



THE FLORISTIC DIVERSITY OF VEGETATION IN *STIPA TENACISSIMA* IN THE SOUTHERN SLOPE OF THE REGION OF TLEMCCEN, ALGERIA

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Abstract

Our study focuses on the diversity of the floristic cortège *Stipa tenacissima* related in the southern slopes of the region of Tlemcen. The area study is characterized by a great floristic diversity, which is related to the combination of ecological factors that are also very varied (bioclimatic change, action anthropozoogenic).

To better understand the current state and the distribution of vegetal assemblages of *Stipa tenacissima*-related, the study is essentially based on the enumeration of species with identification of their floristic characters and their biological, morphological types phytogeographic distributions.

The results obtained from the floristic identified made according to the method of Braun Blanquet, show the dominance of the therophytes. This therophytisation remains related to the conjugate of man and the evolution of climate action.

Key words : *Stipa tenacissima*, South of Tlemcen, vegetation dynamics, therophytes, anthropozoogenic, Bio-climate.

Introduction

In Algeria, the recent work on Mediterranean vegetation confirm the intense regression of the vegetation in the Tlemcen region. The vegetation of this region is a good example of study and certainly an interesting approach to the natural dynamics of these ecosystems.

Steppe dominated by *Stipa tenacissima* are one of the most representative ecosystems in semi-arid areas of the Mediterranean basin. These plant communities have been used by humans for thousands of years. *Stipa tenacissima*, endemic to the western Mediterranean, it is well adapted to drought, was one of the dominant elements of the Algerian steppe vegetation.

The sought problematic in this study is to give the current state of vegetation and particularly that related training *Stipa tenacissima* currently existing in the southern slope of the Tlemcen region, based on the phytoecological appearance of plant communities that is this natural heritage.

Materials and Methods

The study area (fig. 1) is located in western Algeria, the territory which, it is inserted is a huge eco-resort located in the southern province of Tlemcen.

It is situated between 1° 31' and 1° 39' west longitude and 34° 25' and 34° 28' north latitude.

The study area is limited geographically by :

- the wilaya of Sidi Bel Abbes in the east.
- the Algerian-Moroccan border to the west,
- the town of El Aricha South,
- the Monts de Tlemcen in the north.

The choice of stations is still guided by the presence of related training *Stipa tenacissima*, which is the subject of our study; we have chosen 03 representative stations: Ain Sfa; Sidi El Abed and Djilali.

According BOUAZZA and Benabadji (1998), the method used is to collect all plant species encountered and make a list of species identified three stations.

Description of stations

Station1 : Ain Sfa

Located between Sebdou and Sidi Djilali; after the village of Ain Sfa, is characterized by the following geographical coordinates: 1° 31 '02' west longitude and 34 ° 28 '52' north latitude, at an altitude of 1462m, with a 20% slope a recovery ranged between 40% and 60%.

