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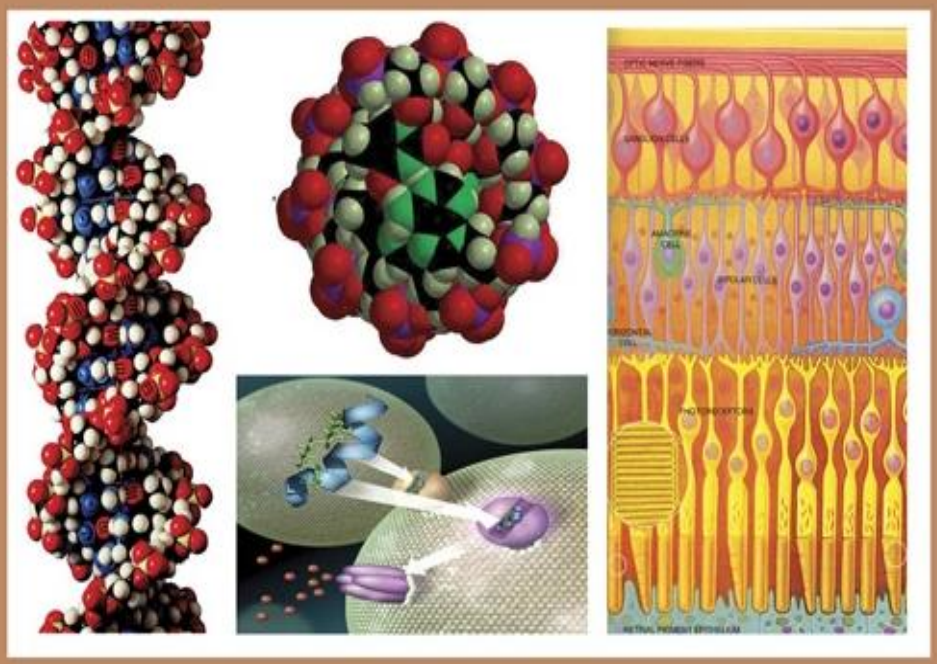

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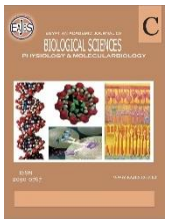

Ethnobotanical Study on *Ziziphus lotus* L in Western Algeria (Relizane)

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ABSTRACT

This study compares the various knowledge of the use of *Ziziphus lotus* L. in a semi-arid zone in the west of Algeria (Relizane province). The ethnobotanical survey used semi-structured interviews carried out on 300 people in four different localities. The final matrix was processed using the appropriate statistical methods for the different types of variables (quantitative and qualitative). The hierarchical ascendant classification reveals a high diversity of the use of *Ziziphus* by the local population (therapeutic and cosmetic). The Results indicate that the use of the plant is almost therapeutic (75%) whereas the most used parts are leaves (70,33 %) and fruits (19,66 %). The plant is much more used in cases of pain and fever with a percentage of 41,33 %. It is also used for gastrological and respiratory diseases. The analysis of variance revealed significant differences for all the analyzed parameters. This is explained by the fact that the plant is used in different ways for different diseases with different modes. It was concluded that the inventory interview was the most effective method to better inform the local population's know-how, as it allowed for the identification, It is recommended to intensify the ethnobotanical investigations to trace the phytotherapeutic path of the species.

INTRODUCTION

In Algeria, because of the diversity of its environment and flora, traditional pharmacopeia disposes of a richness of plants used for the treatment of a large spectrum of diseases. Many studies have demonstrated that traditional medicines are still used, and should be scientifically studied. Many authors have studied the traditional pharmacopeia in different areas of Algeria (Rebbas & Bounar, 2014; Rebbas *et al.*, 2012; Derridj *et al.*, 2009).

Ziziphus lotus is one of the major medicinal plants belonging to the Rhamnaceae family which includes around 550 species spread over around 45 genera (San *et al.*, 2009). Being both a tropical and a subtropical plant, *Z. lotus* is commonly present in arid and semi-arid regions (Maraghni *et al.*, 2011). In Algeria, this xerophytic plant can be found in the sand dunes of Saharan region as well as in the aride and semi-arid zone where it occupies different types of soil (Guirado *et al.*, 2017). *Z. lotus* is dormant from October to March and its fruits are harvested during the summer (Maraghni *et al.*, 2010). It forms clumps of a few meters in diameter and 2 to 5 m in height. Its thorny stems possess small deciduous leaves and tasty fruits called jujube and are known locally as 'Nbeg' (Ghedira, 2021) (Hammi *et al.*, 2015).

