Plant Archives Vol. 21, No. 2, 2021 pp. 494–497 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2021.v21.no2.076

FLORISTIC DIVERSITY OF JUNIPERAIE IN THE REGION OF TLEMCEN CASE OF *JUNIPERUS PHOENICEA*

Manel Berber and Hassiba Meziane-Stambouli
AbouBakrBelkaid University, SNV/STU Faculty. Department of Ecology and Environment, Tlemcen.
Laboratory of Ecology and Management of Natural Ecosystems w0410700, Tlemcen –Algeria
Corresponding Author e-mail: madiocre@gmail.com

(Date of Receiving : 17-04-2021; Date of Acceptance : 25-07-2021)

ABSTRACT

This study tackles the floristic diversity of Juniperaies in the region of Tlemcen, mainly on *Juniperus phoenicea*.The attention was focused on the Phoenician juniper which has the property of fixing the dunes and which has a floristic procession composed of tree species. From an ecological point of view. The works dedicated to the red juniper is been carried out on the Mediterranean rim and remain insufficient. This work aims to highlight the structure of the ecological unit of *Juniperus phoenicea* in order to update the inventories made in the coastal region of Tlemcen.
Keywords **:** Tlemcen, coastline, *Juniperus phoenicea*, diversity, biology, morphology.

INTRODUCTION

The Algerian forest is subject to severe, irregular and brutal climatic constraints, notably with prolonged phases of drought adversely affecting tree growth and natural regeneration, combined with strong human pressure and neglect (overgrazing, logging, fires). The coastline, like that of the Maghreb, is as a whole the subject of significant human pressure, more intense than in the rest of the country, this pressure has been exerted on the vegetation for decades and it is still continuing today.

This sandy coastline presents a rich biodiversity and provides a heuristic framework for reflection on ecology, biogeography and plant evolution. Although studied this habitat is relatively simple and presents particularly didactic characteristics to understand the reciprocal relationships that can unite the biotic and abiotic environments (Attar, 2016).

The preservation of biodiversity is a priority with regard to the variety of existing ecosystems;due to their sensitivity and the rate of their degradation (Berber, 2014).

The vegetation of the region of Tlemcen, presents a good example of study of plant biodiversity, and especially an interesting synthesis on the natural dynamics of ecosystems from the coast to the steppe. Several authors initiated this study; let us quote mainly (Quezel, 2000; Dahmani, 1997; Zeraia, 1981; Bouazza and Benabadji, 1998).

The Phoenician juniper (Juniperus phoenicea) represents one of the forest species that plays a considerable ecological role because it behaves as a forest species resistant to desertification and to the pressure of man and his herds on the one hand, but also, interposes itself between the steppe formations of the low altitudes and the forest formations (Akrout, 2001).

All authors who have been interested in the phytoecological study of coastal dunes agree that there are interrelationships between the geomorphology of the dunes, climatic conditions, chemical and mineralogical composition of the sand, plant communities and morphological and phenological properties of dominant species (Doing *et al*., 1971; Doing, 1975, 1981; AIME *et al.*, 1983; Doing, 1985).

From an ecological point of view, the work devoted to the red Jenevrier has been carried out on the Mediterranean region; are generally insufficient and hardly justifiable. This present work on *Juniperus phoenicea* complements the inventories already carried out in the coast of the Tlemcen region, we will try to contribute to the study of the floristic diversity of *Juniperus phoenicea* in this same coast.

MATERIALS AND METHODS

The study area is located in the North-West of Algeria, it covers the region of Tlemcen (Rachgoune) where the Phenician juniper occupies a very important place, and less important in the wilaya of Ain Temouchent (Beni Saf) which corresponds to the plateau of Sidi Safi. The two stations are located on the coast, of which it should not be forgotten that the latter is also located in the southern part of the Mediterranean (Figure 1).

Table 1: Geographical data of the study area. (National Office of Meteorology).

