

Valorisation of Psammophytes in the Tlemcen Region (Oranie-Algeria)

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Abstract

This study is devoted to the analysis of psammophytes the mountains of Tlemcen. These courses are well represented and are mainly related to the significance of sand deposits and the presence of gypsum and salt. This study was conducted on the basis of phytosociological surveys to determine the close affinity of different plant groups. Second, the knowledge of this rich flora can make proposals leading to the preservation and improvement of these fragile environments, in order to limit damage and to promote their development in a rational way. To value psammophytes species we have achieved 24-50 per station surveys; and each measurement was conducted in a floristically homogeneous surface. This is a set of 71 phytosociological relevés and 181 species in the Monts de Tlemcen Zarifet station; Ouled- Mimoun; Nedroma and Sid Djilali. For this analysis we will focus on ecological determination of the floristic diversity and syntaxonomic analysis which will be devoted to the description of phytosociological units encountered. Analysis of the A.F.C showed 02 plant groups represented by: A very diverse vegetation settles to fix these dunes giving birth to live dunes more or less related to the fixed des. Therobrachypodietea class. The Sidi Djilal station is characterized by a dune xeric environments Nebkhas kind determined by the species *Ziziphuslotus*. Using phytosociological and phytodynamiques data, we could understand the evolution of this vegetation, and diversity.

Keywords: Phytosociology; Psammophile; Dune; Tlemcen; Algeria; Diversity

Introduction

The Mediterranean coastal ecosystems are characterized by strong climatic and soil constraints, salinity, wind, drought and shallow soil or mobile. The work presented here concerns the valuation of psammophiles the Tlemcen region. This is linked to a high percentage of sand, always above 60%. Although they are located in the northern part; South, these formations are well represented and are mainly related to the significance of sand deposits and the presence of gypsum and salt.

South of the Tell Atlas, we meet on the high plateaus of grassland formations Djebaili [1] as part of the arid Mediterranean floor, which represent a transitional step towards the Saharan floor. These steppe consist of a mosaic of three plant communities dominated by Poaceae respectively *Stipa tenacissima*, *Lygeum spartum* and Asteraceae *Artemisia herba alba* [2-4].

Quezel [5] states that the continental dunes, located mostly in the Sahara, appear in the Highlands, in the Mediterranean climate situation. Their Flora is close to that of the Saharan dunes, with in particular:

Aristida pungens

Retama retam

Scrofularia bypericiflora.

The Algerian coast, like Tunisia, is a whole subject to significant human pressure more intense than in the rest of the country. This pressure acts for decades on vegetation and is ongoing. This study was conducted on the basis of phytosociological surveys to determine the close affinity of different plant groups. Second, the knowledge of this rich flora helps make proposals leading to the preservation and improvement of these fragile environments, to limit damage and to promote their development in a rational way.

Materials and Methods

The study area is characterized by great floristic diversity that is linked to a combination of environmental factors that are also very varied (variation bioclimatic Action anthropozoogène).

This study was conducted on the basis of phytosociological surveys to determine the close affinity of different plant groups. Second, the knowledge of this rich flora can make proposals leading to the preservation and improvement of these fragile environments, in order to limit damage and to promote their development in a rational way. For this study we selected 04 study stations locating in the western part of the north-west Algeria Figure 1. These are located between 1°27' and 1°51' west longitude and 34°27' and 35°18' north latitude. They are limited geographically:

- The north by the Mediterranean Sea
- The south by the province of Naama
- To the west by the Algerian-Moroccan border
- To the east by the province of Temouchent
- Southeast by the wilaya of Sidi Bel Abbas

The latter help us to better understand the dynamics of vegetation but also to better understand the ecological factors. For this we chose

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Figure 1: Geographical locations of stations.

04 areas in the mountains of Tlemcen which is: Zarifet, Ouled Mimoun, Nedroma and Sid Djilali. These 04 different areas from each other by the geographical position, climate, topography, Soil conditions, anthropogenic factors and plant diversity.

