



## Original Article

# The medicinal plants of Bousaada (M'sila, Algeria)

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### ABSTRACT

The study area of Bousaada is characterized by a rather remarkable flora, the floristic list of identified plants is 88 species belonging to 82 genera and 43 botanical families. These plants are of ecological, medical and economic interest which must be preserved, conserved, to ensure their sustainability.

The method of approach is an ethnobotanical survey carried out in the Bousaada region, which was chosen for its florist, ecological and climatic diversity and offers the local population a fairly rich knowledge of traditional herbal medicine, and the fact that traditional healers are known to have a good knowledge of the use of medicinal plants.

This ethnobotanical study is carried out using a questionnaire of the survey is divided into two parts making it possible to collect information on the person (sex, age, levels of study, family situation), and on medicinal plants (name, use, part used, method of preparation).

The aim of this study was to identify, catalog, document the large number of medicinal plants used in the region of Bousaada for the treatment of various human pathologies, and how to exploit and conserve this rich flora.

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## 1. Introduction

Algerian forests present very significant potentialities, 2840 Sahara species included, 147 must be considered as endemic according to Quezel, [Error! Reference source not found.] i.e. more than 8% ; 235 belong to Mediterranean lineages, with more than 300 endemic North African species; however, the valuation and the good management of this floristic heritage is marked as a prime interest.

The interest of medical sciences and industry is growing for medicinal and aromatic plants, from their production to their use by the public, several sciences and disciplines are concerned, forestry, agronomy, chemistry, pharmaceuticals

and ecology [2]. Phyto ecology, which is interested in the study of the auto ecology of species by associating with the synecology between groups of species and their environment, the objective of which is to ensure sustainable development for a possible proposal for a management plan on a stationary scale which will facilitate monitoring [3].

## 2. Materials and Methods

### 2.1. Presentation of the study area:

The city of Bousaada is located on the Tellien Atlas and

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south of Chott El Hodna and covers an area of 256 km<sup>2</sup>, limited to the north by the municipalities of Ouled Sidi Brahim, Maarif and El Haouamed and to the south by Oultame, Temsa and ELHamel.

Bousaada has two large oueds : Oued Maitre and Oued Bousaada. The waters which drain these two oueds flow into the sebkha basin to the south of the chott, it is notably surrounded by a strip of palm groves on the east side and dunes on the north side. So we can say that « The territory of Bousaada is well determined by natural elements » [4].

At the geological level, the study area represents a stratigraphy of the meridian valley based on rocky chains

pointed in the sand and rocky hills; the sand and the mountain ranges are composed of marl and sandstone. The main types of soils are mineral soils, magnetic calci, hydromorphic soils, saline and alkaline soils. The average annual rainfall is 185.8 mm. The minimum temperature during the coldest month recorded in January is 4.1 ° C and the average maximum temperature of the hottest day (July) is 39.8 ° C, the dry season extends throughout of the year, the seasonal type is APHE with an Emberger thermal precipitation equation, 1955 is 17,55.

