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# ETHNOECOLOGY OF PLANTS OF MEDICINAL INTEREST IN THE SAHARAN ATLAS OF BÉCHAR (SOUTHWESTERN ALGERIA)

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**Abstract**

***The Saharan Atlas covers important plant resources spread over the plains, mountains, chotts, dayas and desert areas. It is geographically located in the most western part of the Saharan Atlas in the sub sector. An ethnobotanical survey was conducted with the local population (local healers, herbalists, connoisseurs and nomads) to have a better approach to the traditional use of medicinal plants in the Saharan Atlas. It has enabled a floristic inventory of 127 botanical taxa in medicinal spontaneous belong to 36 families and 100 genera plants. The analysis of the surveys shows that the Asteraceae (25%), the Poaceae and Fabaceae (9%) are the three most dominant cosmopolitan families in the floristic list. In general, preparations are commonly used infusion, maceration, infusion and decoction to treat gastrointestinal disorders, respiratory, circulatory, rheumatic pain, kidney, stones, haemorrhoids, lung cooling, indigestion, emmenagogue, upset ear, skin, wounds, constipation, vermifuge, vulnerary, painful menstruation, healing, upset stomach and skin disorder (wounds, burns and abscesses). The inventory is a source of information that contributes to knowledge of medicinal plants and a backup of expertise, from orality to literacy by establishing the monograph of medicinal plants and their uses. It can also be a database for the promotion of medicinal plants to discover new active ingredients used in pharmacology. Knowledge and use of spontaneous plants in therapy, requires increased awareness to preserve, enhance and use plant genetic resources against all factors of spontaneous disappearance of integrating these natural resources in the list of species protected.***

Keywords: ethnobotany, ecology, medicinal plants, Saharan Atlas, Algeria

## 1. INTRODUCTION

An essential element in maintaining the stability of the socioeconomic balance has always been the Saharan Atlas.
The course does, in fact, serve as a natural resource for grazing animals, habitat for untamed plants and animals, groundwater supplies, watershed protection and aid in the fight against desertification.
An essential element in maintaining the stability of the socioeconomic balance has always been the Saharan Atlas. The course does, in fact, serve as a natural resource for grazing animals, habitat for untamed plants and animals, groundwater supplies, watershed protection, and aid in the fight against desertification [1].
Traditional medicine in the Saharan Atlas relies heavily on the rich local flora, including wild medicinal plants used to treat various ailments.
This study was conducted in the Bechar province in southwest Algeria, in the Saharan Atlas Mountains.
The study aimed to describe the flora and assess and promote the variety of aromatic and medicinal plants by conducting an ethnobotanical survey of the local population's socioeconomic and therapeutic uses of these plants, as well as their dynamics in connection to their applications.

## 2. MATERIALS AND METHODS

### 2.1. Study area of „Bou Ayech"

The study area is part of the pre-Saharan sector (Saharan Atlas). It is situated on a steep slope and stretches 45 kilometers to the south of the town of Beni-Ounif (Bechar) between the following geographic coordinates: 1°53′33.33″ N, 31°96′66.67″ W. With an average elevation of 780 meters, it is more or less uniform in topography. The study site we have chosen best reflects the phyto-ecological diversity characteristic of the Saharan Atlas, which is the presence of groupings Atlas Pistachio trees (*Pistacia atlantica* Desf.).

### 2.2. Methodological approach

The study aims to characterize the groups of Atlas Pistachio trees in their distribution area, by examining their flora in relation to the Saharan climate. The inventory associated with the survey of local informant's herbal population allows evaluation of the floristic diversity of the station Bou Ayech. The approach employs an instrument comprising a set of cross-sectional lines spread across the various landform divisions under examination, alongside a „organized" type container sample.
This action was executed using 25 phytoecological units with the smallest surface area (100 m²) throughout investigations carried out in the Bou Ayech area.

