Plant Archives Vol. 18 No. 2, 2018 pp. 1703-1708 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

PREVIEW ON SOME SOILS IN MOUNTAINOUS PRE-FOREST SLOPES (ORANIE, ALGERIA)

K. Mezouar*, F. Benabdelmoumene and N. Benabadji

Department of Ecology and Environment, University Abou Bakr Belkaid, Faculty of Sciences of the Nature of Life and the Universe, Laboratory of Ecology and Management of Natural Ecosystems, Tlemcen, BP 119, 13000, Algeria.

Abstract

This study proposes to analyze the relations between vegetation and soils of the southern region of Tlemcen (Sidi Djilali: 2 stations) (in Oranie, Algeria), this course to emphasize the interdependence between soil and vegetation.

This study takes into account both, the analysis of the main soil factors (physico-chemical characteristics of the soil), which determine the distribution of plant communities and secondly, the relationship between soil factors and vegetation.

The results of the multidimensional analysis (P.C.A.) highlight the importance of total limestone, organic matter and the particle size (clay, silt and sand) on ground vegetation. Soil enabling therophytes installations are for most asset contributions soils.

The study of soil / vegetation connections allowed to highlight the dominance of biological types (therophytic) related elements edaphic soil substrates in the region.

Key words : Soil-vegetation relationships, flora, edaphic settings, Sidi Djilali (Oranie, Algeria).

Introduction

In semi-arid and arid bioclimate, the transformation of potential forests already matorrals (pre-steppe sets) translates in the modification of the original matorrals where installing new shrubby occupants better suited to the accentuation of constraints linked to anthropic actions, grazing in particular, and to soil erosion (Quézel, 2000), as the same author concerning soils and substrates, North Africa is extremely diverse; these soils are extremely varied, according on their history and the soil and climatic conditions. Salty soils, often flooded, (Sebkhas and Chotts) are well developed, as well as coastlines or continental dune soils.

Indeed, in arid areas (200-300 mm of rain per year) of Algeria, the various episodes of the Tertiary and Quaternary especially played a big role in the development and composition of the soils. The nature and constitution of the geological formations (tender and rich in salts), strong alterations to the original materials and a climate evolves fiscally to aridity have translated in the plains with soils with the main types of minerals: quartz as primary mineral clays and salts (Halitim, 1988).

Among the soil factors that intervene on the distribution of vegetation are: texture, saltiness, content and level of concentration of limestone and gypsum, water logging, the useful water reserve, the organic matter content. This was the subject of previous work in Tunisia and Algeria steppe (Le Houérou, 1969; Pouget, 1980; Merzouk *et al.*, 2009; Benabdelmoumene, 2011; Ghezlaoui *et al.*, 2013; Lahouel *et al.*, 2014; Mezouar, 2016). It is important to note that it is difficult in general to link a species or plant community pedogenetic a determined type, especially as in the steppe regions, relations soil-vegetation are essentially act as according surface horizons (Halitim, 1988).

Some authors have established direct relationships between some taxa and certain variable conditions, which is to determine the environmental profiles of these taxa. This approach is similar to that of mutual information (Godron, 1968 and 1984; Daget *et al.*, 1972; Daget and Godron, 1982 in Bonnin and Tatoni, 1990).