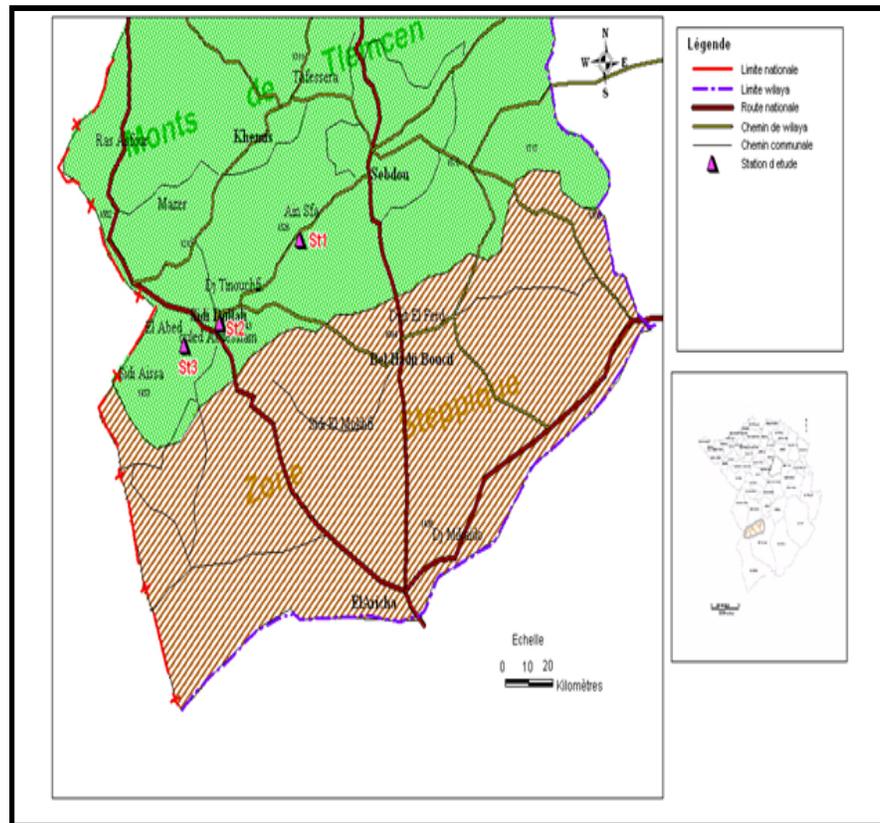


Fig. 1 : Location of study sites.

Floristically, we noted the presence of *Juniperus oxycedrus* and *Quercus ilex*, *Ulex boivinii*, *Rosmarinus officinalis*, *Thymus ciliatus* and finally diverse herbaceous species that dominates the station.

In this station, *Stipa tenacissima* always accompanies *Chamaerops humilis* one hand and *Rosmarinus officinalis* other. We also include traces of fire in a few feet of *Stipa tenacissima*.

Qualitatively, good palatable species are eaten before they had time to train volunteers for the coming seasons and they are entirely leaving room for non-palatable species such as *Ferula communis*, *Urginea maritima*, *Ulex boivinii*.

Station 2 : Sidi-Djilali

Towards this station is 3 km after the common Sidi - Djilali. It is situated between 1° 34 '38' west longitude and 34° 25 '50' north latitude, at an altitude of 1242m.

It is characterized by planar topography (5% gradient) and a recovery rate of 30 to 40%. Its floristic is fragmented by cereal crops.

This station has a group of indicator species of steppe landscapes. It is dominated by *Stipa tenacissima*; followed by a floristic based: *Echinaria capitata*, *Paronychia argentea*, *Atractylis humilis*, *Atractylis*

cancellata; *Thymus ciliatus* subsp. *Coloratus*, *Schismus barbatus*, *Plantago psyllium*, *Scabiosa stellata*, *Eryngium campestre*.

We noted the presence of several feet *Ziziphus lotus*.

Clearing and farming system is defined as a total non-application of vegetation in this area to use the land to other interests such as agriculture (The cereal).

Station 3 : El Abed (Ouled Abd Slam)

It is located next to the village Ouled Abd Slam, 1° 39 '52' west longitude and 34° 26 '52' north latitude, at an approximate altitude of 1268m and a slope of 15%.

This station is dominated by *Stipa tenacissima* with *Rosmarinus officinalis*, *Thymus ciliatus*, *Ulex boivinii*, *Ammoides verticillata*.

We have cited the presence of tree strata: *Juniperus Oxycedrus* and *Quercus ilex*. In this breeding station is the main factor of degradation of the vegetation and soil. (Sheep farming).

Allowed to recall and clarify the climate of the southern slope of the Tlemcen region is Mediterranean semi-arid and arid. Bouazza and Benabadji (1991) several previous works and Bouazza (1991, 1995) from the point of view climate Benabadji.

