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ETHNOBOTANIC STUDY OF THE ATRIPLEX HALIMUS L. IN THE REGION OF SIDI BEL ABBES- WEST ALGERIAN

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ABSTRACT

The *Atriplex halimus L*, whose vernacular name in Algeria « Guettaf », is a shrub widespread in the Sidi Bel Abbes region in western of Algeria. It is a plant species of the Chenopodiaceae family. It is in high demand by the population of the wilaya of Sidi Bel Abbes for the treatment of some diseases. These include the genitourinary system, the digestive tract and its annexes, the cardiovascular and respiratory system. It is even indicated as hypoglycemic in diabetics.

The objective of our study is an ethnobotanical investigation of the plant in question, where we will try to identify its common uses by the population of the region of Sidi Bel Abbes for healing purposes.

Keywords: *Atriplex halimus L*, *Chenopodiaceae*, Treatment, Diseases, Ethnobotanical investigation.

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1. INTRODUCTION

Medicinal plants represent a potential reservoir containing various raw materials essential for drug synthesis. The use of these plants for purposes of treating oneself is an ancestral practice and “for a very long time, these plants have played a very important role in treating various disorders and health problems” [1].

Herbal medicine was imposed by the shortcomings of conventional medicine in solving some of the suffering experienced by patients, particularly in painful chronic diseases and cancers [2]. The World Health Organization (WHO) reported in 2003 that approximately 65- 85 % of the world population rely on traditional medicine to meet their primary health care needs, due to poverty and lack of access to modern medicine [Web 1]. It has even recommended an assessment of the safety and efficacy of herbal medicines to standardize their use and integrate them into conventional health care system [3].

The genus *"Atriplex sp"* has a number of halophytes with a variety of ecological and physiological traits allowing growth and reproduction in a saline environment [4]. *Atriplex halimus* is a native plant in North Africa where it is very abundant [5]. In Algeria, the *Atriplex* is spontaneous in semi-arid and arid bioclimatic stages. It is a bushy shrub with a silvery white appearance of 1 to 2 meters, spread out and very ample. When not grazed, it can reach four (04) meters and constitute a tricked that is difficult for animals to penetrate [6]. It is ranked among the plants most used by the population of the steppe to treat hyperglycemia [7], urinary tract inflammation (cystitis) and urinary lithiases and it is qualified as a coetaneous and renal drainer, a diuretic and a depurative, [8]. With antimicrobial and anti-inflammatory activity, Atriplex is also recommended to treat malaria [9] and is also used as an effective antiepileptic [10].

This plant was the subject of an ethnobotanical investigation in 2020 in the capital and the south of the wilaya of Sidi Bel Abbes.

2. MATERIALS AND METHOD

a. Study area

The wilaya of Sidi Bel Abbes is located in northwestern Algeria. It covers a land area of 915,063 km^2 [11]. It is delimited as follows (Figure 1):

- To the North by the wilaya of Oran.
- To the Northwest by the wilaya of Ain Temouchent.,
- To the Northeast by the wilaya of Mascara,
- To the West by the wilaya of Tlemcen,
- To the East by the wilaya of Mascara and Saida,
- To the South by the wilaya of Nama and El-Bayad,
- To the Southeast by the wilaya of Saida.