Stations	Town	Location	Length	Height
Beni-saf	Ain Temouchent	35°20′N	1°27′	68
Rachgoune	Tlemcen	35°18′	1°28′	06

Station 1: Rachgoune

The grounds of the station of Rechgoune are of sedimentary alluvial origin, they are composed of littoral sands coming from the sea, of alluvial and fluvio-marine origins, silty or clayey, and they are characterized at the same time by tertiary grounds and by basaltic tuffs, recent volcanoes that spread out on both sides of the mouth of the river. This information is either volcanic or quaternary sandstone, clay or limestone (Sardran, 1952).

The vegetation dominates is:

- *Juniperus phoenicea*
- *Juniperus oxycedrus*
- *Lavatera maritima*
- *Ononis spinosa*
- *Matthiola longipetala*
- And some relics of *Quercus coccifera*

Station 2: Beni-Saf

The grounds are limestones with lithothamnias rich in shells of fossils of type lumachellique of age Miocène post-nappe. These limestones rest on clays with sandstone intercalations of Tortonian age (Miocene). The limestones constitute a plateau called "Sidi Safi plateau" from where calcium carbonate is taken for the cement factory of Beni Saf. These limestonesare covered in places by volcanic formations of basaltic type.

The vegetation that dominates consists of:

- *Juniperus phoenicea*
- *Pinus maritima*
- *Pistacia lentiscus*
- *Rhamnus alaternus*
- *Phillyrea angustifolia*

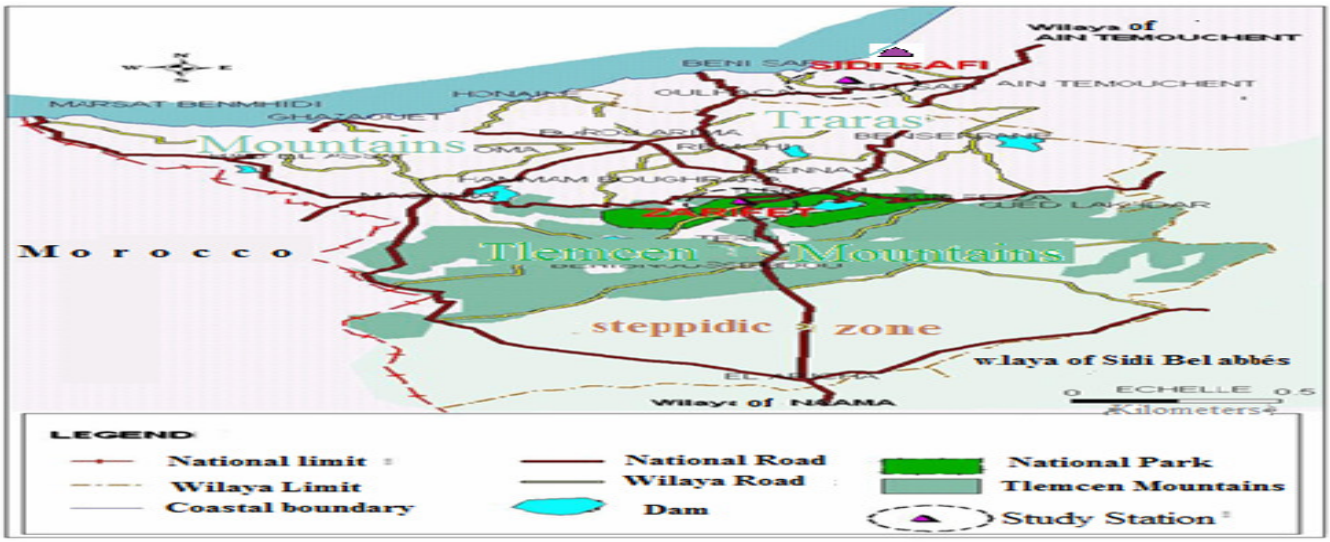

Fig. 1 : Geographical location of study stations

The chosen working method is the exhaustive sampling; we collected all the species in order to compare the floristic richness between each station. The samples were taken in spring because this season is considered optimal (flowering period for most species), each of these stations includes ecological characteristics identified or measured in the field: geographical location of the stations, topography, altitude, nature of the substrate, cover, physiognomic type of vegetation. According to the exhaustive inventory carried out in the two stations, we counted approximately 109 species.