***Author for correspondence :** E-mail : mezouarmed1@gmail.com

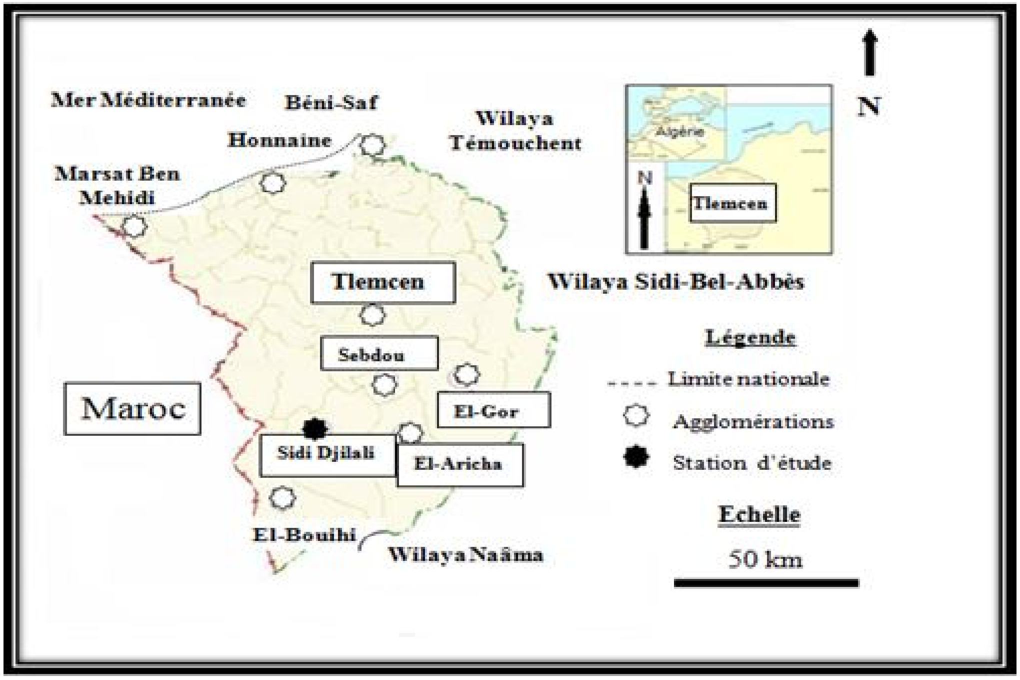


Fig. 1 : Location of the study region.

It seemed interesting to us through this chapter dedicated to soil-vegetation relations, including species composition with some edaphic parameters such as: the percentage of $CaCO_3$, of Sands Clays, of Silt and Organic Matter. In our case the question we would ask is: Is there a dependency or loyalty between therophytic topics identified in these matorrals mountain slopes located around Sidi Djilali and edaphic elements analyzed? In an attempt to bring the answers to this question.

Methodology

Geographical site

The study area is located in western Algeria (fig. 1). There is a vast eco-complex located on the foothills of the southern slopes. It belongs administratively to the Sidi Djilali. The region is crossed by the road linking Sebdou to Sidi Djilali. The state of Morocco limits the Western region (This region is located between 34° 27' north latitude 1° 34' to west longitude and an altitude of 1280 m.)

Soil analyzes

The samples were taken in the light of the substrate on which the soil was formed (mostly rock). We took the samples (representative) 5 in number per station. These soil samples were collected at the rhizosphere overall.

The choice of the number of samples was dictated by the terrain (facies and local microtopography).

We in the light of analytical findings put into direct contact different edaphic parameters (% $CaCO_3$, % Sables, % silt, % clay and % organic matter) with the floristic composition obtained from floristic surveys (Braun-Blanquet, 1951) including biological types (Therophytes in percentage) in the study stations: Station 1 (Sidi Djilali), Station 2 (Ain Sfa).

The principle of the method was developed from the work already done on the lawns of the Apennines in Italy Meridional (Bonnin and Tatoni, 1990).

The statistical distance between the records as a function of the frequencies of the species recounted has been calculated by the A F C. Next, for the computer processing of data edaphic flora. We used the method of principal component analysis (PCA), assisted by the "Minitab 16" software.

The coordinates of (species) are given for each factor axes, projecting clouds of points.

