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PHYTO DIVERSITY OF STEPPE WESTERN, ALGERIA

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Abstract

The steppe landscape, such as the general floristic heritage of the Mediterranean zones of western Algeria. Known for decades, a continual decline due to the combined action of man and climate. The study presented here is based on data supplied by the exploitation of previous work results on the steppe landscape of Tlemcen one hand and the 150 floristic surveys conducted in this area. Comparison of different biological spectra shows us the importance of therophyte and evolution of species not palatable to highlight the stage steppe announced by several authors in the region. The representation of morphological types confirmed these results. This study is devoted to the analysis of the vegetation of the steppe region of Tlemcen.

Key words: South of Tlemcen-Steppe-Western Algeria

Introduction

The purpose of this study is the knowledge and inventory of the flora of southern Tlemcen steppe (western Algeria). It aims to study biological and biogeographically taxa of this landscape to explain the spatial distribution. The study area (fig. 1) is located in western Algeria, territory where it fits is a huge eco-complex located in the south of Tlemcen. In this eco-complex, we identified three media forming the various degrees of degradation (climate variability and human actions).

It is located between 1°27' and 1°51' west longitude and 34°27' and 35°18' north latitude; it extends over an area of about 501709 ha.

The study area is geographically limited by:

- Mountains of Tlemcen in the North,
- Naâma province in the South,
- Algerian-Moroccan border in the West,
- Sidi Bel Abbès in the East.

The bioclimatic study (from 4 weather stations) for two periods (1913-1938 and 1984-2009) (Fig. 2) shows a vertical and horizontal offset of the studied area, linked directly to Emberger's Q_2.

- Aïn Sefra station moves from arid to arid winter cold to cool winter.
- El Aricha station moves from semi-arid with cold winter to arid with cool winter.
- Ras El-Ma station has been shifted from bioclimatic semi-arid with cool winter to arid with temperate winter.
- Finally Saf-Saf station goes from sub humid with temperate winter to semi-arid with cool winter.

This bioclimate encourages the settlement of steppe species such as: *Stipa tenacissima* L.*, Artemisia herba alba* Asso and *Astragalus armatus* Willd. The floristic surveys were conducted from mid-April to mid-May of the year 2010. That sampling campaign was preceded by several field surveys in order to highlight the different study area plant formations. The survey structure is variable and takes into account the aggregation of species involved in the biological structure and imposes itself in each case.

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Materials and methods

The problem in this study is sought to provide the vegetal cover current status and, in particular, that of steppe vegetation and landscape including the currently existing one in the steppe region of Tlemcen, while relying on the phytoecological aspect of plant that constitute this heritage.

For this purpose, we evaluated the plant diversity of the study area.

The vegetation structural heterogeneity was addressed at two different levels:

* In the landscape, we analyze the diversity of the medium by mapping the steppe landscape different units
* Within the same unit of vegetation, a break occurs between the most represented spatial physiognomic vegetation types.