The mountains of Tlemcen

Composed of rugged terrain, the mountains of Tlemcen have slopes of 20% on average, or more. These are covered by a dense plant cover thus limiting the phenomenon of erosion, with the exception of a few islands such as the area of El Khemis where bedrock outcrops. These are clay and marl formations. The mountains of Tlemcen consist of Mesozoic and Cenozoic land. The sedimentary rocks assigned to the Upper Jurassic and Cretaceous carbonates are mainly formed. According Benest [6], the mountains of Tlemcen have the following stratigraphic series:

The sandstone Boumediene

- The limestone Zarifet
- Dolomites of Tlemcen
- Terni Dolomites
- The Marno-limestone Raourai
- Limestone Lato
- The calcareous marl of Hariga
- Sandstone Merchiche

The high steppe plains

The high steppe plains of Tlemcen region form a unity

geomorphological feature of the Atlas area. They are a tabular zone average of 1100 m altitude. The quaternary field which constitutes the vast tabular extent is represented by two distinct formations: the old Quaternary alluvium and Quaternary.

The soils are shallow, everywhere, with a foundation of limestone layers sensitive to water and Wind erosion (calcareous crust). Chaabane [7] confirms that the Quaternary substrate is of three types: continental, the other marine shoreline and sandy and the last lagoon, rich in evaporites.

To value psammophytes species we have achieved 24-50 per station surveys; and each measurement was conducted in a floristically homogeneous surface. The surface of the statement must be at least equal to the minimum area, containing virtually all of the species present. Execution of statements accompanied by the raising of stationnels characters. (Location, altitude, exposure, recovery rates, substrate, slope etc.) Then, each species is assigned two indices; the first concerns the abundance-dominance, the second sociability. The abundance - dominance expresses the space occupied by the projection on the ground of all individuals of each species. This coefficient admits the following scale [8].

Species present in low abundance and cover up the number 5 as per the scale value and recovery value was 75, which was higher in comparison to any abundance. It was observed that an individual element of the species was isolated and 5 individuals of the same species were in continuous stands.

Once the surveys conducted, they were sorted by correspondence analysis (A.F.C) and a hierarchical clustering (C.A.H). For this analysis we will focus on ecological determination of the floristic diversity

and syntaxonomique analysis will be devoted to the description of phytosociological units encountered.

Results and Discussion

Contribution of the A.F.C and C.A.H, in the mountains of Tlemcen is described in Table 1.

This is a set of 71 phytosociological readings and 181 species in the Monts de Tlemcen Zarifet station, Ouled Mimoun, Nedroma and Sid Djilali. The eigen values of the first axes are 0.165 and 0.057 respectively, the clouds are really structured on the main level. On this level opposes sets.

2/1 Plan

Negative side: The following species are example to the negative side of the 2/1 plan.

Anagallis arvensis
Bromus rubens
Calycotome spinosa
Chamaerops humilis
Cistus monspeliensis
Cistus villosus
Convolvulus althaeoides
Dactylis glomerata
Eryngium maritimum
Erodium moschatum
Lavandula stoechas
Lavatera maritima
Olea europaea
Pinus halepensis
Ulex parviflorus

Positive side: The following species are example to the positive side of the 2/1 plan.

Velezia rigida
Ziziphora capitata
Thymelea passerina
Senecio cineraria
Echinaria capitata
Briza minor

The positive side is dominated by species such as xeric therophytic : *Velezia rigida*, *Briza minor*, *Ziziphora capitata* and *Echinaria capitata*. The negative side is the chamaephytiques species; phanérophytiques

| Blueprint | 1 | 2 | 3 |
|--------------|--------|-------|-------|
| Rate Inertia | 11,643 | 6,774 | 4,041 |
| Own values | 0,169 | 0,095 | 0,057 |

Table 1: Contribution of the A.F.C and C.A.H, in the mountains of Tlemcen.

most frequently observed in the scrub on siliceous substrates and which are represented by: *Lavandula stoechas*, *Cistus monspeliensis*, *Cistus villosus* and *Pinus halepensis*. 2/1 The plan reflects a gradual evolution of species in the direction of the axis. This evolution is reflected in substrate binding.

3/1 Plan

Negative side: The following species are example to the negative side of the 3/1 plan.

Aegilops triuncialis
Althaea hirsuta
Asteriscus maritimus
Ctenopsis pectinella
Daucus carota subsp gummifer
Gladiolus segetum
Lolium perenne
Thymelea passerina
Ziziphus lotus

Positive side: The following species are example to the positive side of the 3/1 plan.