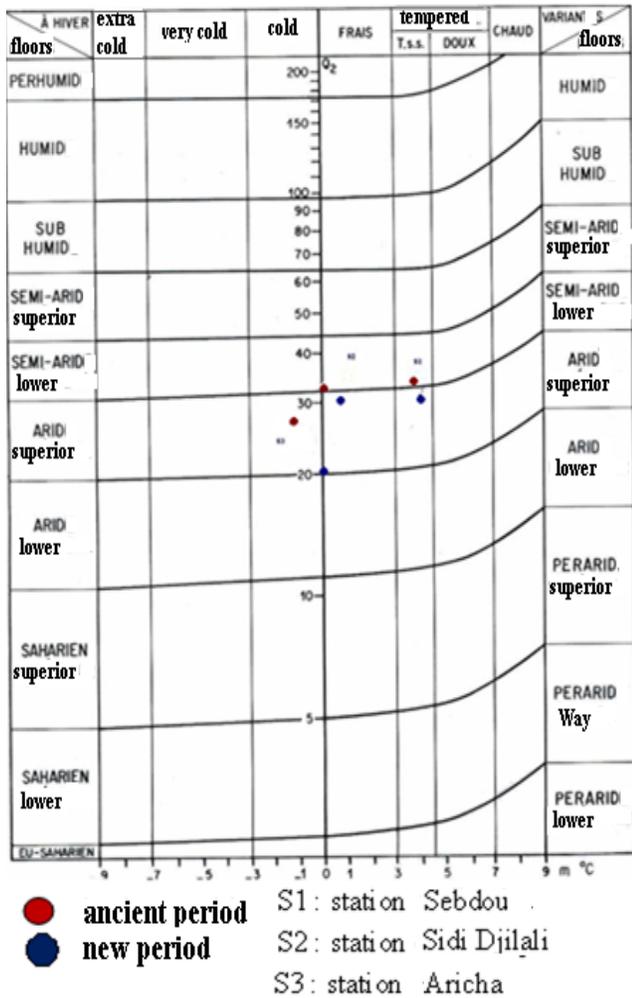


Fig. 2 : Rainfall Climagramme of EMBERGER.

According to the rainfall climagramme EMBERGER (Q2) fig. 2; the three stations are classified in semiarid bioclimatic downstairs to arid superior for the two periods considered.

This type climate promotes the extension of a xerophyte and especially therophytique vegetation.

Results and Discussion

Thanks to all these works, it is possible at this time to clarify the distribution of taxa and identify the components botanical and ecological plant formations *Stipa tenacissima*-related. In the region of Tlemcen

Table 1 : Biological types of the study area.

Stations	Phanerophytes		Chamaephytes		Hemicryptophytes		Geophytes		Therophytes	
	Number	%	Number	%	Number	%	Number	%	Number	%
AïnSfa	2	2,27	16	18,18	5	5,68	6	6,81	59	67,04
Sidi Djilali	0	0	13	17,56	5	6,75	4	5,40	52	70,27
ElAbed	2	2,27	13	16,04	4	4,93	4	4,93	58	71,60
The study area	2	1,88	19	17,92	5	4,71	7	6,60	73	68,86

Figure 3 shows the distribution of families at the level of the study area, at the level of which the inventory completed post 106 species in 90 genera and 27 families.

The Poaceae and Asteraceae are all dominant. Alone these two families represent more than 36% of the studied flora.

Other families have a low percentage to very low. So in arid area and in the Sahara, most of the families are represented by one or two genres and most of the genres by one or two species only.

Single family (Palmeaceae, Primulaceae) show a very low percentage of 0.94%. Families of Saharan affinities are presented in the three stations with a small percentage (1, 88%); it is the case of the Boraginaceae.

The dominance of families across the study area is conditioned by the climate change, the geographical position stations and especially the anthropic action carried out permanently on this area.

The floristic composition of the study region is very rich in its diversity.

The biological types are conditioned by environmental factors and determine the data type of the plant formation. We determined the biological Spectra *Stipa tenacissima*-related training.

Table 1 shows the distribution of biological types in plant formations between the surveyed stations.

We notice that the distribution, biological types in our plant training remains very heterogeneous. Patterns of biological spectra of all of the stations are of type:

Therophytes > Chamaephytes > Geophytes > Hemicryptophytes > Phanerophytes

The Therophytes have a very high rate with a percentage varying from 67, 04 to 71, 60% in all stations. This can be explained by overgrazing and the cultures that represent the latter. Then come the Chamaephytes, with a percentage of 16, 04% to 18.18%. These formations show a strong adaptation to dryness.

These species are represented mainly by: *Ziziphus lotus*, *Ulex boivinii*, *Astragalus armatus* and *Eryngium maritimum*.