These station micro-homogeneities are our sampling

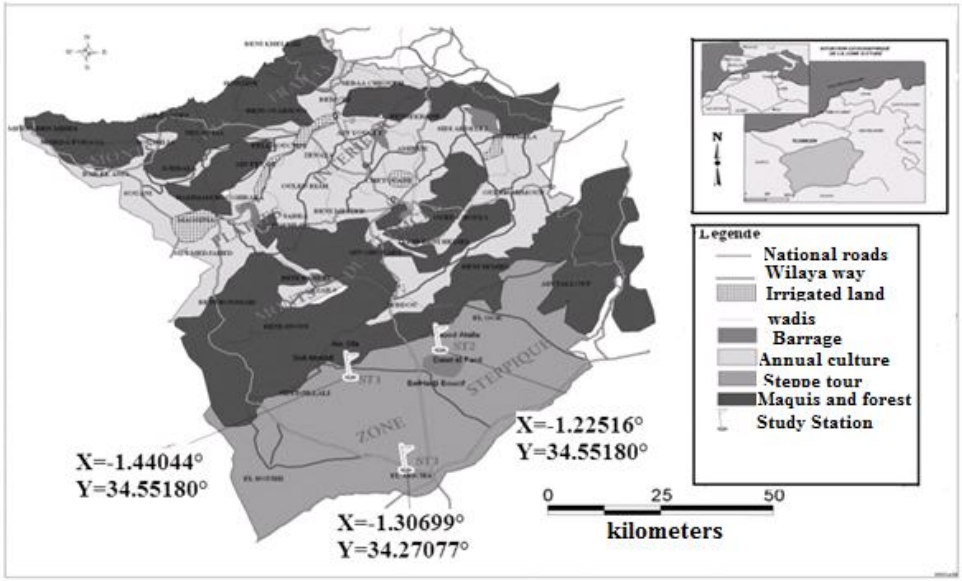

Fig. 1: Location map of study sites.

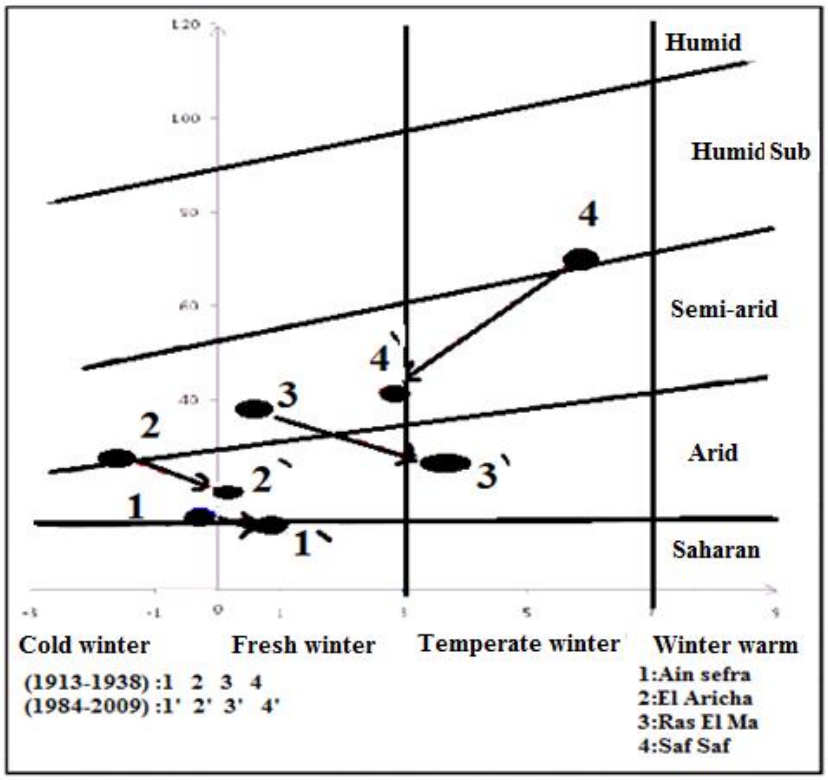

Fig. 2: Emberger'spluviothermic climagramme.

subject and help us to better understand the dynamics of the vegetation but also to better understand the ecological factors.

For this we chose three stations; different from each other by: geographic location, climate, topography, soil conditions, anthropogenic factors and plant diversity.

These stations are distributed as follows:

Sidi Djilali

This station is located in Sidi Djilali vicinity, with Southeast exposure. It is located at an altitude of 1335 m, its coordinates are X = -1.44044° and Y = 34.55180°.

This station shows a recovery rate of 30 to 40% and a slope of 5 to 10%. Its floristic trail is fragmented by cereal crops.

In this area, the anthropozoological action is intense and causes a significant change of the vegetation compared to work carried out in 1991 and 1995, Benabadji (1991, 1995); Bouazza (1991, 1995).

For the flora, we note the presence of a steppe landscapes indicator species group. It is dominated by *Stipa tenacissima* L., with a height between 40 and 60cm, followed by a floristic trail based on: *Stipa parviflora* Desf., *Echinaria capitata* (L.) Desf., *Paronychia argentea* (Pourr.) Lamk., *Astragalus armatus* Willd., *Thymus ciliatus subsp coloratus* (bois. Et Reut.) Batt. ,*Asphodelus microcarpus* Salzm. Viv. *Ornithogalum umbellatum* L., and *Paronychia argentea* (Pourr.) Lamk.