RESULTS AND DISCUSSIONS

The totality of the taxa collected in the study area and/or in each station, is counted by biological type, that has for goal to know a maximum of species in order to determine the type and the dynamics of these plant formations.

For the station of Beni-Saf, it presents the type: TH>CH>HE>GE=PH

The station of Rechgoune, it presents the type: TH>CH>PH=HE>GE

The dominance of Therophytes in all the stations, confirms the degradation of the vegetation carpet and the result of the research carried out on the invasion of these species explains the action of intense degradation of man on these ecosystems (fires, grazing, deforestation and others). The Chamaephytes come in second position with 34% for the station of Beni-Saf and 35% for the station of Rechgoune. The Phanerophytes, remains little represented with 8% and 14% (Béni Saf and Rechgoune), but remains dominant by its biomass, which constitutes pre-forest formations and which are represented by the following species:

- *Juniperus phoenicea*
- *Phillyrea angustifolia*
- *Olea europaea*
- *Quercus coccifera*

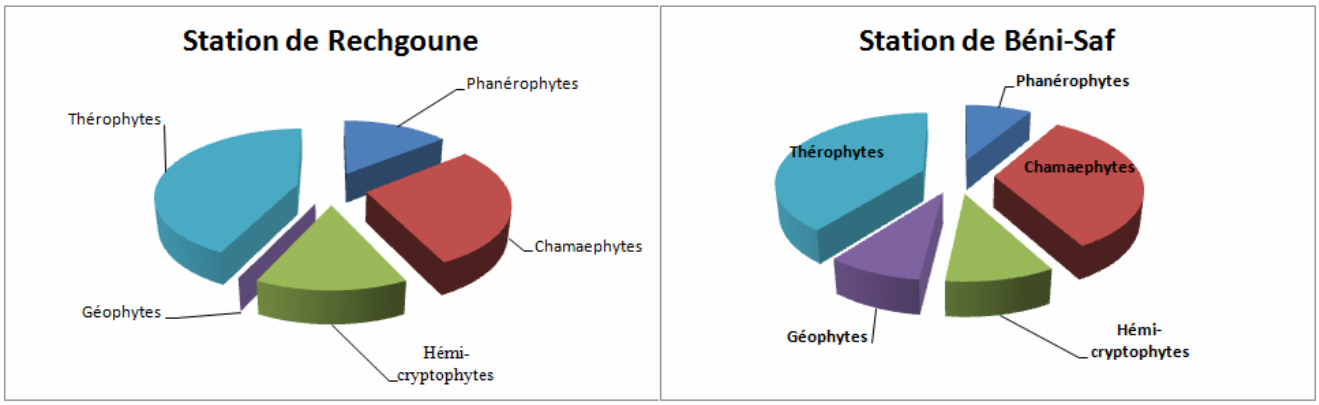

Fig. 2 : Biological types of the study stations

Hemicryptophytes, is little represented in the study area, this can be explained by the poverty of the soil in organic matter and the low altitude.

From the morphological point of view, annual herbaceous plants present the highest number in both stations, 49% for the station of Beni Saf, 60% for the station of Rechgoune. In second position, come the perennial ligneous, they occupy a relatively important place in the two stations. Remain the perennial herbaceous, the number begins to grow knowing that the degradation of the environment promotes the installation of herbaceous species.

