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FLORISTIC DIVERSITY OF *WITHANIA FRUTESCENS* (SOLANACEAE) IN THE STATIONS OF ZENÂTA AIRPORT AND SEBAA CHIOUKH IN THE REGION OF TLEMCCEN (WESTERN ALGERIA)

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ABSTRACT

Vegetation cover is one of the main components of natural environments. Vegetation plays a fundamental role in the structure and functioning of ecosystems, of which it constitutes an expression of biological potential. The forest ecosystem of western Algeria, and more precisely that of the Tlemcen region, which is part of the Mediterranean domain, has suffered for several years a continuous regression, clearly visible and sometimes irreversible, and most often due to a combined action of climatic, ecological and anthropogenic factors. Faced with the gravity of this ecological situation in the region, the need for an action plan to preserve biodiversity is imperative in order to measure and quantify the degradation of biological resources. But such a plan can only see the light of day if the knowledge and management of the flora by the ecologists is mastered, with the major concern for the dynamics of the vegetation, because the vegetation of the Tlemcen region presents a good example. Study of plant diversity and an interesting synthesis of the natural dynamics of ecosystems, from the coast to the steppes.

Keywords: *Withania frutescens*, phytobiogeography, Tlemcen (Western Algeria), Solanaceae, morphology

INTRODUCTION

The last decade has been marked by the particular interest in flora, its biological characteristics, and its adaptation to climatic fluctuations as well as the influence of human activities.

(DiCastrì., 1981) and (Quezel., 1989), show that the intense anthropic action (deforestation, fires, overgrazing, crops and various offenses) leads to a decrease in forest areas, estimated between 1 and 3% per year (Quezel *et al.*, 1990), formed mainly by pre-forest chamaephytic and nano-phanerophytic species, which explains the total disappearance of evergreen forests in the Mediterranean region and their replacement by fairly open environments, which occupy almost the entire forest.

The study area (the Tlemcen region), is part of the landscape of North Africa where the notion "climax" is rather theoretical (Dahmani., 1997) given the unstable state in which the study stations are located.

(Bestaoui, in 2001) notes that in the region of Tlemcen, the pastoral problem constitutes a real threat to the vegetation because the majority of the populations remain dominated by 80% of the herbaceous layer.

The Tlemcen region is not immune to circum Mediterranean natural laws. It has a very diverse flora that is closely linked to disturbance factors. And that's why we took two reference stations "Zenâta Airport and Sebaa Chioukh".

The comparison of the biological spectra in this region shows the importance of the Therophytes, which undoubtedly confirm the therophytization announced by several authors (Barbero *et al.*, 1995)

To better understand the characteristics of the plant formations, the study carried out is based essentially on the analysis of exhaustive inventories of the species encountered in the formations with *Withania frutescens* in the two study stations, which are characterized by a count of species with an identification of their morphological, biogeographical types. We will also show that the study region has a very diverse flora and very much linked to different disturbance factors.

MATERIALS AND METHODS

The various comparative and complementary studies have enabled us to carry out the ecological zoning on a small scale (1/50000), these studies are carried out in the ecology / botany laboratory of Tlemcen, with a floristic network carried out in the field by several outputs, to lead to different readings for the two study stations: Zenâta Airport, and Sebaa Chioukh.

According to (Dagnelie 1970), (Guinoch *et al.*, 1973), define sampling as being the set of operations, which aim to take from a population, individuals to constitute the sample.

In order to identify the dynamic aspect of the plant cover in place, our investigation requires very precise

Table 1. Inventory of families in percentage in the two stations

Families	Sebaachioukh	Zénata Aéroport
Oleacées	1%	1%
Liliacées	5%	3%
Fabacées	8%	8%
Palmacées	1%	1%
Thymeleacées	1%	1%
Lamiacées	8%	8%
Solanacées	2%	2%
Rhamnacées	1%	1%
Poacées	10%	11%
Malvacées	4%	2%
Apiacées	5%	4%
Primulacées	2%	2%
Caryophyllacées	6%	6%
Aracées	1%	1%
Aristolochiacées	1%	1%
Asteracées	15%	19%
Brassicacées	3%	3%
Concolvulacées	2%	2%
Campanulacées	1%	1%
Orobanchacées	1%	1%
Oxalidacées	1%	1%
Amaryllidacées	1%	1%
Papaveracées	1%	1%
Plantaginacées	3%	3%
Renonculacées	2%	2%
Resedacées	1%	1%
Rubiacees	1%	1%
Polygonacées	1%	1%
Rutacées	1%	1%
Crassulacées	1%	1%
Anacardiacees	1%	1%
Boraginacées	2%	2%
Cyperacées	1%	1%
Geraniacées	1%	1%
Euphorbiacées	2%	2%
Zygophyllacées	1%	1%
Valerianacées	1%	1%
Cystacées	2%	2%
Plumbaginacées	1%	1%
Iridacées	1%	0%
Apocynacées	1%	0%
Thamaricacées	0%	0%
Rosacées	0%	0%
Chenopodiacees	0%	0%
Asparagacées	0%	0%
Cucurbitacées	0%	0%
Dioscoréacées	0%	0%