Sedum tenuifolium
Paronychia argentea
Galium verum
Daucus carota (Figure 2)
Chrysanthemum coronarium
Asparagus albus
Arbutus unedo

The negative side, gathers therophytic xeric species settling sue the mobile sand inside, it expresses a very degraded environment. The bright side, shows therophytic meso relatively hygrophilous species by the presence of *Sedum tenuifolium*, *Galium verum*. Plan 3/1 corresponds to a xericity gradient in the direction of the axis.

Echinops spinosus, *Centaurea incana*, *Carthamus coerulus* and *Astragalus armatus* are considered companion for inside psammophytes species. This plan shows a gradual evolution of aridity. The Sidi Djilali station is characterized by the predominance of species Therobrachypodietea is a dune xeric environments Nebkhas kind determined by the species *Ziziphus lotus*. What is certain, in this area we find accepting cash and / or seeking rich soils sands. Changes in the humidity factor are wider. Therophytic species are well represented and their presence is constant. Their particularity reflects a certain level of specificity to soil factors (Figures 3 and 4).

Conclusion

The analysis of the A. F.C highlighted 02 vegetal groups that organise themselves on the map 2/1 and 3/1 in a pattern corresponding to the analysis of adaptive strategies Mac-Arthur [9]. This segregation is a variation of soil moisture and textural and structural elements. Furthermore, nitrophilous Therophytiques species with a high potential biotic and reciprocal growth settled more easily, there will be

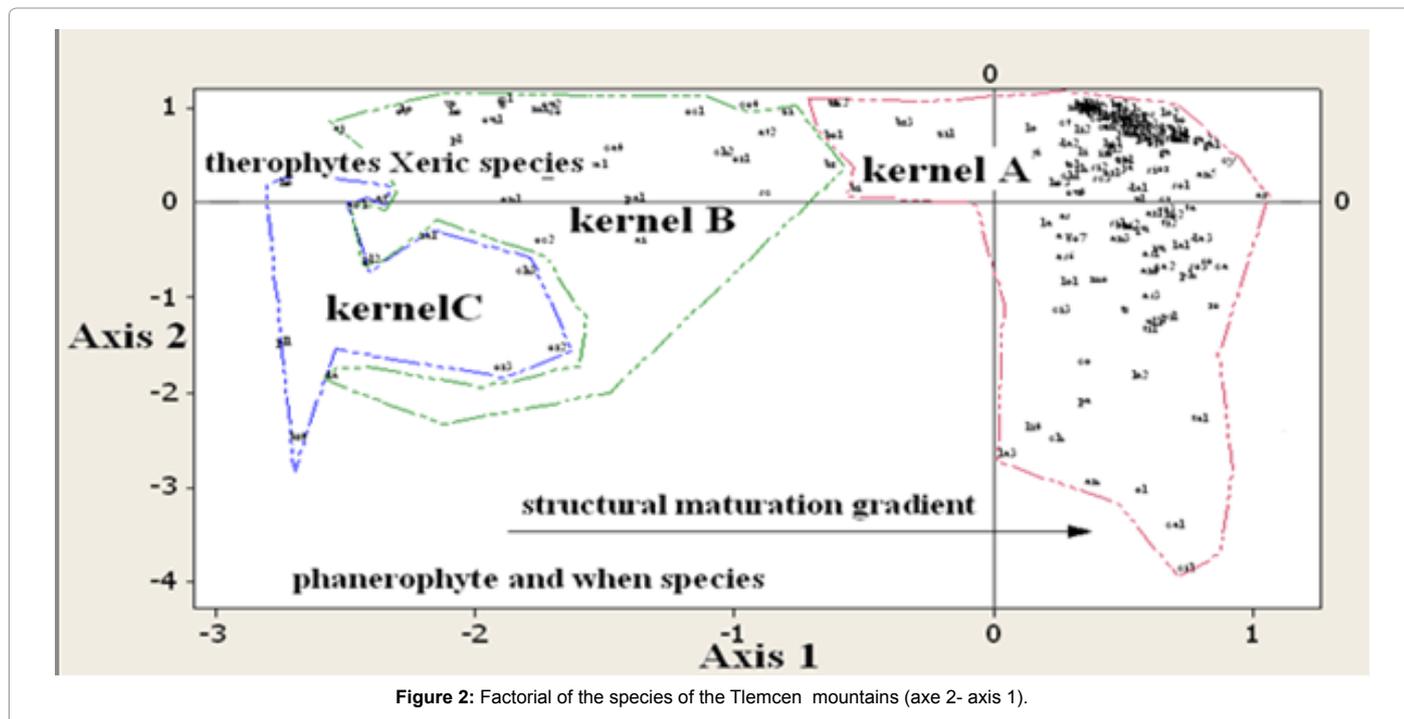


Figure 2: Factorial of the species of the Tlemcen mountains (axe 2- axis 1).