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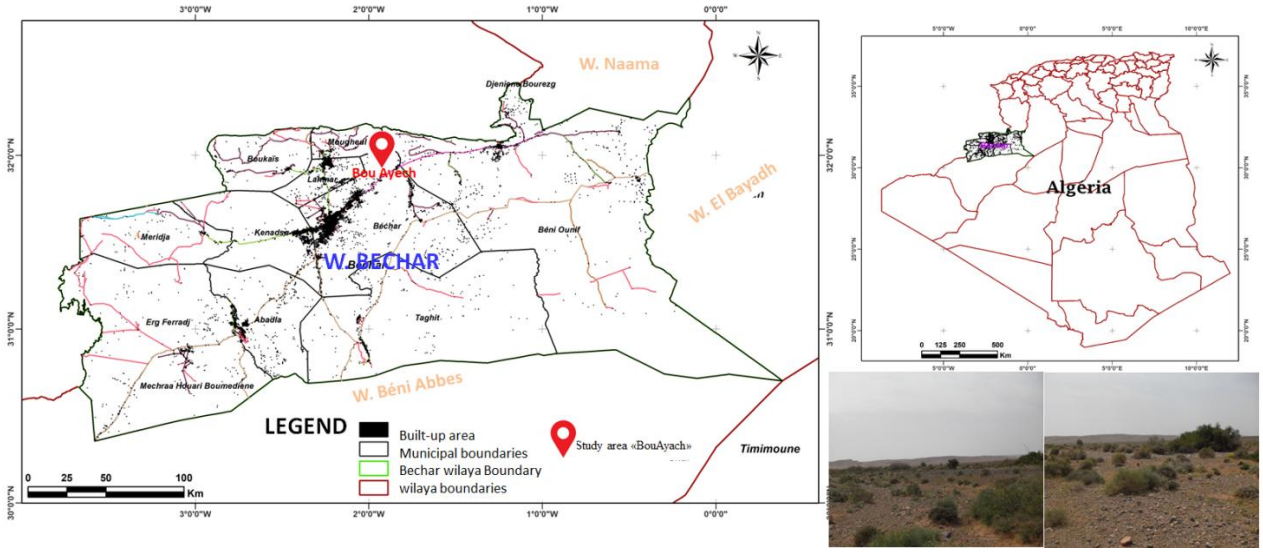


**Figure 1. Geographical location of the „Bou Ayech" study station**

This work was completed by identifying samples collected in the field using available flora and herbaria to translate this knowledge into popular traditional scientific knowledge. Gathering comprehensive details regarding the medicinal applications utilized by the inhabitants of the region is facilitated by a scientific understanding derived from investigations of local medicinal plants.

As part of an ethnobotanical survey of medicinal plants, floristic, ecological, and ethnobotanical research was carried out on the taxa of the floristic assemblage of the pre-forest group *Pistacia atlantica* in southwestern Algeria (Béchar).

In our work, we consulted several studies on the flora of:

- Algeria and southern desert regions [2];
- Sahara [3];
- Medicinal Plants Algeria [4];
- Medicinal Plants of Arid Areas [5];
- Encyclopedia of useful plants, flora of Algeria and the Maghreb, Africa, East and West Plant Substances [6];
- Traditional medicine in the Ouargla region [7];
- Ethnobotanical work in the southwest region [8-17];
- 100 Medicinal Plants of Algeria [18].

Using records of investigations we identified the plants used. Record Monitoring field contains the following information:

- Botanical identification (common and scientific name, family);
- Identification of biological type;
- Geographical location;
- Usefulness of precision plant.

## 3. RESULTS AND DISCUSSIONS

The Saharan Atlas is home to many spontaneous medicinal and aromatic plants, which form the basis of traditional treatments.

The pre-Saharan grouping of Atlas Pistachio trees (*Pistacia atlantica* Desf.) hide a great floristic diversity

### 3.1. Ecological analysis

The *Pistacia atlantica* species is found clustered in the southern base of the Saharan Atlas, spread across the rocky and arid plains of the Sahara's northern region, which appears to be the ideal setting for its growth and proliferation [1, 19-21].

This group thrives on regs, glazes denudation, erosion on glazes covered by a shallow silt soil, mainly in sandy loam texture [14, 20].

#### 3.1.1. Climate of the Study area

*Climatic context*

The climate of the Béchar region is continental desert. Its main characteristic lies in the very significant temperature differences between winter (2 to 3°C) and summer (45°C), and equally significant differences between the extreme temperatures reached in the same month.

The monthly temperature contrasts between extreme values show that the winter season is the most contrasting, with variations reaching a factor of 3 in December and 2.5 in January. Spring remains the season during which the extreme temperature values are the least extreme.