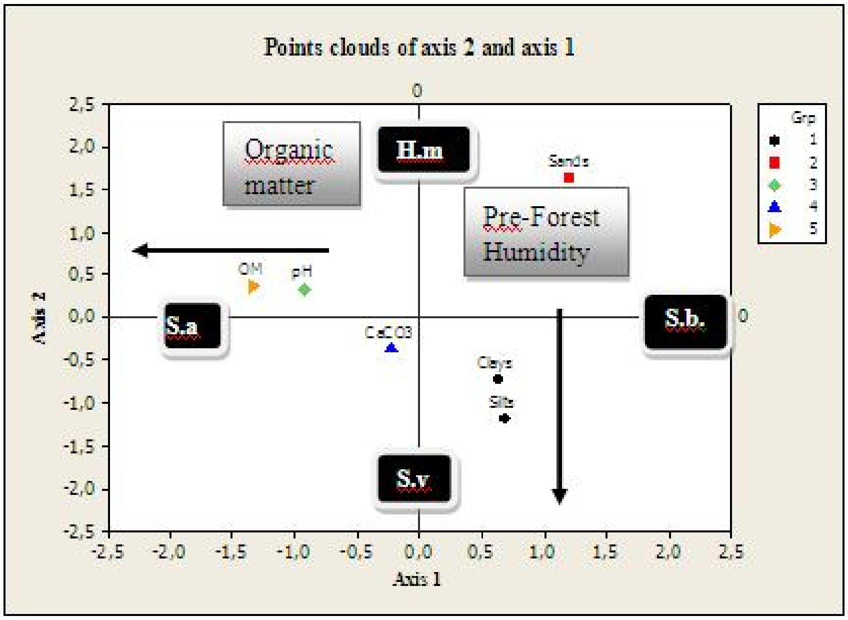
Results and Interpretations

Station 1 (Sidi Djilali)

- **Interpretation of axis 1**
- Own value : 4.9411
- Inertia ratio : 0.988

Negative side	Positive side
pH (-0,93453)	Clay (+0,62594)
$CaCO_3$ (-0,22739)	Silt (+0,68021)
MO (-1,33901)	Sands (+1,19479)

At this axis we notice a gradient organic matter (OM) which is the positive side to the negative side of the axis,



Axis 1

*Sinapis arvensis*L. : S.a.(-2,16)

Schismus barbatus L. Thell. : S.b. (+1,81)

Axis 2

Salvia verbenaca L.: S.v. (-1,77)
Hordeum murinum L.: H.m. (+2,10)

Fig. 2 : Factorial species / parameters Edaphic Station 1 (Sidi Djilali) (Axis 1 - Axis 2).

while the positive side textural gradients (fine and coarse) underlying the axis.

Annual species therophytic at axis 1 particular *Sinapis arvensis* and *Schismus barbatus* are respectively related to the organic material for the first and edaphic sand element for the second plant species.

- **Interpretation of axis 2**
- own value: 0.0435
- Inertia ratio: 0.009

Negative side	Positive side
Clay (-0,72527)	Sands (+1,63278)
Silt (-1,19841)	pH (+0,32623)
$CaCO_3$ (-0,38153)	OM (+0,47438)

On this axis 2, there is gradient increasing silt (fine soil) that goes from the positive side to the negative side.

It seems that at this axis 2 as *Hordeum murinum* (post-crop species) is attracted by the sandy textural element on the positive side, by following *Salvia verbenaca* against textural purposes the negative side elements.

- **Interpretation of the axis 3**
- Own value: 0.0127
- Inertia ratio: 0.003

Negative side	Positive side
Sables (-0,10271)	Clays(+0,96232)
$CaCO_3$ (-2,15345)	Silt (+0,32629)
	pH (+0,29241)
	OM (+0,28215)

It is noteworthy that the $CaCO_3$ (limestone aggregate) is the main gradient that manages the axis. This is the positive side to the negative side.

At this axis 3 we can notice that the therophytic *Plantago lagopus* and *Brachypodium distachyum* species are attracted to the limestone edaphique total element.