This plant is employed in nutrition, health and cosmetics in several forms: honey, tea, jam, juice, oil, loaf and cake. In addition, in traditional medicine, both in North Africa and the Middle East, several parts of *Z. lotus* are given as anti-urinary troubles agents, antidiabetes, skin infection, antifever, antidiarrheal, insomnia agents, sedative, bronchitis and hypoglycemic activities (Adzu *et al.,* 2003) (Anand *et al.,* 1989).

In This context, the shrub *Z. lotus*, commonly named 'Sedra', is the subject of many current laboratory investigations. The objective of the main word was to evaluate the different knowledge and multiple uses of *Ziziphus lotus* as a medicinal plant in the treatment of different diseases in the region of Relizane (West of Algeria). We proceeded to establish an inventory of how, when, where and by who the plant is used.

MATERIALS AND METHODS

Study Area:

Relizane province area is situated in North-Western Algeria. It covers an area of 4 851 km² and has a population of 726 180. This area is characterized by a semi-arid bioclimatic stage. Geographically, this area contains many provinces; the survey was conducted in the following areas: Relizane city, Yellel, Matmar and Zemmoura (Fig. 1).

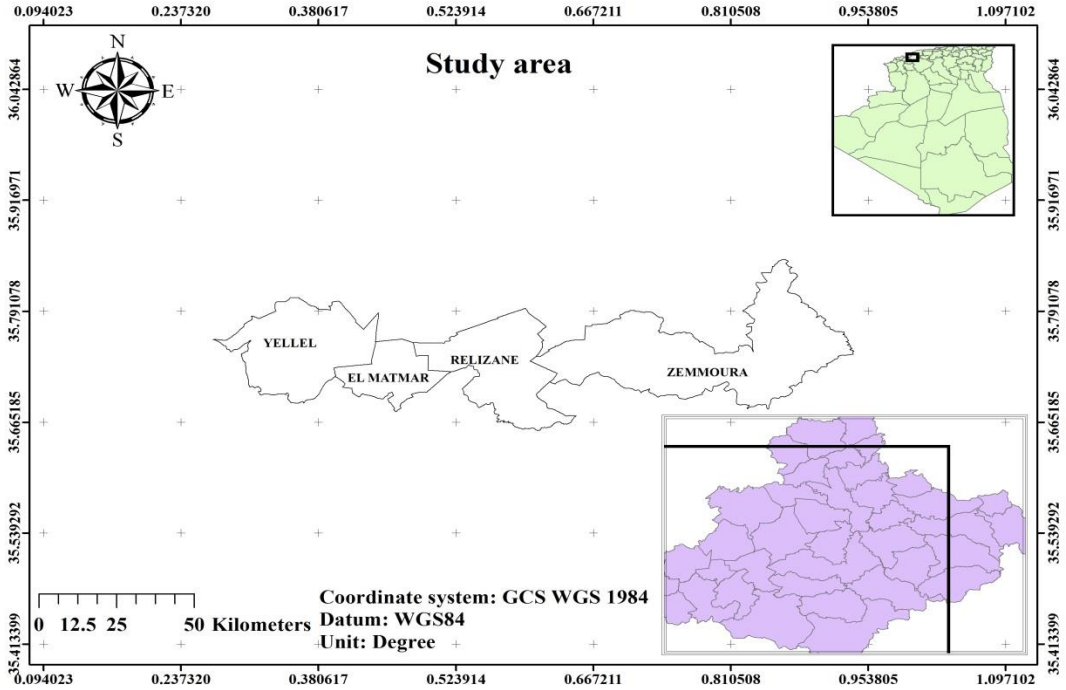

Fig. 1: Localization of the study area.

Methods:

The ethnobotanical surveys were carried out from September 2021 and July 2022 using a semi-structured survey (Martin, 1995) of which the interview was conducted with adult people, who live in the area and practice the use of medicinal plants. 300 people (adult men and women) were interviewed. They were asked to give their knowledge about the plant as well as their uses against diseases, the parts of the plant harvested, the method of preparation of the remedy, and details of administration and dosage.