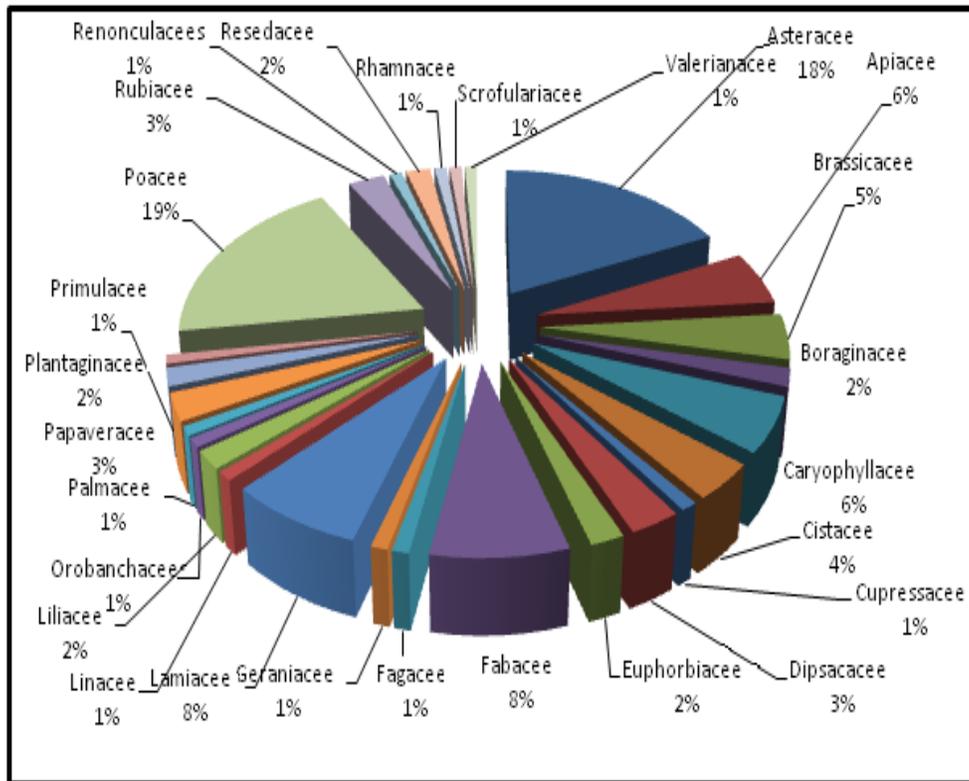
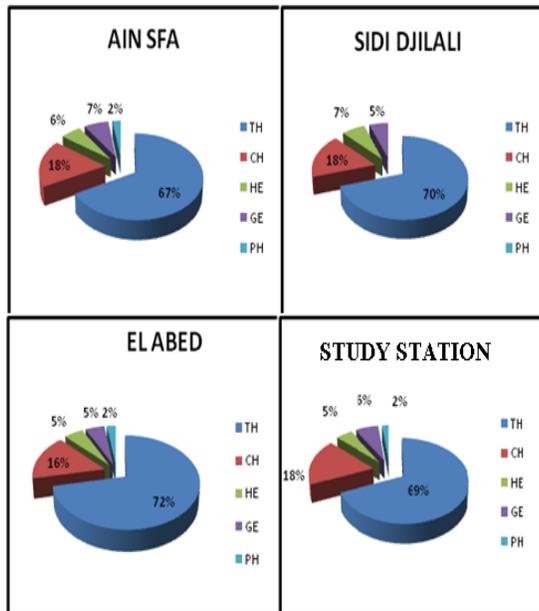


Fig. 3 : The percentage of families in the study area.

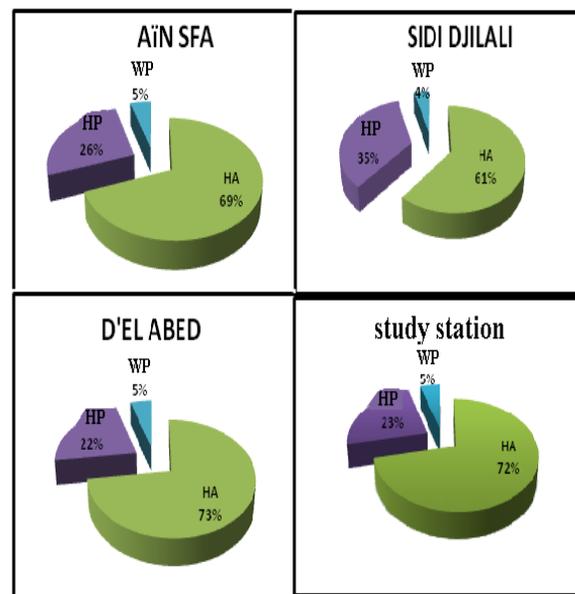


TH: Therophytes, GE : Geophytes CH : Chamaephytes HE : Hemicryptophytes PH : Phanerophytes

Fig. 4 : The percentages of the biological types.