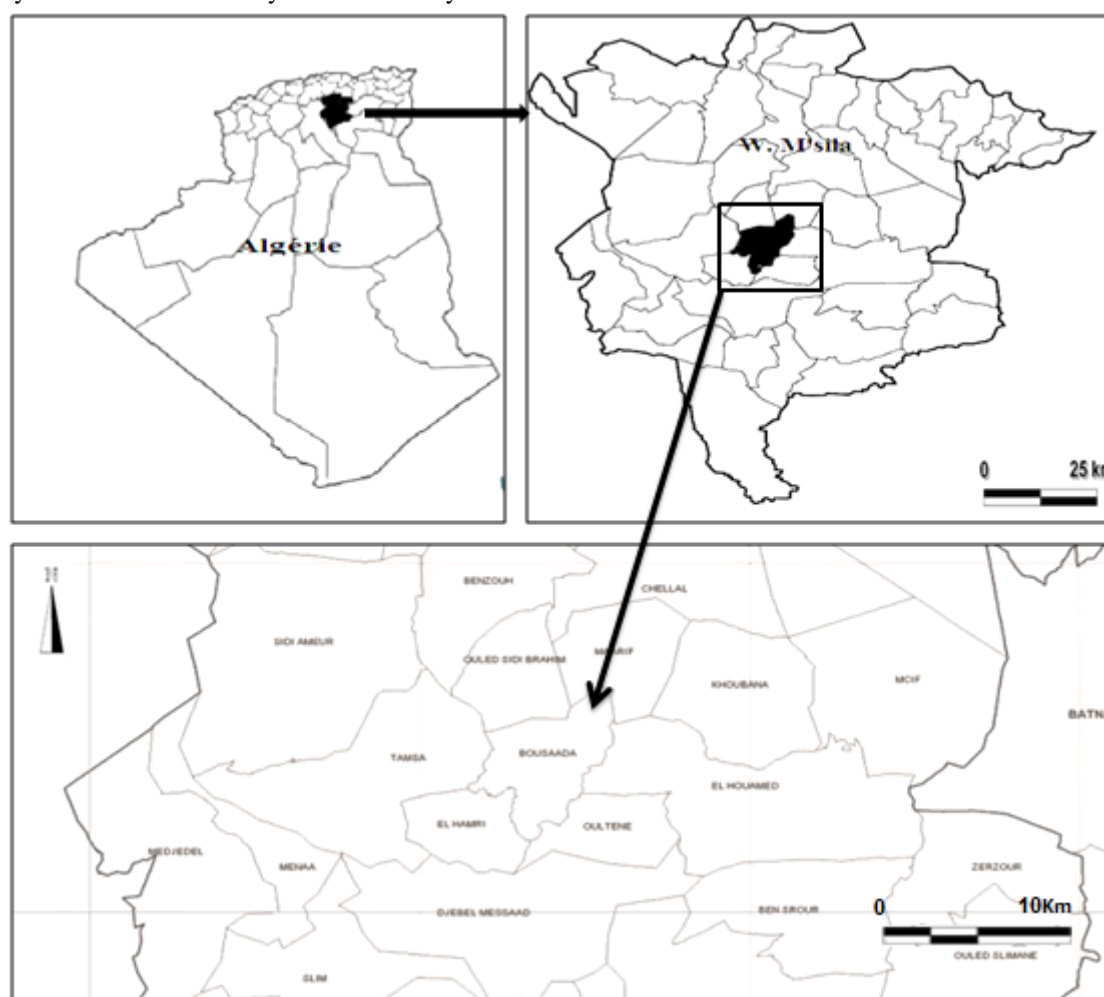


Figure 01: Geographical location of the study area Bousaada (M'sila, Algeria).

#### 2.4. Methodology

With this in mind, an ethnobotanical survey on medicinal plants was undertaken in the Bousaada (M'sila) region. In order to identify the therapeutic uses and the habits of local populations. Taking these specificities into account by determining the ethnobotanical use values of these plants could not only help define in management programs, the parts qualified for conservation, but also those which

contribute to the goods beings of the local populations.

This ethnobotanical study is carried out using a two-part survey questionnaire that collects information on the person and on medicinal plants. These surveys have enabled us to list the species used as well as to determine the part of the plant used and how it is used. The survey carried out in March 2019 [Annex 01].

For the determination of the plant species, we used the new Algerian flora by Quézel and Santa [5], flora of North

Africa by Maire[6], Encyclopedia of useful plants by Baba Aissa [7][8], the flora of the Sahara of Ozenda [9] [10], and Ramade's encyclopedic dictionary of natural science and biodiversity [11].

### 3. Results and Discussion:

#### a. Analysis of informant profiles :

According to these surveys, the study area is characterized by a fairly remarkable flora, the floristic list of plants identified is 88 species belonging to 82 genera and 43 botanical families. The ethnobotanical survey carried out in the Bousaada region made it possible to interview people of both sexes (men and women), aged over 20 to over 60, married and single and at different intellectual levels, who informed us on the therapeutic and traditional local applications of medicinal plants. The survey data were grouped together by prospected municipality, sex, age group, family situation and by level of education in order to be able to determine the response rate of respondents by category throughout the region.

**Gender approach:** The medicinal plants are used well by women than by men (59.30% against 40.70%).

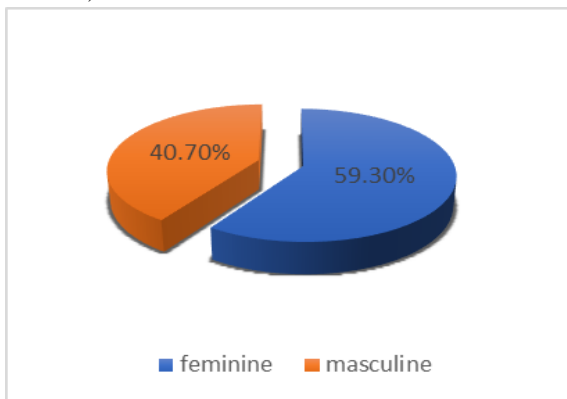


Figure 02: Distribution of informants by sex.