Climatically, its northern boundary closely follows the 150mm isohyet in Algeria; its southern boundary only rarely crosses the 100mm isohyet [1, 20-22].

### 3.1.2. Biogeographical setting

Biogeographically, the station is part of the Saharan Atlas sector; the surveys are located in sub-sector AS1 in the sense of Quezel and Santa (1962).
That is to say, in the westernmost part of the Saharan Atlas.

### 3.1.3. Geological setting

The study area is part of the pre-Saharan sector (Saharan Atlas). It is located on Quaternary glacis.

### 3.1.4. Soil Characterization of the study area

The distribution of the vegetation is very irregular and is closely linked to all the physico-chemical characteristics of the soil. On the other hand, steppe soils are skeletal, that is to say poor and fragile because of the scarcity of humus and their very shallow depth. The environments inhabited by clusters of Atlas Pistachio trees (*Pistacia atlantica* Desf.) and shrubby steppes featuring *Haloxylum scoparia* are typically defined by a sandy-loamy or sandy and rocky composition present on the surface of carbonate crusts, frequently appearing as fragments containing a fluctuating carbonate concentration of 1.22 to 12.7% in particular soil varieties; this component is usually transported to a depth spanning 40 to 60 cm. Conversely, in different kinds of soil, it is uniformly spread across the complete vertical section.
These occupied soils are typically thin and lack substantial organic material, fluctuating from 2 to 3.65%, exhibiting an alkaline pH level that spans between 6.7 and 8.8 [1,21,25].

### 3.1.3. Floristic Characterization of the study area

The research site was methodically assessed based on its plant composition, which included: 36 plant families, 97 plant genera, and a total of 127 plant species (Fig. 2).

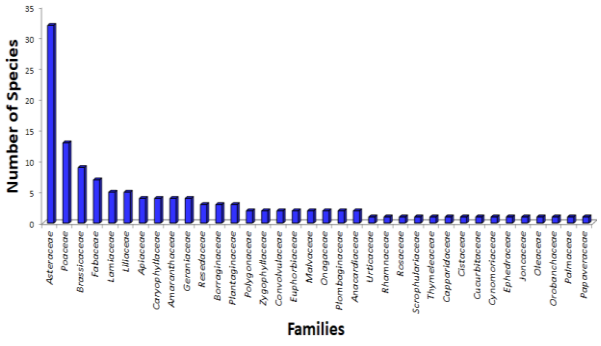


**Figure 2. Systematic composition of the „Bou Ayech" study station**

The assortment of plant life here is varied in both its makeup of floral species and how thickly it grows, which is essential to how the environment is put together and how it works, revealing its full capacity to support life [22,26]. The Asteraceae family, known for its widespread global presence, largely shapes the plant life within the resort, featuring 26 different groups and 32 kinds of plants, with the Poaceae family coming in second, including 12 groups and 13 kinds of plants, while the Brassicaceae family with its 7 groups and 9 kinds of plants, and the Lamiaceae and Liliaceae families, each having 4 groups and 5 kinds of plants, take the third and fourth spots, next are the Caryophyllaceae family (4 groups and 4 kinds of plants), then the Fabaceae family (3 groups and 7 kinds of plants), the Chenopodiaceae and Apiaceae families (3 groups and 4 kinds of plants), and lastly, the Polygonaceae, Convolvulaceae, Anacardiaceae, and Plombaginaceae families (2 groups and 2 kinds of plants).
Note the presence of family Geraniaceae with a single genus and four species, the presence of families (Borraginaceae, Plantaginaceae and Resedaceae) with a single genus and three species and the presence of families (Zygophyllaceae, Euphorbiaceae, Malvaceae and Onagaceae) with one genus and two species.
We observe that there are families (Urticaceae, Rhamnaceae, Rosaceae, Scrophulariaceae, Thymelaeaceae, Capparidaceae, Cistaceae, Cucurbitaceae, Cynomoriaceae, Ephedraceae, Juncaceae, Oleaceae, Orobanchaceae, Palmaceae, and Papaveraceae) each represented by a single genus and one species.
These systematic analyses reveal a more nuanced diversity in families and genera across the different study sites. Asteraceae, Poaceae, and Fabaceae are three families common to the various study sites, with a clear predominance in the floristic lists [27].
These three plant groups constitute between 35 and 40% of all plant species found in every region of the Sahara. Their widespread presence is reasonable given their classification as cosmopolitan families, known for their extensive global distribution across all land areas [1,25,27].

