicum a*nd *Asphodelus microcarpus*. The presence of these generally toxic species indicates anthropization. Thus , the presence of species such as: *Stipa tenacissima*, Stipatortilis, *Quercus ilex* and *Thymus ciliatus* indicates a degraded matorral dominated mainly by xerophyte species.

• The negative side demonstrates a pre-forest formation with the presence of the following species: *Salvia officinalis, Juniperus oxycedrus, Rhamnus lycioides, Rhamnus alaternus, Ballota hirsuta and Rubia peregrina.*

The presence of *Cistus albidus, Helianthemum ledifolium, Helianthemum hirtum, Helianthemum cinereum,* thus translate a soil on siliceous substrate. The presence of *Micropus bombycinus* indicates the occurrence and dominance of the therophytes.

So plan 2/1 translates a humidity gradient in the direction of the axis.

Plan 3/1

• The positive side includes pre-forest species such as: *Olea europaea sylvestris, Quercus ilex, Rhamnus lycioides, Rhamnus alaternus, Foeniculum vulgare, Rosmarinus officinalis, Helianthemum ledifolium*.

• The negative side gathers the indicator species of a strongly degraded environment such as *Chamaerops humilis, Ampelodesma mauritanicum, Urginea maratima, Raphanus raphanistrum,* thus the presence of xero-thermophilic species which adapt to aridity and drought such as: *Stipa tenacissima*, *Juniperus oxycedrus*, *Quercus coccifera* aux which is added *therophytia***.**

It is worth mentioning that we notice at this axis a dynamic gradient of regressive vegetation from the positive side to the negative side. This plan reflects a gradient of structural degradation.

## References

Aidoud, A. (1983). *Contribution to the study of steppe ecosystems in southern* Oran. Phytomass, primary productivity and pastoral application, Thesis of doctorate. *United. Sci. Tech. H. Boumediéne*, 245. Appendices.

Aimé, S. (1991). *The ecological study of the transition between the subhumid, semi-arid and arid bioclimates in the thermo-Mediterranean stage of the Oranian Highland in northwestern Algeria*). Thesis of doctorate. *Es. Sci.,*

*Univ. Aix-Marseille III*, 190.

Allen, T.F.H. and T.B. Starr (1982). Hierarchy .*Perpectives for ecological complexity*. Chicago, University of Chicago press, 310.

Babali, B. (2014). *Contribution to a phytoecological study of the mountains of Moutas* (Tlemcen- Western Algeria). Syntaxonomic, Biogeographical and dynamic aspects. Doctoral thesis, University of Abu BakrBelkaid, Tlemcen, Algeria. 160.

Benabadji, N. and N. Bouazza (2000). *Some climatic changes in southwestern Oranie* (western Algeria). *Rev. In. Ren*., **3:** 177-124.

Benabadji, N. and N. Bouazza (2001 Nov.). *The impact of man on the forest in the region of Tlemcen*. *For. Med*., **XXII. N ° 3:** 269-274.

Bouazza, M. and N. Benabadji (1998). *Floristic composition and anthropozoic pressure of the southwest of Tlemcen*. Rev. Sci. Tech. Univ. Constantine. Algeria, 93-97.

Cornier, B. (2002). *The alluvial vegetation of the Loire between Charolais and Anjou: modeling test of the hydro system*. Doctoral thesis. Etat. Univ. Francios Rabelais, **1:** 227.

Floret, C., E. Le Floc'h, R. Pontanier and F. Romane (1981). Dynamics of ecological systems in the arid zone. Application to the development on an ecological basis of an area of pre-Saharan Tunisia. *Acta. Oecologica. Oecol. Applic*., **2(3):** 195-214.

Gounot, M. (1969). *Method for the quantitative study of vegetation*. Edi Masson et Cie. Paris. 314.

Guinochet, M. (1973). *Phytosociology*. ecology collection I. Masson éd., Paris, 227.

Hachemi, N., O. Hasnaoui, I. Benmehdi, N. Medjati and M. Bouazza (2012). *Contribution to the study of the therophytization of the matorrals of the southern slopes of the mountains of Tlemcen*(western Algeria). MediterraneaSerie De EstudiosBiologicosEpoca II N ° 23, 158-180.

Hadjaji Aoual, S. (1995). *The settlement of the thuja of Berber in Algeria*: phytoecology syntaxonomy, sylvile potentiality. Thesis of Doctorate.Ec, Sci. Univ. Aix-Marseille. 159 + annexes.

Hasnaoui, O. (1998). *The study of groupings with Chamaerops humilis I var*. *Argentea* in the region of Tlemcen. Algeria. Thesis of Magister.InstSci of nature.Tlemcen, 176 + annexes.

Meziane, H. (1997). *Contribution to the study of anthropozoogenic plant formations in the region of Tlemcen* .IngeneeringMemoire. Univ. Abou Baker Belkaid Tlemcen, 80-87.

Quézel, P. (2000). *Reflection on the evolution of flora and vegetation in the Mediterranean Maghreb*. Ed. Ibis. Press. Paris. 13-117.

TerBaak, C.J.F. (1987). *The analysis of vegetation-environment relationships by canonical correspondence analysis*. *Vegetatio*, **69:** 69-77.