

ETHNOBOTANICAL STUDY OF AN ASTERACEAE ARTEMISIA HERBA ALBA (ASSO.) IN CHOTT EL GHARBI (WESTERN ALGERIA)

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Abstract

The objective of this work is to identify the therapeutic uses of medicinal plants in the Chott El Gharbi region through ethnobotanical surveys carried out on a local population who have used phytotherapy for a long time in a way transmitted from generation to generation. The investigation was carried out in the two communes of Chott El Gharbi. Among the botanical families of the species most used in herbal therapy, Lamiaceae and Asteraceae. The best-known species in various treatments is Artemisia herba alba (Asso.). The leaves represent the most used parts of plants and the decoction represents the most frequent method of preparation.

Keywords: Artemisia herba alba (Asso.), Ethnobotanical surveys, medicinal plants, Chott El Gharbi, phytotherapy, Algeria

1. INTRODUCTION

Throughout the world, traditional medicine relies on the natural resources available in the local environment, as well as the knowledge and know-how of the local population. With an area of 2,381,741 km², Algeria is the largest river country in the Maghreb. It is known for its wide variety of medicinal and aromatic plants, as well as for the many common uses that each of the country's terroirs gives them. These are ancient know-how passed down from generation to generation, especially among rural populations. It is a medical heritage present among elderly women and healers [1]. The medicinal plants used are often available in the local environment, which facilitates the recognition and know-how necessary to exploit these resources [2]. Our region is characterized by a climate arid to semi-arid, characteristic of the Oran highlands, more precisely in the region of Chott El Gharbi, which is located in the northeast of the Wilaya of Naâma (Algeria).

2. METHODOLOGY

2.1. The study area

The Chott Gharbi Basin occupies an area of approximately 11.784 km² or approximately 1/3 of the Wilaya of Naâma.

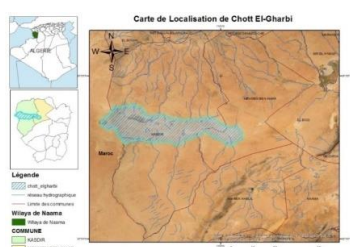


Figure 1. Map of study zone

It is bordered to the north by the mountains of Tlemcen (Djebel Sid Abed 1540 m and Mekaidou 1456 m altitude), to the east by the Moroccan mountains of Tendrara 1679 m and in the south by the mountains of Ksours (Djebels Gaaloul 1612 m and Guetoub El Hamara 1594 m). It is an endorheic basin which constitutes approximately 75.56% of Algeria and 24.46% of Morocco [3].

2.2. Bioclimatic and geomorphological presentation

Given the morphology of its relief, the Chott El Gharbi region presents a bioclimate of the semi-arid type in the north to arid in the south, with a cool to cold variant, and a relatively low average annual rainfall varying from 250 mm to less than 100 mm/ at South [4].

The north of the southern high plains of Oran is more watered compared to the south. Likewise, rainfall increases from west to east (longitudinal gradient: more than 300 mm per year at El Nâama [5]. The area figure 1, retained within the framework of this work, has the following main characteristics:

The region is classified as an area very sensitive to desertification because of the importance of climatic aridity, the unequal distribution of water, a high sensitivity of soils to desertification and constraints linked to the socio-economic situation of the populations (Overgrazing). *Artemisia herba alba* (Asso.) occupies large areas of the local steppe in the form of sagebrush rangelands. Often at the formation level with a clayey texture with the presence of limestone.

These rangelands experience significant anthropogenic pressure combined with episodic summer droughts of varying length in recent years [5].

2.3. Ethnobotanical surveys

At Chott El Gharbi in the Oran steppe, we carried out an ethnobotanical survey on the medicinal and aromatic plants used by the inhabitants of this region. Among the 39 species inventoried in the phytotherapeutic notebook of herbalists and healers in the region Table 1. All are spontaneous species.