El Gor

Located in semi-arid bioclimatic atmosphere, this resort is located in a valley a few miles from the first station. It is characterized by coordinates: X = -1.30699°, Y = 34.27077° and Z = 1260 m. The recovery rate is about 45% and the slopes are from 5% to 10%. This station is dominated by *Stipa tenacissima* L. with a height rarely exceeding 35 cm. But we also note a significant decayed number of *Stipa tenacissima* L. stalks.

El Aricha

This station is characterized by the coordinates: X = -1.22516° and Y = 34.55180° Z = 1095m. El Aricha is oriented towards the south-west of Tlemcen with a slope hardly exceeding 15%. This station is home to plant species that are particularly abundant *Artemisia herba alba* Asso., *Spartium junceum* L., *Lipidium glastifolium* Desf., and *Mathiolatri cuspidate* (L) R.Br. *Stipa tenacissima* L is less important. This species rarely exceeds 25 cm in height we have also: *Phillyrea angustifolia* L. And *Ulex boivini* Webb, showing that the vegetation is a scrub facies, it has a recovery rate of 35%.

Results and discussion

Systematic composition

The floristic composition of the steppe landscape includes approximately 113 species, with 26 families and 84 genera (table.1) shows that the most represented families are Asteraceae with 22 genera and 32 species,

Table 1: Study sites flora composition in families, genera and species.

Families	Sidi Djilali		El Gor		El Aricha		Whole study area	
	genera	species	genera	species	genera	species	genera	species
ANGIOSPERMAE								
1-MONOCOTS								
Poaceae	6	7	5	6	6	7	8	9
Liliaceae	2	2	2	2			4	4
Iridaceae	-	-	-	-	2	2	2	2
2-EUDICOTS								
Caryophyllaceae	2	2	2	3	1	1	2	3
Renonculaceae	2	3	1	1	1	1	2	3
Papaveraceae	2	2	2	3	-	-	2	3
Fumariaceae	1	1					1	1
Brassicaceae	2	2	3	3	4	4	6	6
Resedaceae	1	2	1	1	1	2	1	3
Rosaceae	-	-	-	-	1	1	1	1
Fabaceae	3	5	4	4	6	6	8	11
Geraniaceae	1	1	1	1			1	1
Linaceae	1	1	1	1	1	1	1	2
Euphorbiaceae	1	2	1	1	1	1	1	2
Malvaceae	1	1	1	1	1	1	1	1
Apiaceae	2	2	2	2	1	1	3	3
Cistaceae	2	4	1	4	1	3	2	5
Oleaceae	-	-	-	-	1	1	1	1
Convolvulaceae					1	1	1	1
Borraginaceae	2	2	1	1	2	2	2	3
Lamiaceae	5	5	5	5	4	4	6	7
Globulariaceae	-	-	-	-	1	1	1	1
Plantaginaceae	1	2	1	3	1	2	1	4
Rubiaceae	-	-	-	-	1	1	1	1
Dipsacaceae	2	3			1	1	2	3
Asteraceae	15	19	18	19	11	15	22	32

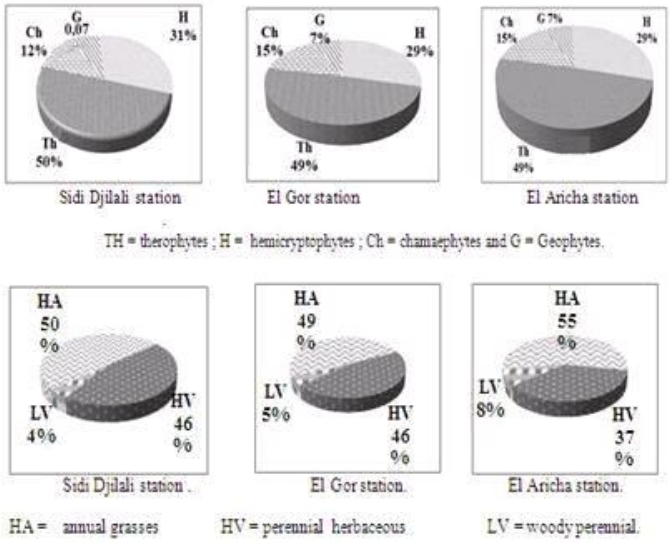

Fig. 3: Biological types and Morphological types

Fabaceae with 8 genera and 11 species, Poaceae with 8 genera and 9 species, Lamiaceae with 6 genera and 7 species, Brassicaceae with 6 genera and 6 species and the Cistaceae with 2 genera and 5 species. This flora belongs to the subphylum Eudicots in angiosperms. These are 86.74% and only 13.26% are Monocots.