Station 2 (Ain Sfa)

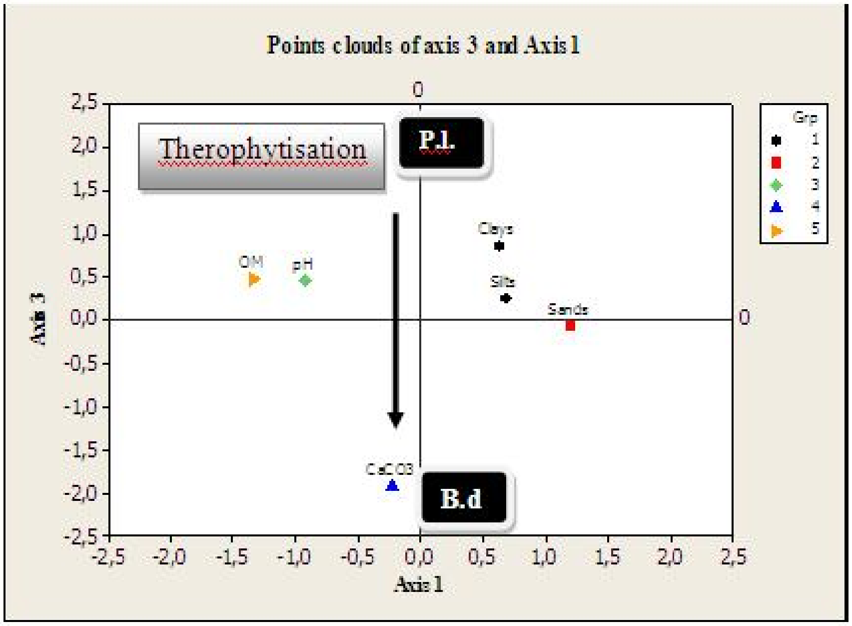
- **Interpretation of axis 1**
- Own value: 3.9815
- Inertia ratio: 0.79

Negative side	Positive side
pH (-0,90931)	Clays (+0,70971)
$CaCO_3$ (-0,31070)	Silts (+0,64372)
OM (-1,32164)	Sands (+1,18821)

The same phenomenon noted on the previous station is in fact the texture of fine elements underpinning this axis, its gradient is the positive side to the negative side. Across the organic matter seems to stand out, the gradient of this parameter is the positive side to the negative side of the axis.

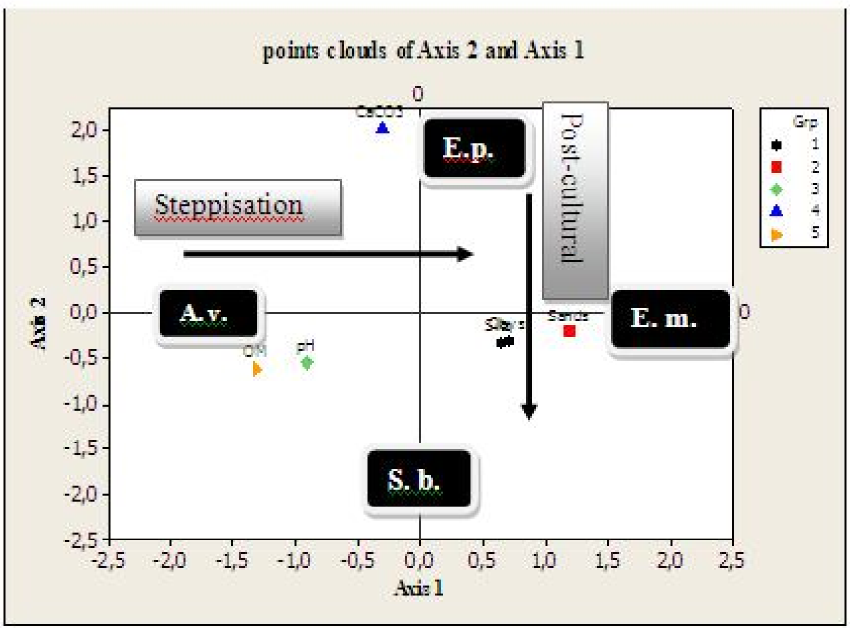
On this axis, Annuals therophytic *Eryngium maritimum* and *Aegilops ventricosa* are related to the texture of fine elements for the first and second organic material to the plant species.