The most widely used and distributed by the local population is *Artemisia herba alba* (Asso.) called also white mugwort. It is an endemic of the Mediterranean steppe and acquired a great advantage in the treatment of numbers of diseases [3].

Through the ethnobotanical investigation of spontaneous species from the western steppes of the Chott El Gharbi region of the wilaya of Naâma, we noted the following criteria to develop a biological profile of the species which will allow us to present its biological and phytochemical characteristics: biological type of Raunkiaer, therapeutic indications and traditional uses, chemical composition.

We have also listed, according to the availability of information, the active compounds of this plant and, then, its therapeutic indications and uses.

These criteria taken into account show on the one hand the active constituents of the species and its activities and on the other hand its biological type which justifies the adaptation of the species, its mode of multiplication and its biological conservation in a natural environment.

3. RESULTS AND DISCUSSIONS

The species encountered in the arid steppes mainly belong to biological types adapted to drought and harsh climatic conditions. These are therophytes and chamephytes which represent the highest levels of the biological spectrum of steppe vegetation. These biological types are very adapted to drastic aridity conditions [6]. *Artemisia herba-alba* (Asso.) is an herbaceous, perennial plant, greenish-silver in color, 30-50 cm in height with branched, rigid and erect stems figure 2.



Figure 2. *Artemisia herba alba* Asso. (Ozenda, 1991)

Table 1. Inventoried species in Chott El Gharbi

Species	Biological type	Morphological type
1. <i>Thymus algeriensis</i>	Ch	H.V
2. <i>Astragalus pentaglottis</i>	Th	H.V
3. <i>Muicaria prostrata</i>	Th	H.A
4. <i>Savia verbenacca</i>	He	H.A
5. <i>Plantago ovata</i>	He	H.A
6. <i>Brachypodium distachyum</i>	He	H.A
7. <i>Erucaria uncata</i>	Th	H.A
8. <i>Salsola foetida</i>	Th	H.A
9. <i>Atriplex halimus</i>	Ph	L.V
10. <i>Suaeda fruticosa</i>	Ch	L.V
11. <i>Arthrophytum scoparium</i>	Ch	H.V
12. <i>Lygeum spartum</i>	Ch	H.V
13. <i>Atriplex dimorphostegia</i>	Ch	H.A
14. <i>Salsola vermiculata</i>	Ch	H.A
15. <i>Malva aegyptiaca</i>	Th	H.A
16. <i>Ziziphus lotus</i>	Ph	L.V
17. <i>Salsola sieberi</i>	Ch	H.A
18. <i>Peganum harmala</i>	Th	H.V
19. <i>Plantago albicans</i>	Ch	H.V
20. <i>Hordeum murinum</i>	Th	H.A
21. <i>Pao bulbosa</i>	Th	H.A
22. <i>Stipa tenacissima</i>	Ch	H.V
23. <i>Pseudocytisus integrifolius</i>	Ch	L.V
24. <i>Artemisia herba-alba</i>	Ch	L.V
25. <i>Noaea mucronata</i>	Ch	L.V
26. <i>Alyssum scutigerum</i>	Th	H.A
27. <i>Arthrocnemum glaucum</i>	Ch	L.V
28. <i>Halogeton sativus</i>	Th	H.A
29. <i>Atractylis cancellata</i>	Ch	H.V
30. <i>Atractylis flava</i>	He	H.V
31. <i>Atractylis serratuloides</i>	He	L.V
32. <i>Helianthemum apertum</i>	He	L.V
33. <i>Helianthemum rubellum</i>	He	H.A
34. <i>Astragalus scorpiodes</i>	Th	H.V
35. <i>Herniaria hirsuta</i>	Th	H.A
36. <i>Schismus barbatus</i>	Th	H.A
37. <i>Cornulacac monocantha</i>	Ch	L.V
38. <i>Adonis dentata</i>	Th	H.A
39. <i>Fagonia arabica</i>	Ch	H.A

The leaves are small, sessile, pubescent and silvery in appearance [7]. Divided into thin, white, woolly strips. The flowers are grouped in clusters, with very small and ovoid flower heads of 1.5 to 3 mm in diameter, yellow to reddish in color (Bezza et al., 2010 [8]). The fruits are achenes. The plant's vegetative growth takes place in the fall (large leaves), then at the end of winter and in spring (smaller leaves) (Akrou, 2004 [9]).