The Geophytes are less dominant with only 4.93 a6, 81%. They are represented by *Stipa tenacissima*, *Cynodon dactylon*, *Thapsia garganica* and *Urginea maritima*.

Dahmani (1996) reports that the Geophytes are certainly less diversified in degraded environment, but



WP: Woody Perennial, HP: Herbaceous Perennial, HA: Herbaceous Annual

Fig. 5 : Percentage of morphological types.

they can in some cases of representation in specific mono trend (overgrazing), through their recovery.

Danin and Orshan (1990) confirm that the Geophytes are less dominant in the steppe areas.

The Hemi-cryptophytes are of lesser significance characterized by percentages of 4.93% to 6.81%. This

can be explained by the poverty of the soil organic matter; phenomenon confirmed by Barbero *et al.* (1989).

Benabadji *et al.* (2004) add that grazing favours the installation of species often refused by the herd. They are represented in our case by *Astragalus armatus*, *Biscutella didyma* L., *Reseda luteola* L. and *Matthiola tricuspidata* (L.) R.Br.

Finally, these spectra show a reduction, or even the total absence of the phanerophytes (Sidi Djilali) mainly due to phenomena of degradation of vegetation; this can be explained by the intensive clearing and especially pressure anthropozoogene.

The disturbance index allows quantifying the therophytisation of a medium (Loisel *et al.*, 1993).

$$IP = \frac{\text{Number of chamaephytes} + \text{Number of therophytes}}{\text{Total number of species}}$$

This index was calculated from the number of species through surveys. For all of the stations, this index remains high compared to the results of El Hamrouni (1992) in Tunisia, where he earned 70% as strong value.

For our case, the disturbance is of the order of 86% for the entire study area, strong degradation caused by human action is clearly visible (clearing, fire, grazing and urbanization). In this context, Barbero *et al.* (1990) report that the disruption caused by man and its herds are many and correspond to two more severe situations ranging from the matorralisation up to the desertification through the steppisation.

The importance of disturbance index is proportional to the dominance of therophytes who find here their favorable environment for their development (sandy substrate, poverty in organic matter); which also reflects a more open environment.

Morphological characterization

Stipa tenacissima related plant formations are marked by their heterogeneities between the woody and herbaceous plants, on the one hand and perennials and annuals on the other hand (table 3).

From a morphological point of view, the steppe flora

Table 2 : Disruption of surveyed stations index.

Stations	Disturbance index
Aïn Sfa	85,52%
Sidi Djilali	87,83%
El Abed	87,65%
The study area	86,79 %

is marked by a clear difference between the herbaceous annual and perennial grasses.

However, the woody perennials are represented by a small number that varies between 3 and 4.

The intervention of the man and his flock has a significant impact on the distribution of the different classes of morphological types. The figures show clearly the dominance of herbaceous annual with 71,69% of all of the studied flora. The herbaceous perennials keep an important place with a percentage 22,22% to 26,13%. The woody perennials come in third with a percentage of 4.05 percent to 4.93 percent.

Structural instability of the ground, poor in organic matter, harsh climate and anthropic action promote the installation and development of species to life cycle short to the dependent on the woody perennial usually more demanding in trophic and water needs.

Analysis of the Fig. 6 shows the dominance species of Mediterranean biogeographical type with 34.28%, come second species in the Western Mediterranean with 8.57% and Eurasian species with 4.76 percent.

The rest (monospecific) represents a low turnout, but contributes to the diversity and the richness of the potential genetic of the region.

The taxa, original sub-mediterranean, endemic North African, paleotempere and Ibero-Mauritanian, occupy a significant place in the study area and are respectively 2.83% of the global workforce.