The dialogue took place in Arabic and French depending. The information collected in the field was completed at the University of Relizane (Department of Biological Sciences). Data collected and noted on the survey forms were then inputted and statistically analyzed.

Data Analysis:

The data was processed by two methods: (i) hierarchical ascendant

classification and (ii) multifactor variance analysis. The treatment was carried out by the R 3.6.3 software.

RESULTS

Sex of the Persons:

The information obtained showed that the majority of the people interviewed were men, with 153 persons for men and 147 for females **(**Fig.2**).** This can be explained by the diversity within the communities in the study area.

Fig. 2: The gender ratio of the study population.

Plant use:

According to the results, the use of the plant is almost therapeutic (75,33 %) (Fig. 3). That being said, a very limited number of persons use it in cosmetics (19,33 %). The fruit is consumable and rich in vitamins A, C, iron and calcium, its nut can also be used to make oils in cosmetics

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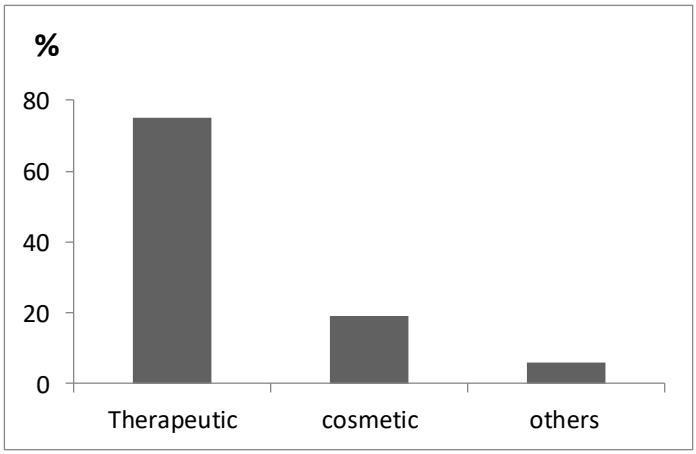

Fig. 3: Percentage of plant use.

The AHC allowed us to classify the three hundred people into two groups regarding the nine selected variables (Fig. 4).

The first group (A), represents the cosmetic vocation (very limited), while the second group (B), represents medicinal use (very large). Indeed, the therapeutic use of the plant concerns the following diseases: pain and fever, gastrological, neurological, respiratory and dermatological.

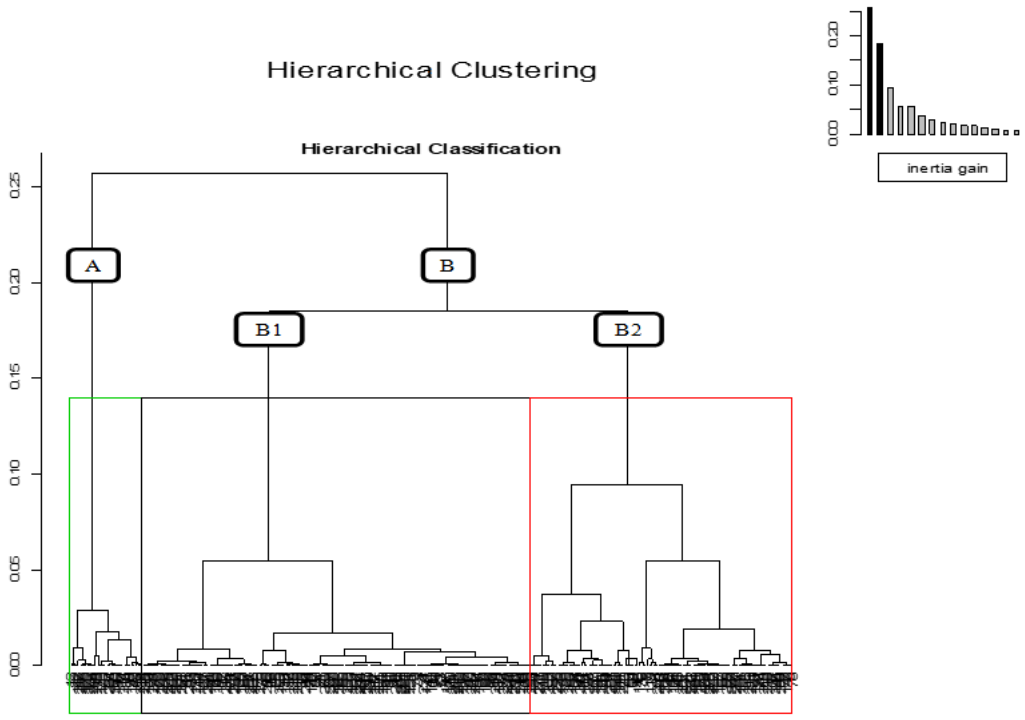

Fig. 4: Dendrogram of the AHC.