**Age group:** The use of medicinal plants in the Bousaada region is widespread among all age groups, with a predominance among the elderly [30 to 40] years old (26.74%). However, for the age group over 60 years, there is a rate of (20.93%), and for the age group of [40 to 50] years (18.60%), then (17.44%) for the age group of 20 to 30 years and for people aged [50 to 60], the use of medicinal plants (16.28%) does not represent a great therapeutic interest.

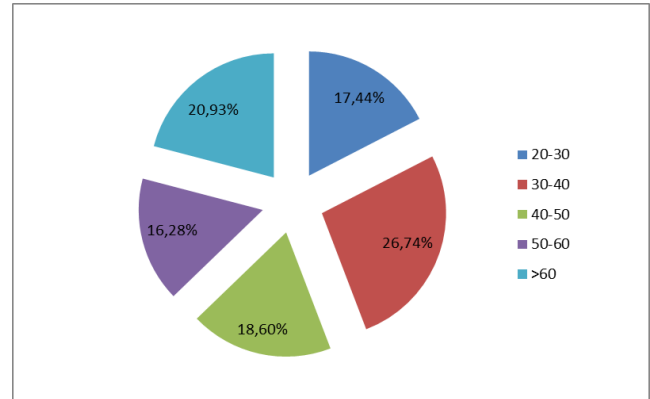


Figure 03: Distribution of informants by age.

**Levels of study:** The vast majority of the users of medicinal plants have the primary level with a percentage of 34%. This relatively high percentage is in direct correlation with the level of education of the local population using the plants. Nevertheless, people with secondary school level have a significant percentage of medicinal plants use which is 26%, while those with a university level have a percentage (24%) in the while illiterate people use medicinal plants very little (16%) compared to educated people.

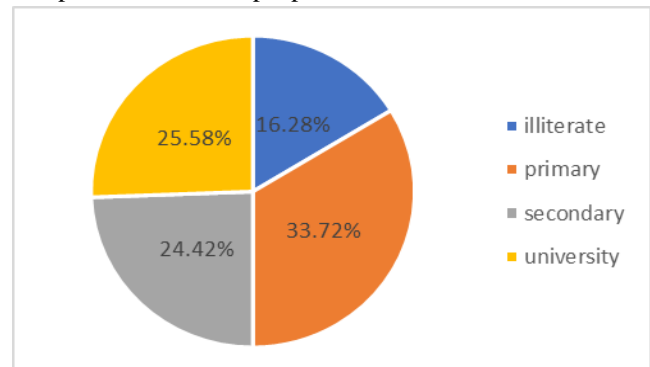


Figure 04: distribution of informants by level of study.

**The family situation:** Medicinal plants are much more used by married people (84%) than by single people (16%).

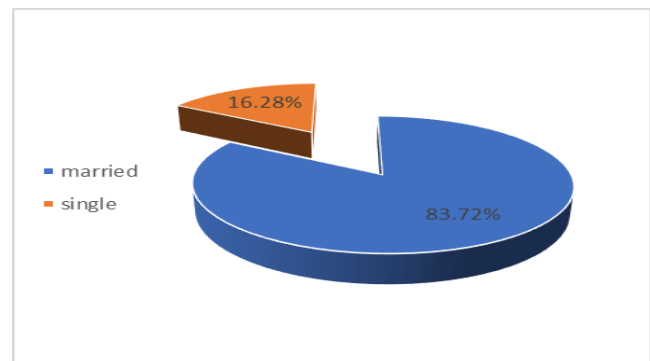


Figure 05: distribution of informants according to family situation.

### b. Medicinal uses of plants :

**Part used:** The plant parts used are classified in decreasing order of importance: leaves (31.70%), fruits (10.77%), roots (9.58%), seed (7.78%), flowers (8.38%), aerial part (7.78%), stem (5.38%), and whole plant (3.59%).

The remainder of the parts used is represented by a rate of (18.59%).