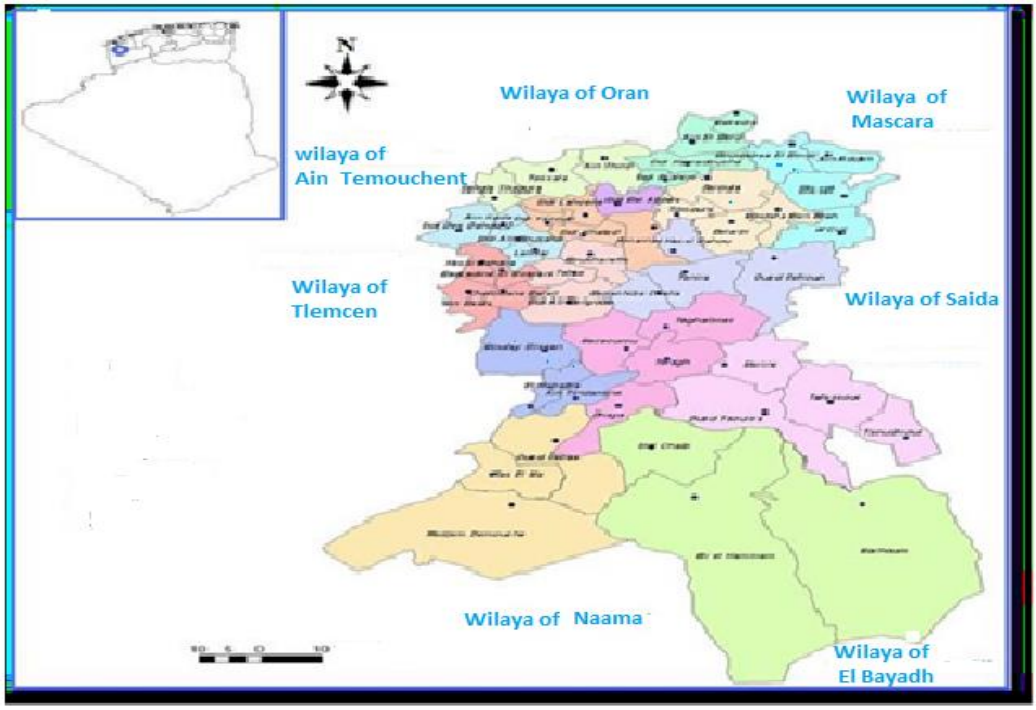

Fig.1. Geographical location of the wilaya of Sidi Bel Abbes.

Source: Forest conservation of the wilaya of Sidi Bel Abbes, 2016

The wilaya belongs to the semi-arid Mediterranean bioclimatic stage in the north [12] and arid in the south. The climate is rainy and cold in winter, dry and warm in summer. Spring and autumn are more or less humid and short duration.

The natural relief of the wilaya is characterized by the existence of distinct physical units forming a series of parallel mountain ranges oriented from west to east, representing a diversity of geographical spaces divided into three (03) large ensembles clearly differentiated from the physical, climatic and socio-economic point of view [13]:

1) The mountainous areas occupying an area of 225,000 ha, they are located in the North and in the center and represent 25% of the total area.

2) The lowland areas covering an area of 324,000 ha represent 35% of the total area.

3) The steppe zone constitutes the south of the wilaya and covering 366,000 ha representing 40% of the total area.

2.1. Ethnobotanical investigation

Ethnobotanical studies are the ideal approach to understand, in a given region, the uses as well as the socio-cultural and economic perceptions of plant resources by the local population.

The ethnobotanical study is conducted in the capital and south of the wilaya of Sidi Bel Abbes (municipalities of Ras El Ma and Redjem Demouche), during the period from February to

March 2020. The choice of localities is hardly arbitrary. In fact, the two southern communities represent the place where ancestral therapeutic habits are in place and where the inhabitants believe more in the virtues of plants and still use them in a very broad way. As for the population of the capital of the wilaya, living a certain intellectual modernity (university, high schools, vocational training); it has not abandoned the use of the plant for therapeutic purposes.

Questionnaire sheets have allowed us to collect valuable information for development of this contribution. The survey affected an overall population of two hundred and forty-six (246) individuals, of whom two hundred (200) responded favorably with a participation rate of 81.3%. The target population consists mainly of herbalists, users and connoisseurs of traditional medicine (elderly people, healers, pharmacists, doctors and others).

The collection of information was done using the semi-structured interview method: The approach of the herbalists interviewed was based on local language dialogue, accompanied by the purchase of the medicinal plant, a digital camera, sachets, duct tape and markers were used in this study.

Each interview lasted on average about twenty minutes. All interviewees were briefed on the purpose of this study. The survey questionnaire form is divided into two parts to collect information about the person and the medicinal plant (*Atriplex halimus L*):

1) Informant: Age, gender, family situation, level of education...
2) Information on the medicinal plant where questions information about:
   - ♦ Name of the plant: vernacular name
   - ♦ Parts used: stems, roots, leaves, seeds, aerial parts, etc.
   - ♦ Collection period: autumn, winter, spring, summer.
   - ♦ Method of preparation: decoction, maceration, infusion, ...
   - ♦ Treated diseases.
   - ♦ Therapeutic efficacy and side effects observed by the herbalist
   - ♦ Source of information: documentation, experiences of others.