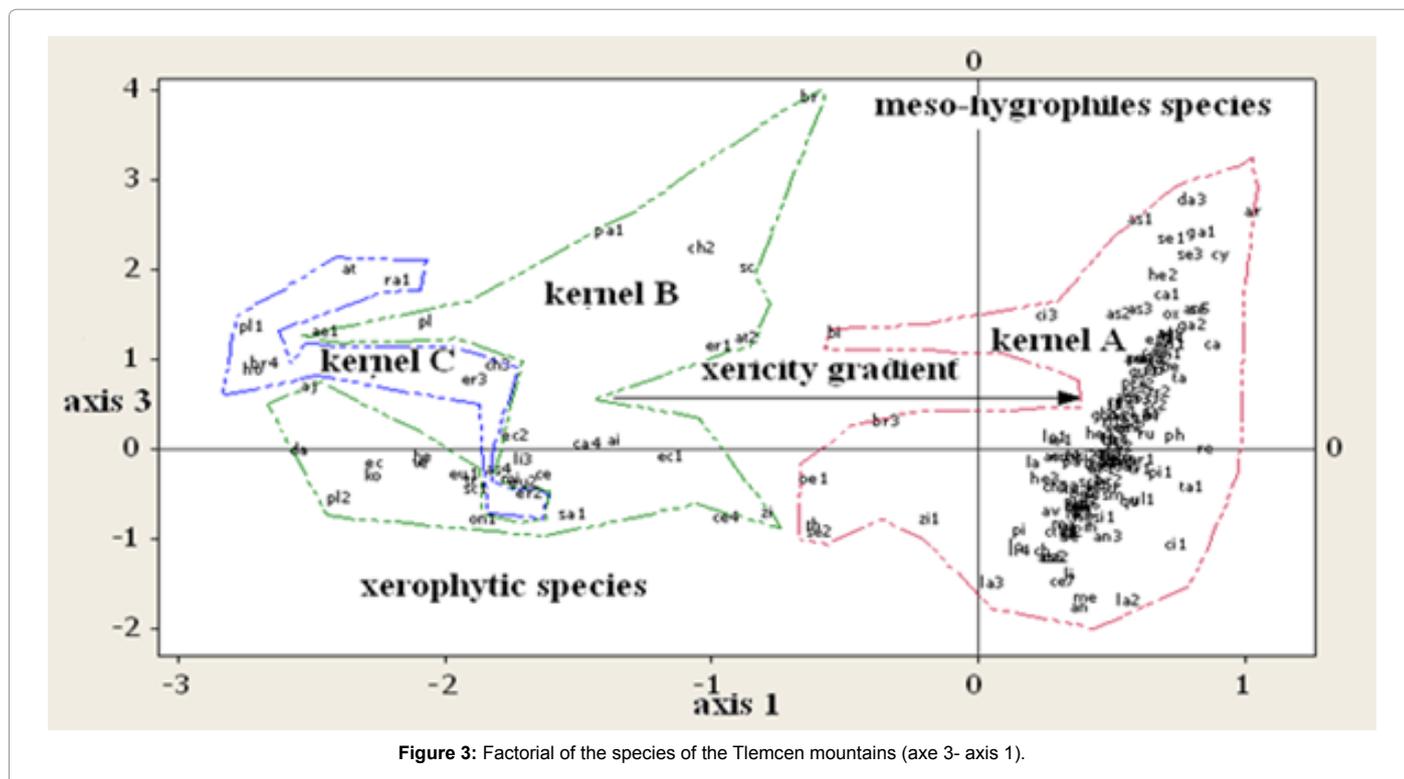


Figure 3: Factorial of the species of the Tlemcen mountains (axe 3- axis 1).