Table 2. Percentages of biological types in the two study stations

Biological types	Sebaachioukh	Zénata Aéroport
PH	3%	7%
CH	18%	17%
GE	8%	8%
TH	64%	65%
HE	7%	8%

Table 3. Percentages of morphological types in the two study stations

Morphological types	SebaaChioukh	Zénata Aéroport
L.V	11%	9%
H.V	29%	27%
H.A	60%	64%

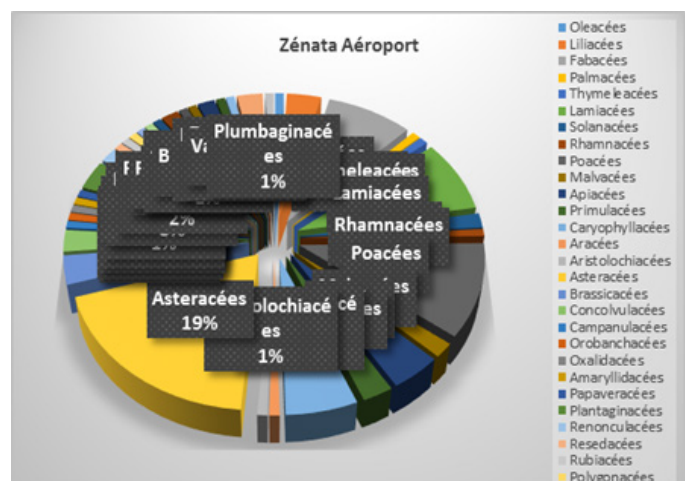


Figure - 01: Breakdown by family in the Zenâta Airport station

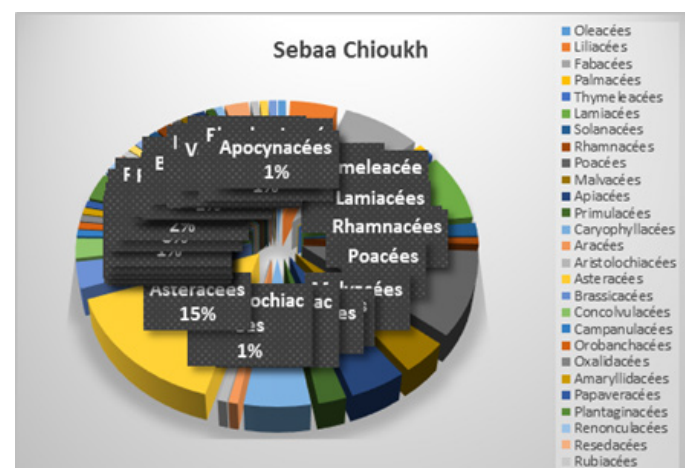


Figure - 02: Breakdown by family in the Sebaa Chioukh resort

knowledge of the factors governing the establishment of plant populations.

The analysis of the plant structure takes into account the method of floristic surveys which requires us to list all the plant species present. This floristic list changes from one station to another, from one year to another within the same station. This change is due in large part to the dominance of therophytes in favor of phanerophytes and chamaephytes.

We choose locations as typical as possible and note the environmental conditions and the list of species. The surveys are carried out using a complete data sheet that collects ecological data from the site:

- Geographical location of the station;
- Geology, pedology, topography (slope, exposure);
- Structure of the plant community (covering, stratification, height, density);
- Surrounding situation;
- Human and animal influence (anthropozoogenic action);
- Descriptive ecological variables.

Currently, the survey method is based on the so-called Zuricho-Montpellier method (Braun-Blanquet *et al.*, 1951) which consists of determining the smallest area called "minimum area (Braun-Blanquet, 1952); (Gounot-1969).

RESULT AND DISCUSSION

The analysis of the floristic procession of the two study stations "Zenâta Airport and Sebaa Chioukh" allowed us to say that there is a heterogeneity in the distribution of genera and species between families, and that the most represented in these two stations are:

- Zenâta Airport: Asteraceae 19%, Poaceae 11%, Fabaceae and Lamiaceae 8% then Caryophyllaceae 6%, Apiaceae 4% and finally Liliaceae, Brassicaceae and Plantaginaceae 3%, the other families have a very low percentage rate.