State of the Plant:

The information obtained revealed that the desiccated plant was the most used with a percentage of 72,66 % **(**Fig.5**).**

The Used Parts of The Plant:

The leaves and the fruits are the most used parts with respectively 70,33 % and 19,66 %; also, there are people who use the whole plant. The use of stems, roots and flowers is insignificant (Fig. 6).

Form of Use:

The most useful forms of the plant are herbal tea and powder with a respective percentage of 48,66 and 32,33 % (Fig. 7). The forms of essential oils and greasy oils are used in the field of cosmetics.

Methods of Preparation and Administration:

The most common method of preparation is an infusion with a percentage of 38,33 %, followed by decoction and cooking respectively with 32,33 and 28,66 % (Fig. 8).

The results revealed that the most used method of administration is oral with 62,66 %. Then we have a massage and rinsing respectively with 30,33 and 8,33 % (Fig. 9).

Dosage Used:

The majority of people interviewed use a precise dosage (69,33 %), while others use a spoon with a percentage of 18,33 % (Fig. 10).

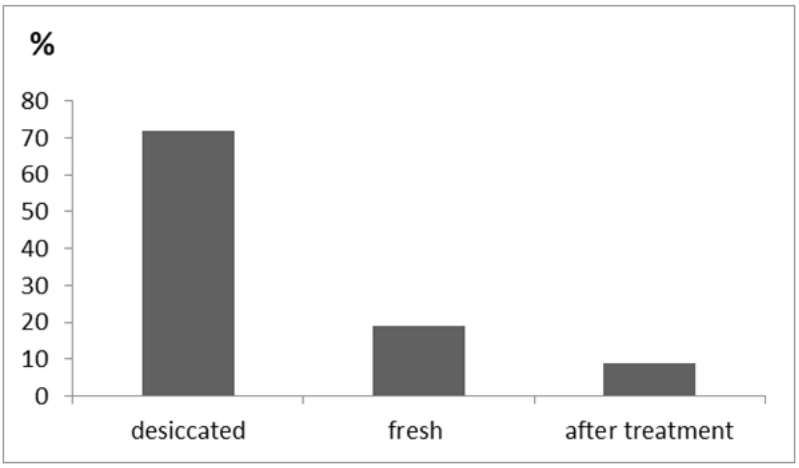

Fig. 5: Percentage of the state of the plant.

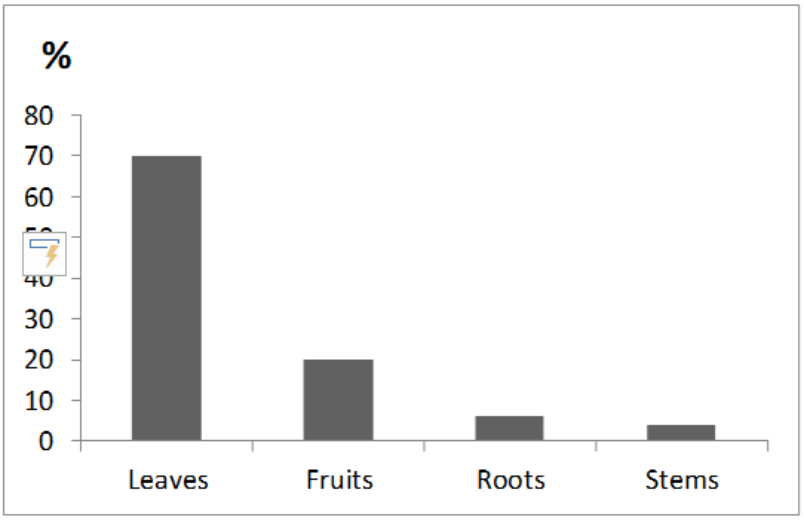

Fig. 6: percentage of parts used.