### 3.2. Ethnobotanical analysis

The local population collects perennial and annual species throughout the year (especially in spring). They also obtain supplies from nomadic groups who roam the region year-round and collect randomly.
The results show the area richness with medicinal plants listed by therapeutic practices, the use of plants as well as the treatment of diseases (Table 1).

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**Table 1. List of medicinal plants the study station of Bou Ayach**

| N° | Scientific name | Vernacular name | Family | Biological type | Organ used | Preparation | Indication (use) |
|---|---|---|---|---|---|---|---|
| 01 | *Pistacia atlantica* | Betoum | Anacardiaceae | Ph | Fr, L | I | Stomach |
| 02 | *Rhus tripartitus* | Tizgha | | Ph | L | D | Stomach |
| 03 | *Anvillea radiata* | Nougued | Asteraceae | Ch | L, S, Fl | D and I | Gastroenteritis, stomach aches |
| 04 | *Bubonium graveolens* | Tafs | Asteraceae | Th | L, S, Fl | D | Stomach pain, dental pain |
| 05 | *Artemisia herba-alba* | Chih | Asteraceae | Ch | L, S | D | Stomach pain, intestinal worms |
| 06 | *Launaea glomerata* | Rghama | Asteraceae | Th | F | Ti | Digestive disorders, fatigue |
| 07 | *Centaurea dimorpha* | Tafgha | Asteraceae | He | L, S, Fl | D | Cold and cold |
| 08 | *Chrysanthemum macrocarpum* | Larbiane | Asteraceae | Th | Fl | I | Dermatitis, Migraine and headaches |
| 09 | *Echinops spinosus* | Teskra | Asteraceae | Ch | L, S, Fl | D and T | Diuretic, nephrolithiasis, Exhaustion |
| 10 | *Matricaria pubescens* | Khzama | Asteraceae | Th | L, S, Fl | T | Gastric ulcer, Gas, Indigestion |
| 11 | *Calendula aegyptiaca* | Okhouane | Asteraceae | Th | L, S, Fl | T and D | Intestinal worms, microbial infection |
| 12 | *Cotula cinerea* | Guertoufa | Asteraceae | Th | L, FI | D | Digestive disorders, migraine and headache, fever |
| 13 | *Zilla macroptera* | Boukhlala | Brassicaceae | Th | L | D | Helminthiasis |
| 14 | *Moricandia suffruticosa* | N'chach | Brassicaceae | Ch | L, S | D | Intestinal worms |
| 15 | *Cleome arabica* | M'kheinza | Capparidaceae | | L | P | Rate, Fever |
| 16 | *Convolvulus supinus* | Chach dhab | Convolvulaceae | He | L | T | Constipation |
| 17 | *Hernaria mauritanica* | Haras lehjer | Caryophyllaceae | He | L | D | Nephrolithiasis |
| 18 | *Gymoncarpos decander* | Djefna | Caryophyllaceae | Ch | L, S, Fl | T | Lithiasis |
| 19 | *Anabasis aretioides* | Dgaa | Amaranthaceae | Ch | L | D | Intestinal worms, gastroenteritis |
| 20 | *Haloxylon scoparium* | Remth | Amaranthaceae | Ch | L | D and P | Snakebites and scorpion healing wounds |
| 21 | *Helianthemum lipii* | R'guig | Cistaceae | Ch | L | T | Microbial infection, irregular cycle |
| 22 | *Ephedra alata* | Alenda | Ephedraceae | Ph | S | D | Diabetes, Asthma, Hypertension |
| 23 | *Euphorbia calyptrata* | Moulbina | Euphorbiaceae | Th | L | Te | Migraine and headache |
| 24 | *Astragalus cruciatus* | Mkharsa | Fabaceae | He | L, S, Fl | D | Snakebites and scorpion |
| 25 | *Retama retam* | R'tem | Fabaceae | Ph | L, Se | T | Vers Intestinal worms |
| 26 | *Ononis natrix* | Hanat bel | Onagaceae | Ch | R | D | Gastrointestinal disorder, constipation |
| 27 | *Rumex vesicarius* | Homidh | Polygonaceae | | R | B | Constipation, Digestive disorders |
| 28 | *Teucrium polium* | Djaida | Lamiaceae | Ch | L, S, Fl | T | Stomach aches, and cold Cold |
| 29 | *Salvia aegyptiaca* | Boufetech | Lamiaceae | Th | L | D | Anxiety |
| 30 | *Salvia clandestine* | Ntif Maalem | Lamiaceae | He | L | P | Wound healing, abscesses, burns Fire |
| 31 | *Marrubium desertii* | Garne kabch | Lamiaceae | Ch | L | P | Migraine and headache |
| 32 | *Ajuga iva* | Chendgoura | Lamiaceae | Th | L, S, Fl | D and T | Stomach upset, Intestinal Worms |
| 33 | *Asphodelus tenuifolius* | Tasia | Liliaceae | Ge | L, Fl | D | rheumatoid arthritis |
| 34 | *Urginea maritima* | Bsal | Liliaceae | Ge | B | M | Hemorrhoids; Cold and cold |
| 35 | *Plantago ciliata* | Lelma | Plantaginaceae | He | L | D | Vessel inflammation |
| 36 | *Limoniastrum feei* | Melfet khadem | Plumbaginaceae | Ch | L, S, Fl | D | Dysmenorrhea, Hair Care |
| 37 | *Limonnium bonduelli* | Merzga | Plombaginaceae | Th | L | D | Diuretic, nephrolithiasis |
| 38 | *Cymbopogon schoenanthus* | Yed khir | Poaceae | Th | Fl | T | Digestive Disorders, Intestinal Worms |
| 39 | *Reseda villosa* | | Resedaceae | He | L | T | Diarrhea, food poisoning |
| 40 | *Neuroda procumbens* | Saadane | Rosaceae | | Fl | D | Spasms and colic |
| 41 | *Fagonia glutinosa* | M'desma | Zygophyllaceae | Th | L, S, Fl | D | Constipation, Intestinal Worms |