- Sebaa Chioukh: there is dominance of Asteraceae 15%, Poaceae 10%, Fabaceae and Lamiaceae 8%, Caryophyllaceae 6%, Apiaceae and Liliaceae 5% and finally Malvaceae 4%, the other families have a rate very weak. In general, the results obtained show a dominance of Asteraceae, followed by Poaceae, then Fabaceae and Lamiaceae, then Liliaceae and Caryophyllaceae. The interactions between vegetation, climatic factors and relief play a major role in the dynamics of these species.

The classification of plants is based on a variety of criteria. Plant systematics are based on characters derived from the inflorescence which are considered to be less variable and less subject to influences than those of other plant organs.

Many systems have been proposed to classify these different biological types, the most common remains the classification from an ecological point of view of (Raunkiaer- 1934)

According to (Raunkiaer-1905, 1934), biological types are considered as an experiment in the strategy of adaptation of flora and vegetation to environmental conditions.

(Raunkiaer-1907) starts from the reasoning that plants from a biological point of view, are above all organized to cross the critical period of the seasonal cycle. The results obtained clearly show that the distribution of biological types in the two stations "Zenâta Airport and Sebaa Chioukh" is heterogeneous. In the Zenâta Airport station, the rate of therophytes remains the highest 65%, then chamaephytes 17%, geophytes and hemicriptophytes 8%, and finally phanerophytes 7%. In the Sebaa Chioukh station, the therophytes are the best represented with a high percentage of 64%, the Chamaephytes 18%, the Geophytes 8%, the Hemicriptophytes 7% and finally the Phanerophytes 3%.

We observe that in our two stations, the therophytes present the highest rate, which testifies to a very strong anthropic action. Grazing enriches the soil with nitrates and allows the development of ruderae, especially annuals. In addition to anthropization, therophytization is said to have its origin in the phenomenon of aridification. Despite the importance of therophytes, chamaephytes retain an important place in the plant formations of the study area. They are most common in matorrhea and are better adapted to aridity (Elenberg *et al.*, 1967). They are found in pastures and fields. (Floret *et al.*, 1990) also describe this distribution in agreement with (Raunkiaer, 1934) (Orshan., 1982).

Phanerophytes are always rarer compared to other biological types in the two stations studied.

The state of the physiognomy of a plant formation can be defined by the dominance and / or the absence of species with different morphological types.

The strong degradation acts on the regeneration of species. The non-regeneration of perennials thus leads to modifications that result in non-resilient pathways, and leading to a change in potential production and botanical composition (Wilson- 1986)

From a morphological point of view, the formations of the study stations are marked by heterogeneity between woody and herbaceous plants and between perennials and annuals.

Phanerophytes are always rarer compared to other biological types in the two stations studied.

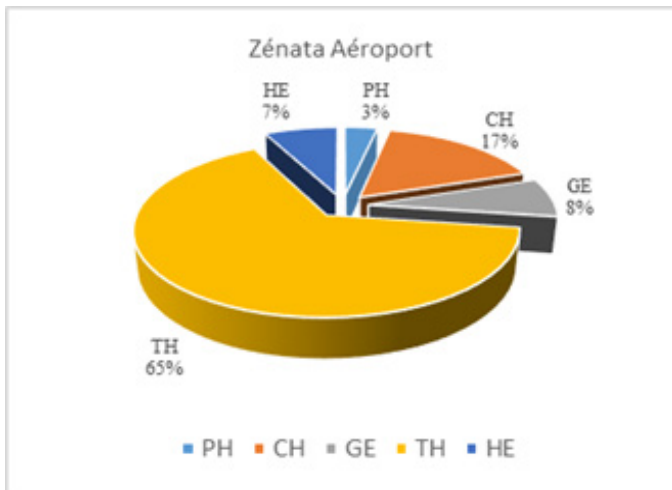


Figure - 03: Biological types of the floral procession of the Zenâta Airport station

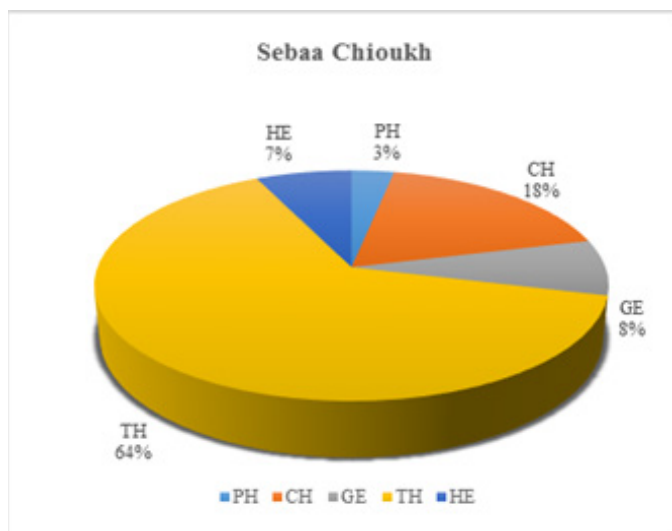


Figure - 04: Biological types of the floristic procession of the Sebaa Chioukh station