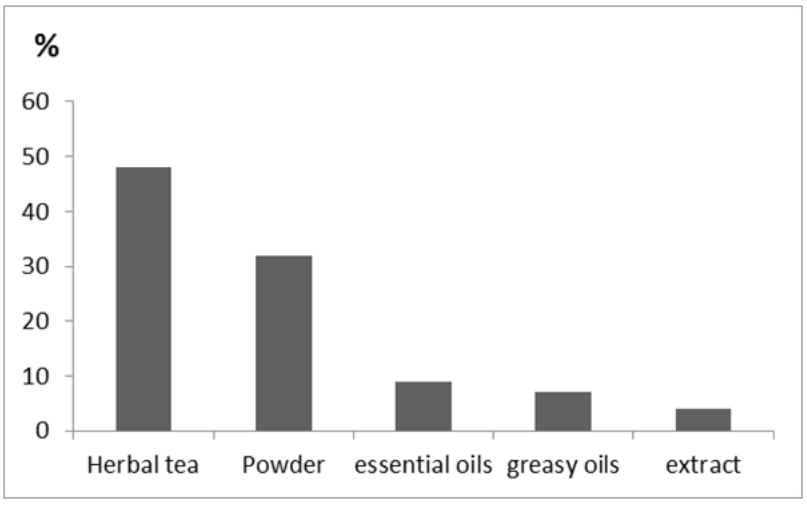

Fig. 7: Percentage of the form of use.

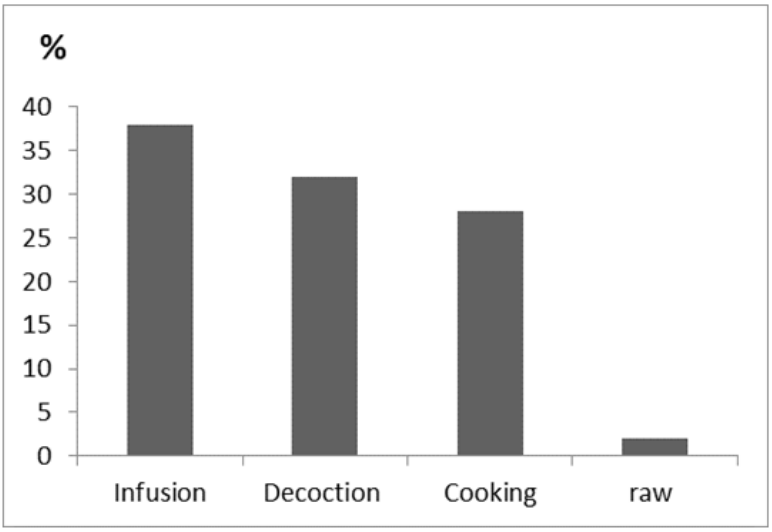

Fig. 8: Percentage of the preparation mode.

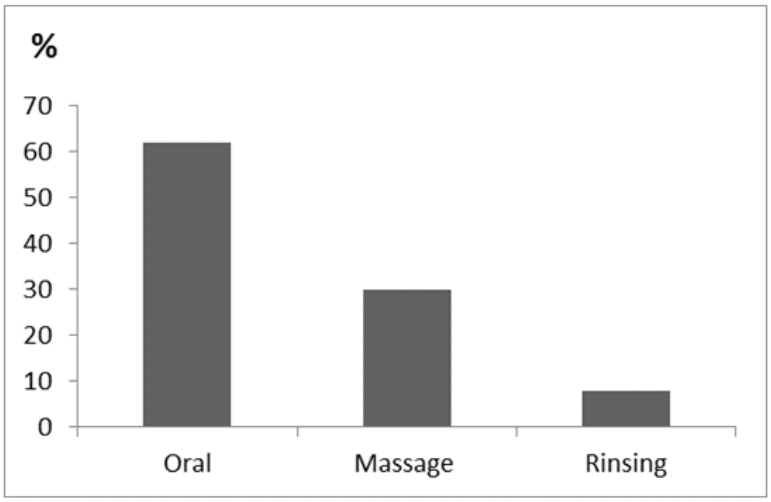

Fig. 9: Percentage of the administration mode.