The data collected is then entered and processed by Excel software. The simple methods of descriptive statistics facilitated the analysis of these data. Thus, quantitative variables are described using average and qualitative variables using numbers and percentages.

3. RESULTS AND DISCUSSION

Analysis of data from the ethnobotanical survey on *Atriplex halimus*, conducted among a sample of the population of the wilaya of Sidi Bel Abbes revealed the existence of a diversity of practices with a broad spectrum of the use of the plant concerned. Therapeutic indications, treated conditions, used parts of the plant; methods of preparation and dosage were identified from the population interviewed with insistence. The target segment of the population is marked by a variety of age, gender, socio-familial status, education level, function and other demographic and sociological parameters.

The individuals questioned are in the order of 81% from the south and only 19% from the capital of the wilaya of Sidi Bel Abbes. Extremes of age ranged from 20 to 85 years of age with an average of 32 years ± 10 years (Figure 1). The 54% are male while the female fraction is 46% of the total population interviewed.

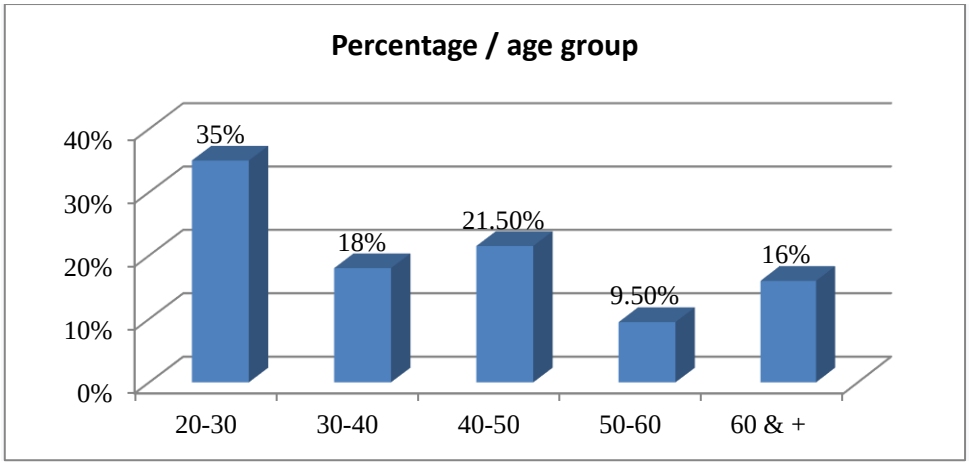

Fig.2. Distribution of the target population by age group. (T. HELLAL, 2020)

All socio-economic and cultural levels (low, medium and high) are taken into account when questioning. The middle class was the majority with a percentage of 65.30%. Low and high socio-economic levels accounted for only 24.45% and 10.25% of the individuals surveyed, respectively. The One-third (28.5%) population had not attended school before. The remaining two-thirds are almost evenly divided between primary, secondary and university levels (23.5%, 25% and 23%). Fortuitously, the bride and groom were much more representative (53.50%) that singles (31%); widowers and divorcees totaled only 9.5% and 7% respectively. Almost all of the people questioned said that the experiment represents their single source of information

about the plant and its uses. Only a small percentage says that their knowledge is attached to reading and scientific study.

Atriplex halimus L is used jointly by both sexes with a slight male predominance. Of the two hundred people interviewed, one hundred and seventy (170) recognize the plant at first sight. They claim that its use is purely therapeutic (81%). Some also point out that it is used for commercial purposes or even as livestock feed in the steppe region (8.5%). Other uses are reported by 10.5% of the population surveyed. (Figure 3).