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

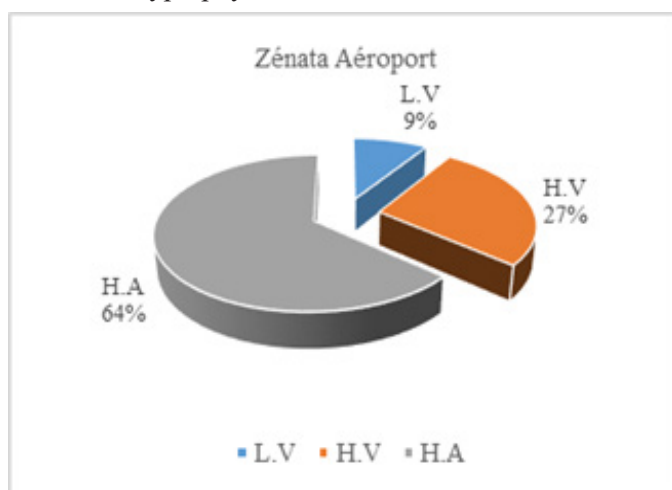


Figure - 05: Percentages of morphological types of the Zenâta Airport station

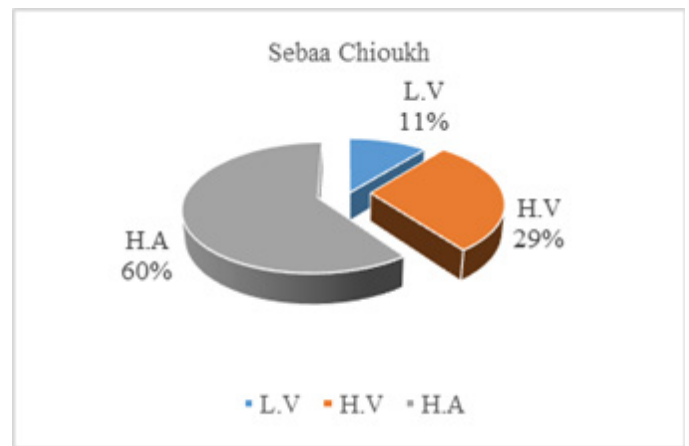


Figure - 06: Percentages of morphological types of the Sebaa Chioukh station

L.V: Perennial woody
 H.V: Perennial Herbs
 H.A: Annual Herbs

Our study area shows that the majority of our species are annual grasses

According to (Kebbas- 2016), the shape of the plant is one of the basic criteria for classifying species into biological types; phytomass is made up of perennial, woody or herbaceous species and annual species.

For our two study stations, annual herbs are dominant with 64% for the Zenâta Airport station and 60% for the Sebaa Chioukh station, perennial herbs occupy the second position, with 27% for the Zenâta Airport station and 29% for the Sebaa Chioukh station, and finally the perennial woody plants with a percentage of 9% for the Zenâta Airport station and 11% for the Sebaa Chioukh station. This is due to the intense anthropization that the forest and pre-forest formations of the region continue to undergo and the invasion by therophyte species which are generally annual herbaceous plants. In contrast, perennial woody plants represent a low proportion compared to perennial herbaceous plants.

CONCLUSION

The vegetation cover is generally influenced by various climatic, edaphic and even anthropozoic factors.

Biodiversity is a term formed from biological diversity that includes three levels of biological variability: ecosystem complexity, species richness and generic variation (Dahmani-1997).

The analysis of the floristic richness of the different groupings and their biological and morphological characters makes it possible to highlight their floristic originality, their state of conservation and their heritage value (Roberts-Pichette-2000)

The exhaustive inventory carried out at the level of the two study stations (Zenâta Airport and Sebaa Chioukh), enabled us to study the following characterizations: biological, morphological, followed by the distribution of families.

This study allowed us to bring out the following results:

- Dominance of annual herbaceous species in the two study stations from a morphological point of view.
- Importance of therophytes which confirms the phenomenon of therophytization.
- The vegetation is of the type: TH> CH> GE> He> PH for the two stations
- The most dominant families in the field are: Asteraceae, Poaceae, Fabaceae, Lamiaceae, then Liliaceae and Caryophyllaceae

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