Conclusion

Vegetation related to *Stipa tenacissima* Tlemcen region is rich in its diversity of flora. The study of the plant formations of *Stipa tenacissima* in South of Tlemcen has allowed us to bring out the following results:

Table 3 : Les types morphologiques en pourcentage.

Station	Woody perennials WP		Herbaceous perennials HP		Herbaceous annual HA	
	Number	%	Number	%	Number	%
Aïn Sfa	4	4,54	23	26,13	61	69,31
Sidi Djilali	3	4,05	19	25,67	52	70,27
El Abed	4	4,93	18	22,22	59	72,83
The study area	5	4,71	25	23,58	76	71,69

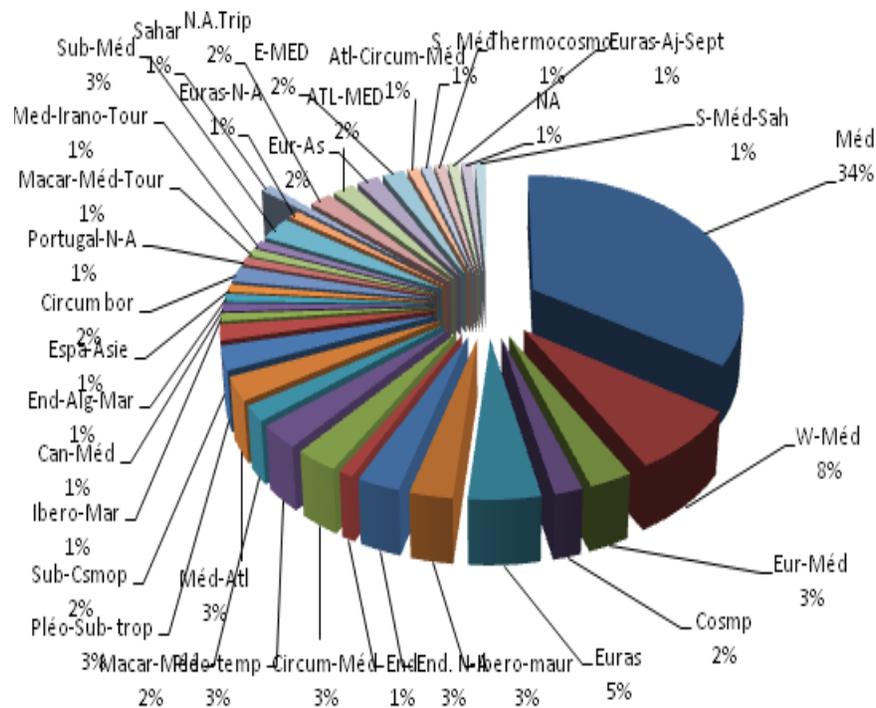


Fig. 6 : Biogeographically types in the study area.

- The Group of Poaceae, Asteraceae, Fabaceae and Lamiaceae dominates the field, which explains their resistance to the harshness of the eather conditions.
- Biological type “therophyte” dominates studied stations, reflecting a strong anthropic action come second chamaephytes, then the geophytes and, finally, the hemicryptophytes.

The phanerophytes, on the other hand, are completely missing in the resort of Sidi Djillali; pads are very low percentages for the other stations (Ain sfa and El Abed).

The calculation of the disturbance index is proportional to the dominance of species therophytiques in all of the surveyed stations. The dominance of the therophytisation character is linked to the invasion of annual species, especially herds throughout the study area. This therophytisation remains linked to the combined human and evolution of the climate action.

This topic, Barbero *et al.* (1981) explain the therophytisation by the final stage of degradation of ecosystems.

- Also, the biogeography distribution shows the dominance of Mediterranean elements, then the West-Mediterranean and finally the Eurasian.
- In these results, the first reaction that emerges from the evolution of this steppe landscape. It's the invasion of the steppes by of Therophytes;

sign of advancement of the desert but also human pressure and evolution of the climate to a certain resident.

- Our results show that this ecosystem is at the limit of its ecological failure and that well up Alfa slicks have disappeared completely. This does not mean that the Alfa will disappear completely but its future especially as a productive species, is largely compromised.

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