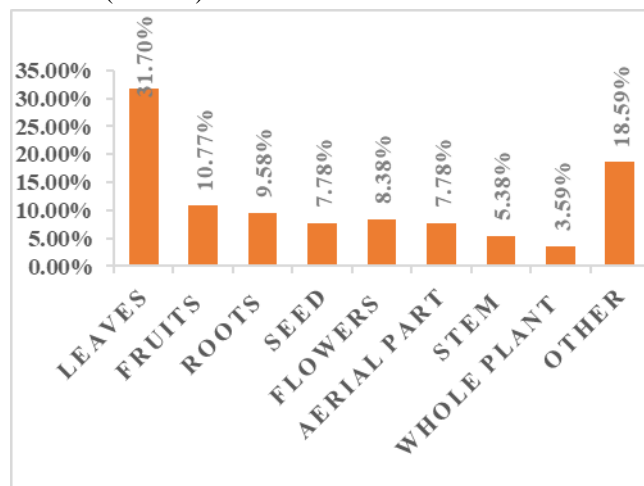


Figure 06: The frequency of use of different parts of medicinal plants

**Method of preparation:** In order to facilitate the administration of the drug, several modes of preparation are employed namely decoction, infusion, powder, fumigation, poultice, maceration and basting. People are always looking for the easiest way to prepare herbal medicines.

Aqueous infusion (39.06%), decoction (26.04%) and powder (21.89%) are the most widely used methods of preparation. The decoction collects the most active ingredients and reduces or cancels the toxic effect of some recipes.

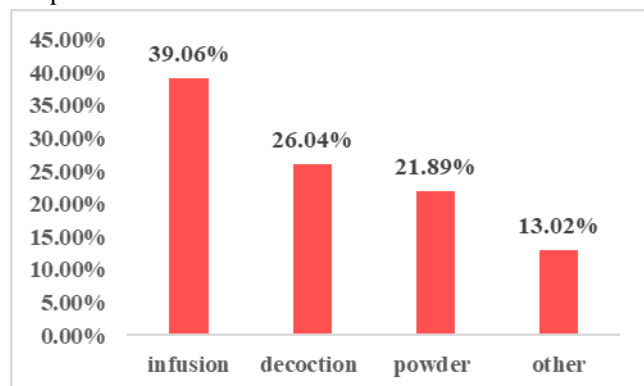


Figure 07: The ways of using medicinal plants

### c. Floristic analysis:

Floristic analysis of the listed plants shows that 98 species are used. They are divided into 44 botanical families. Of the 44 families encountered, four families clearly dominate the use profile, which are: Lamiaceae 11 species,

Asteraceae, fabaceae 7 species and Aceraceae 6 species.

### 1. Outlooks and recommendation:

The study area thus defined and located in an arid bioclimate which makes it very fragile and sensitive to the station conditions on this regard we propose the following solutions while hoping that they will be applied by the local authorities:

1. Set up various techniques and means for the restoration and rehabilitation of degraded habitats, in particular those which have revealed a rich heritage of interest;
2. Fire prevention, the risk of this scourge is greater in the eastern area and around the landfill. It is therefore necessary to ensure increased surveillance and provide, if necessary, rapid means of intervention, particularly in the summer season;
3. Hold meetings with the aim of clarifying the concepts, developing methodologies and criteria for identifying and evaluating habitats. This with the aim of emerging with a uniform national typology which will serve as a basis for future work;
4. Develop awareness-raising, popularization, communication and public orientation actions and involve local populations in the protection of medicinal plants;
5. Strengthen the network of tracks through improvements and opening;
6. Creation of local nurseries meeting conventional standards;
7. Rational exploitation of this potential for methods of domestication;
8. Defenses to keep medical species in their natural state.

### 4. Conclusion :

The floristic analysis of the results obtained by this study made it possible to identify 88 medicinal species divided into 43 families, with the predominance in particular of four families Lamiaceae, Fabaceae, Asteraceae, Arécaceae. Likewise, the most widely used species in this region are *Mentha Viridis* L., *Artemisia herba-alba* Asso, *Juniperus communis* L., *Artemisia Campestris* L., *Rosmarinus officinalis* L., *Peganum harmala* L., *Allium sativum* L., *Teucrium polium* L. and *Allium cepa* L., the most are lamiaceae. Thus, the results obtained showed that the leaves are the most used parts (31%) followed by the fruits (10.77%), the roots (9.58%), the seed (7.78%), flowers (8.38%), aerial part (7.78%), the stem (5.38%), the whole plant (3.59%), The rest of the parts used are represented by a rate of (18.59%). The aqueous infusion (39.06%), the decoction (26.04%) and the powder (21.89%) are the most used methods of preparation, constitute the main part of the preparation of herbal drugs in traditional herbal medicine. In addition, the study of the use of medicinal plants showed

that internal diseases (the digestive system) (43.02%), diseases of the respiratory system and rheumatism with (22.09%), diuretic affections (20.93%) are the major therapeutic indications.

## Appendix

Appendices, if needed, appear before the acknowledgment.

## Acknowledgements

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## Conflict of Interest

The authors declare that they have no conflict of interest

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