Biological and Morphological characterization

Biological types are morphological characteristics by which plants are adapted to the environment in which they live Dajoz (1982). The biological spectrum is the percentage of the different biological types (Gaussen *et al*., 1982). Romane (1987) recommends the use of biological spectra as indicators of the distribution of morphological and physiological aspects.

The species count by biological type is performed on all species. The sampled biological types are chamaephytes, hemicryptophytes, therophytes and geophytes.

The spectra (fig.3) indicate that all biological stations follow the pattern: TH> He>Ch>Ge. The asylvatic atmosphere exists and persists. It confirms the steppe.

According to Negre (1966) in (Achour-Kadi-Hanifi *et al*., 1997); Daget (1980), therophytic adaptation is a strategy according to adverse conditions and a form of resistance to the harsh climate. Aidoud (1983) reported that, in the Algerian highlands, therophytes increase is related to a gradient of increasing aridity. Therophyte sin our area have a very high rate with a percentage ranging from 38.34% to 50% and are generally the most dominant in all stations due to overgrazing and cultures. Followed by Hemicryptophytes characterized with percentages of 29.50% to 35%, and in third position, by the chamaephytes (11.75% to 18.33%).

The absence of phanerophytes allowed us to confirm the intense degradation of the vegetation; this may be explained by the intensive clearing and especially anthropogenic pressure.

From a morphological point of view, the steppe flora is marked by a neat difference between annual grasses and herbaceous perennials. By cons, woody perennials are represented by a small number which varies between 3% and 8%.

Plant formations studied are marked by different proportions between woody and herbaceous species, and between perennials and annuals. This area, with these non-forest species, stays influenced by the evolution and expansion of farming and also by uncontrolled grazing.

Disturbance index

The disturbance index is calculated to quantify the therophytisation of an environment Benmoussa (2008).

DI = (Chamaephytes number + Therophytes number)/number of total species

This index was calculated from the number of species encountered by the 50 surveys per station. For the entire study area, the disturbance index is about 60% (table 2).

Table 2: Indices disturbance data

Stations	Disturbance Index
SidiDjilali	61.76%
El Gor	63.93%
El Aricha	56.66%
All the study area	60.17%

This area undergoes a worrying and sharp deterioration caused by the action of man which is clearly visible (clearing, grazing, urbanization and communication routes). These recorded rates show the strong anthropozoological pressure sustained by these steppes. For all the stations, this index is close to El Hamrouni (1992) results in Tunisia, where he obtained 70% as high value.

In this context, the disruptions caused by man and his cattle are numerous and correspond to situations increasing lysevere from shrubl and to desertification through steppe (Barbero *et al.*, 1990).The studied steppe vegetation is characterized by heterogeneity between woody and herbaceous plants, on the one hand, and perennials and annuals on the other. The sharp damage acts on the species regeneration. There generation of perennial species drives changes leading to non-resilient routes, it also leads to a change in the potential production

and systematic composition Wilson (1986).

Conclusion

In our stations, we note a revalence of Thérophytes. Indeed, the climatic rigours and man action support the development of the species with short life cycle more or less demanding for the hydrous and trophic needs. The examination and the data analysis issues of the floristic statements carried out on the Ground enabled us to quantify the wealth and the floristic diversity of the steppe ecosystem, to carry out the biological, morphological spectra species of the zone of study. The species with strong production are characterized by a short biological cycle (few weeks in few months). It enables them to occupy the ground during the short Periods favorable to their development and this in all the bioclimatic units and all the stages of vegetation Quezel (2000).

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