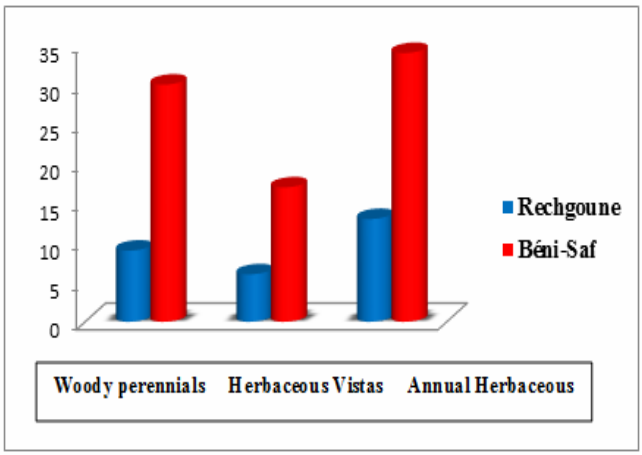

Fig. 3 : Morphological types of the studied stations

The distribution of families on the coast (Rachgoune and Beni-Saf) is not homogeneous; the most represented families on the specific level are the *Asteraceae*, *Poaceae* and *Lamiaceae*.

The Cupressaceae, remain very little dominant knowing that our work is focused on the red juniper and its floral procession; we will take into account its presence in the coastline and in the formation of dunes.

Diversity indices are parameters used in ecology to obtain information on the state of the vegetation, its viability or its evolution Legendre and Legendre, 1998; Magurran, 2004.

Thanks to the calculation of these indices, we could define the state of the vegetation in the two stations, and this to make the state of the art on the current knowledge of the flora present in the littoral of the region of Tlemcen.

Table 2 : Biodiversity indices of the studied station

Stations	Beni-Saf	Rechgoune
Specific Richness (S)	34	12
Total Number of Taxa	31	28
Simpson (1-D) Index	0,9404	0,824
Shannon (H) Index	3,166	2,075
Margalef Index	7,509	3,301
Equitability	0,8977	0,835

Shannon indices

This diversity index is calculated from the following formula :

$$H = -\sum Pi \log_2 Pi$$

The results obtained after the calculation of this index, showed us that the station of Beni Saf shelters a strong diversity within the plant grouping what translates that the conditions of the station are favorable to the installation of a great number of species.

Unlike the station of Rechgoune, which it presents a low plant diversity?

The values of the Shannon index for the two stations also show that the species recorded have the same relative abundance.

Index of reciprocity of Simpson

Its formula is as follows:

$$D = \sum_{i=1}^{S} \frac{ni(ni-1)}{N(N-1)}$$

Simpson's diversity index is less than one at both station, this translates into low stand diversity.

The Simpson index also confirms the dominance of a single family with a very high number of species compared to the other families represented by the Asteraceae.

Margalef Index

The MARGALEF index is calculated from the following formula:

$$Dmg = (S-1)/lnN$$

We find a high specific richness in the station of Beni Saf, unlike the station of Rechgoune, which has a low specific richness the index of MARGALEF is between 3.30 and 7.50 this can be explained by the presence of different families which contain several different species and which reports a great floristic diversity.

Equitability index of PIÉLOU

This is a comparative parameter, independent of species richness and is very useful for comparing potential dominance between sites.

$$J = \frac{H}{Hmax}$$

The two stations are close 0.9, this leads us to infer that the values indicate regularity in species distribution and the abundances of individuals of each species are equal.

Diversity α is the number of families present at the two stations studied at a given time.

Diversity γ is the rate of addition of new families. It therefore corresponds to the diversity at the regional scale (mean scale).

The diversity β corresponds to the rate of replacement of families in an environmental spatial gradient; be it topographic, climatic or habitat; within a given geographical area.

Table 3 : Diversity indices of the studied stations.

Diversity α	23
Diversity γ	1,6
The diversity β	37

For the two stations studied, we noticed that the number of families in both stations is 23 families, which reflects a good floristic diversity. The diversity γ presents a very high number of Family that is to say that we added 14 families in more. The replacement rate of the families (diversity β) is more or less low this can be explained by the adaptation of the majority of the families to stational ecological conditions.