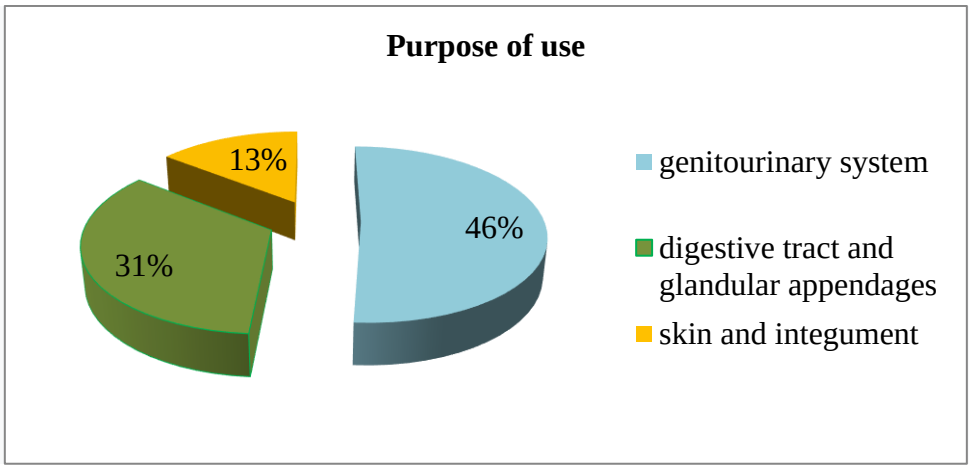

Fig.3. Population distribution by plant use. (T. HELLAL, 2020)

The plant is rather used in its fresh form (76%) than dry (24%). The most common methods of brewing and decoction are used. The use of parts of the plant in the form of powder mixed with honey or milk (commonly known as "Aqda") has very rarely been offered to patients. It is noted that other methods of preparation (cataplasm, maceration) have not been indicated in any way. According to the population interviewed, *Atriplex halimus* is indicated in the treatment of various diseases. In descending order of indications, we have diseases of the genitourinary system, those of the digestive tract and its glandular appendages (liver and pancreas) and dermatoses (coetaneous and integument diseases) that are poorly reported. Other indications (respiratory, osteoarticular diseases, etc.) were very rarely mentioned and did not exceed a rate of 10% overall (Figure 4).

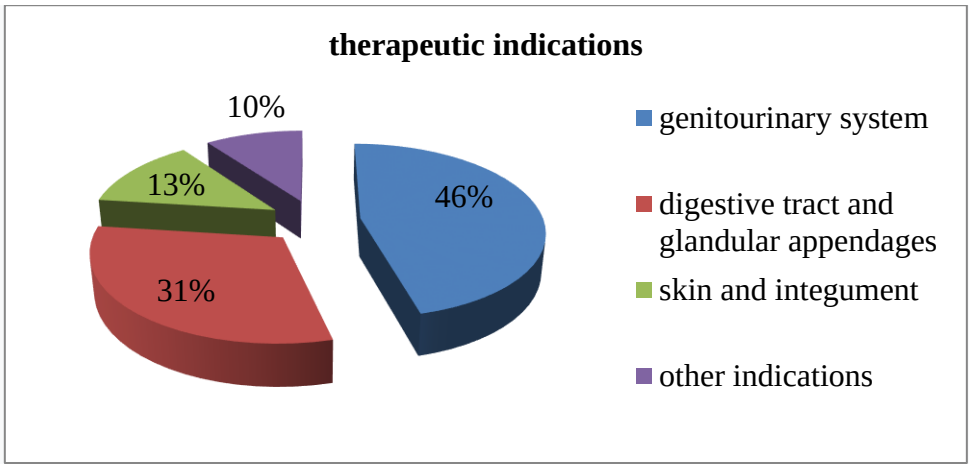

Fig.4. Therapeutic indications of *Atriplex halimus L* by population (T. HELLAL, 2020)

The reference measure by population is "the big glass." Daily dosage varies between one (32%) to three (15%) measures. Two (02) doses are the most cited by those questioned (52%). The duration of treatment depends on the disease and the instructions of the prescriber (herbalist). The majority of the individuals interviewed attest that the effectiveness of treatment by the plant is average or even satisfactory. Part of them; although minimal, sees that it is of a low intake and not very beneficial. More than half attest that treatment with the plant can be complicated by side effects (56.5%) unlike others who find tolerance perfect and safe (43.5%) (Figure 5).