Flowering begins in June and develops mainly at the end of summer [10]. The roots appear in the form of a main root, woody and thick, very distinct from the secondary roots and which sinks into the ground like a taproot. The root penetrates deeply to 40 to 50 cm and only branches at this depth [11].

The Asteraceae family, to which *A. herba alba* belongs, have been the subject of several phytochemical studies (Nassrallah et al., 2020 [12]). Many chemical studies have revealed that the aerial part of *Artemisia herba alba* as well as the genus *Artemisia* is rich in secondary metabolites such as polyphenols, flavonoids, lactones, tannins, essential oils [13-15]). Chemical investigations have shown that plants belonging to *A. herba alba* are rich in its quiterpene lactones such as eudesmanolides and germacranolides (Ayad 1989, Mssais et al., 2008 [16]). Artemisinin is the active medicinal substance Figure 3 isolated from the plant *Artemisia annua* and also present in *Artemisia herba alba* (Asso.) whose medicinal virtue has been known in China for more than 2,000 years. It is a sesquiterpene lactone carrying a peroxide group which seems to be the spearhead of its therapeutic effectiveness [17]. Artemisinin and its derivatives are essential components of artemisinin combination therapies (ACTs) used to treat millions of people with malaria. Artesunate, a derivative of artemisinin, is used to treat people with severe malaria [18]. The presentation below mainly focuses on *Artemisia annua* then *Artemisia afra*, because these are the *Artemisia* species for which the volume of information available is the greatest [19].

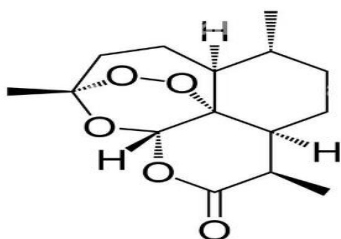


Figure 3. Chemical structure of Artemisinin

3.1. Therapeutic use

According to the ethnobotanical survey that we carried out, through a questionnaire which reached 1200 people belonging to the local population. On medicinal plants used in the therapy of diseases, the use of *Artemisia herba alba* dominates. According to a questionnaire, 46% of patients admit to having taken *Artemisia herba alba* for anti-flu treatments, 38% also used *Thymus* for various treatments, 6% were treated with *Atriplex halimus* and 2% for other species [19].

3.2. Methods of use and preparation

Regarding the method of use, observation of table 2 highlights the importance of the preparation methods (Decoction, Herbal Tea, Maceration, Infusion, etc.) compared to the others. Oral use appears to be a rule which responds to the mode of treatment of the most frequent pathologies and seems to be the most effective. Except for the treatment of skin and rheumatic conditions, the traditional therapist in the steppe region in general [20].

Table 2. Chemical characterization and mode of use of *Artemisia herba alba* (Asso.)

Species	Compounds	Therapeutic uses	Preparation
<i>Artemisia herba alba</i> (Asso.)	Terpenes Flavonoids	Hypoglycemic Hypolipidemic Anti-inflammatory Anti-parasitic Anti-microbial	Decoction Herbal tea Maceration Infusion

4. CONCLUSIONS

In Algerian steppe zones, populations mainly use traditional plant-based medicine, because it remains the most affordable, and recommended for its effectiveness (Boubekeur et al. [21]).

The investigation into herbal therapy at Chott El Gharbi presented in this work provided at first, preliminary information on the richness and diversity of spontaneous plants in these regions. In second, this investigation allowed us to select the species which has the strongest medicinal use among the steppe populations. *Artemisia herba alba* (Asso.) is species with strong medicinal utility alongside *Thymus algeriensis* and *Atriplex halimus*. Finally, due to their high demand among populations, these species should also be subject to conservation management [22].

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