CONCLUSION

Juniperus phoenicea, is a circum mediterranean species found in the Thermo-Mediterranean, this same species dominates the station of Rechgoune; the vegetation carpet is not very abundant and the empty plots observed are the consequence of the presentation of the agricultural lands. For the station of Beni-saf; we find some feet of this species. At the end of this work, we have just summarized the main conclusions of our research to which we have led:

The biological type "Therophyte" is largely preponderant, it confirms the therophytization reported by later works. As for the morphological types, the annual herbaceous plants prevail in the stations, they constitute almost half of the plant cover. Finally, the different diversity indices proposed and calculated, show the regularity in the distribution of species in the study area. Also, that the station of Beni-Saf offers as a whole conditions allowing the installation of species, paradoxically to the station of Rechgoune, which it presents a low specific richness, a low plant diversity, and a low diversity of plant communities.

REFERENCES

Aime, S.; Tabet, L.; Hadjaj, A.S. and SEBAA D. (1983). Phytoecological research in Oranie. Premiers résultats. Mémsoc.Hist.Nat.Afr.N.nouvelle séries (13): 17-32 ENAG.

Akrout, A. (2001). Study of essential oils of some pastoral plants of the region of Matmata (Tunisia).

Attar, A. (2016). Contribution to the study of *Juniperus phoenicea* groupings in the Algerian coast; Master's thesis in "Ecology". Université Abou Bakr Belkaid Tlemcen 153P.

Berber, M. (2014). Contribution to the study of the floristic cortége *Juniperus phoenicea* L. (Cupréssacées) in the coastline of the Tlemcen region. Master's thesis in "Plant Ecology and Environment". University Abou Bakr Belkaid Tlemcen 110P.

Bouazza, M. and Benabadji, N. (1998). Composition floristique et préssion anthropozoïque au Sud-Ouest de Tlemcen. Rev. Sci. Tech. Univ. Constantine, Algeria pp 93-97.

Dahmani, M. (1997). Le chene vert en Algérie, syntaxonomie phytosociologique et dynamique des peuplements. Thése doc. Es. Sciences. Univ Houari Boumediene, Alger, 383p.

Doing, H. (1971). History of landscape and vegetation of coastal dune areas in the province of north Holland. Acta. Bot. Neerl. 20(1): 183-190.

Doing, H. (1975). Beobachtungen und hisyorichetastachenuber die sukzessionuonDuen. Okasytemem in den Nidrlanden. Ber. Der. Inetrn. Symp. DerIntern. VereinfurVeget. He Ranges von Reinhordtuxen. Reinthn, 16: 107-122

Doing, H. (1981). A comparative scheme of dry coastal sand dune habitats with examples from the eastern United states and som other temperate regions veroff. Geobot Inst, ETH, Stiflung Rubel, (77): 41-72.

Doing, H. (1985). Coastalforedune dune zonation and succession in various parts of the world. Vegétation, (61): 65-75.

Kerzabi, R. and Mamoun, A. (2008). Exhaustive inventory of the vegetation of the coastline in the region of Tlemcen.

Legendre, L. and Legendre, P. (1998). Digital ecology 1. Multiple processing of ecological data. 2nd edition. Masson, Paris, 260p.

Magurran, A.E. (2004). Measuring biological diversity. Blackwell Publishing Company United Kingdom, New Jersey, 248p. Of north Holland. Acta Bot. Neerl. 20(1): 183-190.

Quezel, P. (2000). Reflection on the evolution of the flora and vegetation in the Mediterranean Maghreb. Ibis Press. Edit Paris : 89p.

Sardran, G. (1952). Les roches cristallines du littorale Oranais ; XIX éme congrès géologique international. Monographie régionale, 1sérien, n 18,84p, 16 figure. Algérie

Zeraia, L. (1981). Essai d'interprétation comparative des données écologiques, phénologiques, et de production subéro-ligneuse dans les forêts de chêne liège de Provence cristalline (France méditerranéenne et d'Algérie). Thèse. Doctorat Université d'Aix-Marseille III, 370p.