**Biological type:** Th: Therophyte, Ph: Phanerophyte, He: Hemicryptophyte, Ge: Geophyte, Ch: Chamaephyte
**Organ used:** L: Leaf, Se: Seed, Fl: Flower, R: Root, S: Stem, Fr: Fruit, B:Bulb
**Indication (use):** Ti: Herbal, D: Decoction, M: Mixing I: Infusion, Te: Hue, P: Powder, B: Gross,

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The study area is dominated by the development of two main plant formations: *Haloxylon scoparium* and *Pistacia atlantica*.

*Haloxylon scoparium*, which is typical of the Saharan Atlas region and a member of the Amaranthaceae family, represents the initial plant community within this zone as a species found in steppe environments. An ethnobotanical study regarding *H. scoparium* took place among the people living there [26,27,28]. Numerous participants stated that it was used to treat 18 different problems; these included digestive problems, wounds, inflamed skin, diabetes, and scorpion bites, with scorpion bites being the most commonly cited reason at 43% [1,14].

Concerning the second vegetation formation of *Pistacia atlantica* (Anacardiaceae) is a plant of medicinal and therapeutic interest par excellence, as evidenced by its use in the treatment of various diseases and also in cosmetics [9, 16, 29,30].

Investigations into ethnobotany, centered around the inhabitants of the area, have cataloged and recognized the application of flora like *Pistacia atlantica* in addressing stomach issues or leishmaniasis, alongside a variety of other plants customarily prepared as brewed drinks or extracts [9,29].

The knowledge and use of wild plants in the therapeutic field requires raising awareness, preserving, promoting, and utilizing these spontaneous plant genetic resources.

## 4. CONCLUSIONS

The study and analysis phytoecological and ethnobotany of pre-Saharan group assesses the heritage value as a source of information that contributes knowledge of the Saharan pharmacopoeia and a valuation, processing and a backup of popular knowledge in the Saharan atlas.

These invaluable resources represent a significant potential, particularly for food and medicine, but is it necessary to preserve these natural resources against all factors of extinction, and to include them in the list of protected species.

In light of this observation, it is imperative to put in place a vast program to rationally organize the prospecting, inventory and valorization of plant genetic resources at the local, regional and national level.

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