- **Interpretation of axis 2**
- Own value: 0.9943
- Inertia ratio: 0.199



Axis 3
Plantago lagopus L. : P.l.(+2,29)
Brachypodium distachyum L P.B. : B.d. (-2,04)

Fig. 3 : Factorial species / parameters Edaphic Station 1 (Sidi Djilali) (Axis 1 - Axis 3).



Axe 1
Eryngium maritimum L. : E.m.(2,30)
Aegilops ventricosa Ausch. : A.v. (-1,45)
Axe 2
Euphorbia peplis L. :E.p. (1,87)
Schismus barbatus L. Thell.:S.b. (-1,86)

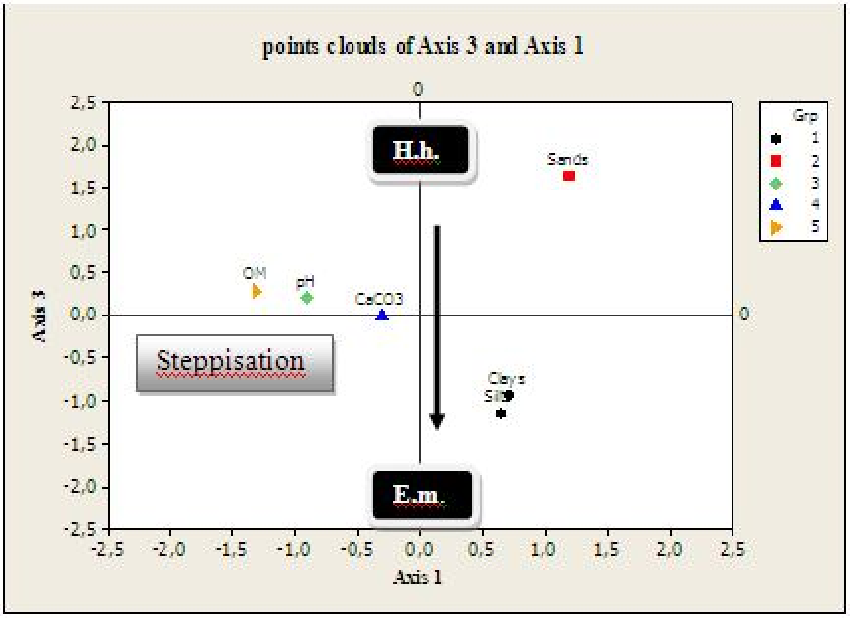
Fig. 4 : Factorial species / Edaphic Station 2 parameters (Ain Sfa) (Axis 1 - Axis 2).

Negative side	Positive side
Clays (-0,31207) Silts (-3.33302) pH (-0,55016) OM (-0,09247) Sands (-0,61322)	$CaCO_3$ (+2,01727)

On the positive side of the axis edaphic parameter ($CaCO_3$) show a rising gradient, which move in the direction: the negative side to the positive side of the axis. Textures variables (silts and clays) are located on the negative part of the axis marked by a gradient to the positive side to the negative side of the axis.

This axis includes therophytic species *Euphorbi*a *Peplis* and *Schismus barbatus*; they are related to edaphic parameters limestone aggregate for the first case and the texture elements for the second case.

- **Interpretation of the axis 3**
- Own value : 0.0217
- Inertia ratio : 0.004



Axe3
Herniaria hirsuta L.: H.h. (+2,32)
Erodium moschatum L.: E.m. (-1,39)

Fig. 5 : Factorial species / edaphic Station 2 parameters (Ain Sfa) (Axis 1 - Axis 3).

Negative side	Positive side
Clays (-0,93386)	Sands (+1,63691)
Silts (-1,15370)	pH (+0,20132)
$CaCO_3$ (-0,02669)	OM (+0,27602)

The edaphic texture parameter (sand) is characterized by an increasing gradient that goes from the negative side to the positive side of the axis 3.

On the opposite side the total limestone and clay are tensioned by an increasing gradient which moves the positive side to the negative side of the axis.