designated the R selection, the form's own selection. The two groupings sets are represented by: A very diverse vegetation moved to fix the dunes giving birth to more or less fixed bright dunes. This vegetation refers to the class of Therobrachypodietea [9]. These bright dunes are fixed by installation of forest and forestry such as prespecies *Geniperus phoenicea*, *Asparagus acutifolius*, *Myrtus communis* and *Asparagus*

stipularis. These species are weakly psammophilous and/or plastic even in the Matorral and forests. And finally, Sidi Djilali station which remains a tompan between Tlemcen mountains and the steppe zone is formed by dunes semi continental type Nebkhas and/or *Ziziphus lotus* finds its perfect ecological amplitude. It can be argued that the capsuled of dune vegetation is very diverse. They develop increasingly dense

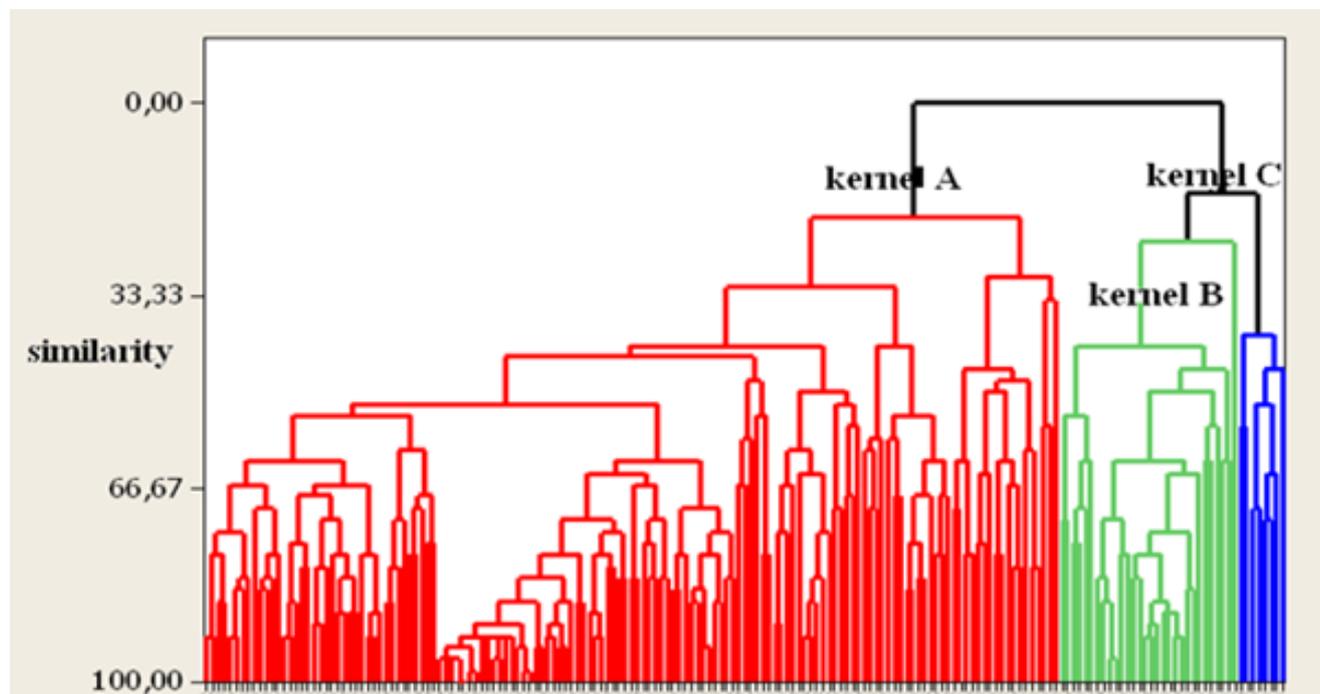


Figure 4: Dendrogram of the species of the mountains of Tlemcen.

vegetation which will then allow vocation sylvatic species permanently fixy and mobile ground [9]. The process of colonization of the dunes by the forest begins with the appearance of the chamaephytes such as: *Erica multiflora* and *Cistus salvifolius* then will follow basic shrubs of: *Juniperus phoenicea* and *Pistacia lentiscus*. The Mainland dune is characteristic of desert landscapes, its flora is close to that of the Saharan dunes containing the floors dry and Saharan psammophilous species.

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