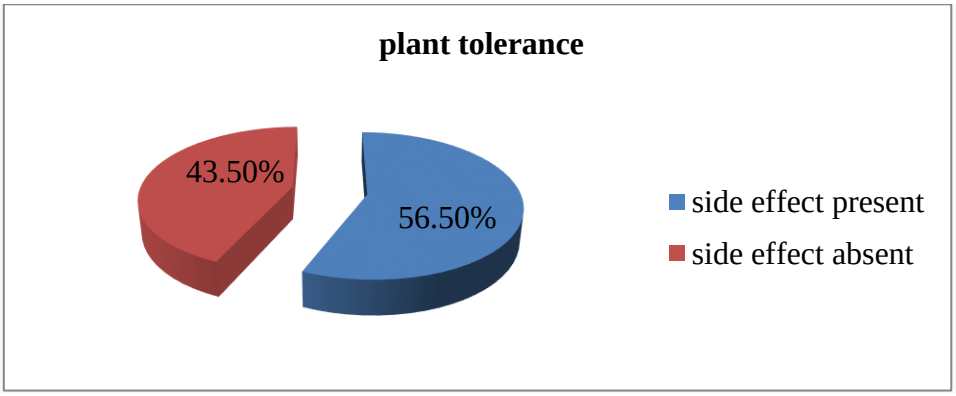

Fig.5. Assessment of the tolerance of *Atriplex halimus L* reatment by the population (T. HELLAL, 2020)

The effectiveness of treatment with *Atriplex halimus* mainly related to the presence of certain active ingredients in its various parts. This plant material is very rich in proteins, fibers, mineral

salts [14], vitamins A, C, and D [15]. The table below assesses the content of each mineral component in this plant (Table 1).

Table 1: Mineral composition of the *Atriplex halimus L* plant. [18]

Minéral composition	***The species Atriplex halimus L.***
Calcium (Ca) (g /kg)	21,5 (±3,7)
Phosphore (P) (g /kg)	U1, 92 (±0,3)
Magnésium (Mg) (g/kg)	20,3 (±4,3)
Sélénium (Se) (g/kg)	22 (±8)
Zinc (Zn) (g/kg)	103 (±27)
Manganèse (Mn) (g/kg)	395 (±49)

And it is rich also on saponins, alkaloids, flavonoids [9].

The beneficial action of common medicinal preparations based on Atriplex *halimus* on the health of the individual depends mainly on the intervention of the following elements:

1) Flavonoids are often presented as anti-allergic, anti-artherogenic, anti-inflammatory, hepato-protective, antimicrobial, antiviral, antibacterial, anti-thrombotic, cardio-protective and vasodilators. [17]. Some flavonoids have a protective effect of liver tissue against cancer [9].
2) Tannins affect diabetes at the cellular level, promoting the action of insulin (decreasing insulin resistance) and its complications and limiting the inflammatory response in different tissues [18]. They are considered anti-nutrients due to the various adverse effects of reduced food digestion, low bioavailability of micronutrients and liver damage [19]. They have a certain astringent power, by which their vasculoprotective, healing and anti-diarrheal properties are explained.
3) Hawthorn dimer proanthocyanidines are believed to be good cardiac sedatives [20]. They constitute a vast family of natural compounds "monoterpenes, sesquiterpenes, diterpenes and triterpenes." Phytosterols are plant lipids that have a structure close to cholesterol. They are effective in reducing LDL (low density lipid) cholesterol thus reducing the risk of cardiovascular disease and are indicated in the treatment of benign prostate hypertrophy in

humans. As for terpenes, they have a lung tropism (selective action) and are used as oxygenants and expectorants.

4. CONCLUSION

The use of traditional medicine is a very ancient ancestral practice. The *Atriplex halimus L* is one of the most important socio-economic and cultural plants among the more than 3000 plant species recorded in Algeria. The ethnobotanical survey confirms, among the population, that the species studied in the wilaya of Sidi Bel Abbes is highly marketed in herbalists and phytopharmacies. The frequency of use of this species has increased with the arrival of a significant number of herbalists and traditional practitioners. Some of the people surveyed reported some side effects and sometimes even toxicities. Awareness is therefore necessary and very useful for future generations when transmitting socio-cultural heritage by herbalists in order to avoid any health complications.

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