At this axis here therophytic *Herniaria hirsuta* is attracted by edaphic element sand and for the second species *Erodium moschatum* is bound by the edaphic parameters: total limestone, silts and clay.

Conclusion

The influential climatic factors greatly on freshwater inputs, otherwise the possibility of regeneration and plant growth rate is conditioned by the quality of soil and especially by the salinity and acidity and intake organic material.

The floors in our own study area if they vary, they display some homogeneous. They have a silty-clay texture. This is due to the presence of the clay having a high retention capacity, but this texture presents a significant percentage of sand; it makes the light soil and easy access to the roots but susceptible to erosion (Itab, 976-1977).

According to Kaouritcheo (1980) light soils are very sensitive to degradation agents.

The presence of coarse material (gravel) increases the water path and attenuates or more months the phenomenon of erosion.

The rate of organic matter is very low; it justifies the low vegetation cover. The limestone rate is average for this region. Concerning the salinity we unsalted soil salinity according to the scale of Aubert (1978).

For our stations, the type of texture is silty clay, soil pH is neutral. These soils are characterized by low organic matter content and salinity on these soils. Each species has ecological characters who choose their environment to fit and can live and each station to edaphic characters that show the type of soil.

It is certainly as the ecological characters connect the plant species to its environment including edaphic characters.

The therophytic species that appear to display strong links to soil parameters considered ($CaCO_3$%, sands %, silt %, clay % and organic matter %), because these subjects seem short cycles a ‘y accommodate these soil variables mentioned.

From these ground data, we can say that there is a relationship between the distribution of vegetation and soil.

References

Aubert, G. (1978). Methods of soil analysis, national documentation center soil CR / DP Marseille, 198.

Benabdelmoumene, F. (2011). Floristic inventory in some resorts located in the region of Hammam boughrara, Mem. Mag. Univ. Tlemcen: 155.

Bonin, G. and T. Tatoni (1990). Thinking about the contribution of correspondence analysis in the study of plant communities and their environment. *Rev. Ecol. Med. Flight. Jubilee Pr Quezel*, **XVI** : 403- 414.

Braun Blanquet, J. (1951). The plant communities of Mediterranean France CNRS Paris 297.

Ghezlaoui, B., N. Benabadji and N. Benabadji (2013). Phytoecological and phytoedaphological characterization of steppe plant communities in the south of Tlemcen (waster algeria). *Rev. OJE.,* **3(8)** : 495-504.

Halitim, A. (1988). *Soil arid regions of Algeria.* O.P.U. Algiers: 384.

Itab (1976 -1977). Pre- specialization "Ps soil" high the Document No. 1666/1 Tlemcen.

Kaouritcheo, L. (1980). *Soil Science.* Practical Handbook Ed Wall.. (Moscow): 55.

Lahouel, N., N. Benabadji and D. Benmansour (2014). Relation ground vegetation in the formations with *Juniperus phoenicea* and *Pinus halipensis* in the matorrals of *Mostaganemois littoral*. *Rev. Euro. Jour*., **10**. 5. ISSN.

Le Houerou, H. N. (1969). The vegetation of the steppe. *ANN Tunisia, Inst Nat Rech, Agron, Tunisia*, **42** : 5,624.

Merzouk, A., N. Benabadji, D. Benmansour and M. Thinon (2009). Some edapho-climatic floristic aspects halophytes stands of western Algeria. Part One: edaphic aspects. *Bull. Soc. linn. Provence*, T.**60**: 1-15.

Mezouar, K. (2016). Soil- vegetation Relation in south of Tlemcen region. Mem. Mag. Univ. Tlemcen. : 51-72.

Pouget, N. (1980). Relations Vegetation ground in South steppes Algiers "work and documents of the S T O R O M; No. 16: 555.

Quezel, P. (2000). Reflections on the evolution of flora and vegetation in the Maghreb Med. Ed. *Ibis*. Press. Paris : 13-117.