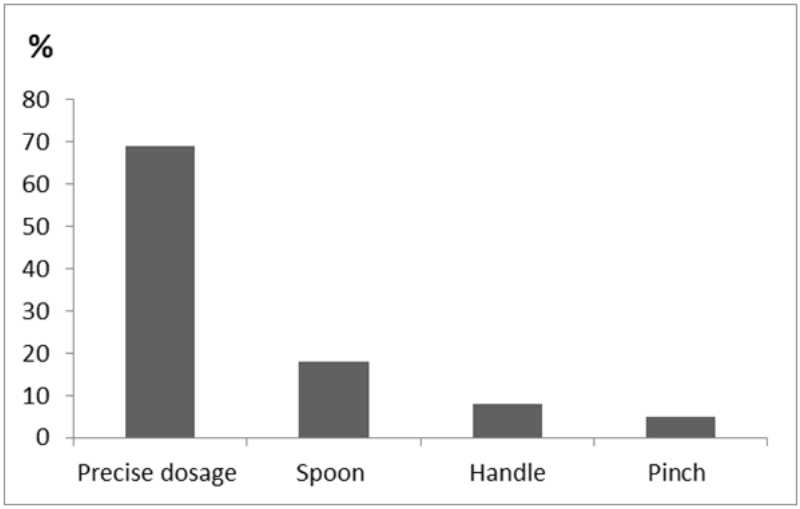

Fig. 10: Percentage of dosage used.

Target Diseases:

According to the results obtained the plant is much more used in cases of pain and fever with a percentage of 41,33 %. It is also used for gastrological and respiratory diseases with respectively 21,66 and 18,66 % (Fig. 11).

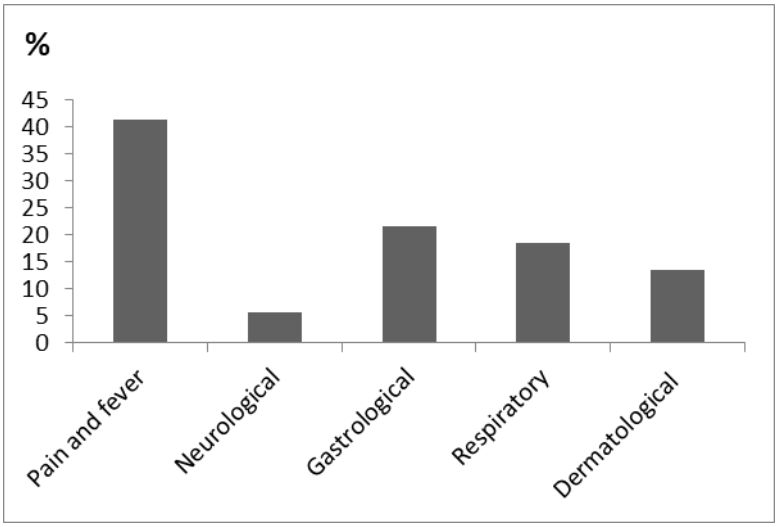

Fig. 11: Percentage of target diseases.

Multi-factor Analysis of Variance:

With many factors to study, it is important to do a multi-factor analysis to identify the variabilities between the different parameters (Table 1).

The analysis of variance revealed significant differences for all the parameters studied. This is explained by the fact that the plant is used in different ways for different diseases with different modes.

Tab. 1: Results of multi-factor analysis of variance.

Questioned persons		
State of the plant	0.028765	*
Target diseases	0.018235	*
State – Parts uses	0.052585	.
State - Sexe	0.077524	.
Target diseases - Utilisation	0.009253	**
Target diseases – Parts- Utilisation	0.045145	*
Target diseases – Admin. mode	0.093	.
Admin. mode – Prepara. mode	0.013694	*
0 '*' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1**		

DISCUSSION

The jujube tree is used by a vast portion of Algerians because it is one of the most valuable and beneficial forest species in our region. Most people use it for therapeutic reasons, but it is also used in cosmetics. Actually, there are several shampoos based on jujube fruits (Rebbas *et al.*, 2012). In traditional medicine, Z. lotus is used as an anti-diabetes, sedative, bronchitis and antidiarrheal by local populations.

Recently, several scientific reports on the health benefits and nutritional potential of bioactive compounds from this jujube have been reported (Abcha *et al.*, 2021; Letaief *et al.*, 2021). This plant is rich in polyphenols, cyclopeptide alkaloids, dammarane saponins, vitamins, minerals, amino acids and polyunsaturated amino acids (Souleymane, 2016).

According to Khouchlaa *et al.* (2017) Z. lotus is used in various ways; jujube oil is used to treat a variety of skin diseases. It is well known that jujube essential oil has antibacterial properties (Hammi *et al.,* 2015). The leaves of jujube are widely used to prepare herbal teas to assist blood circulation, they are also used in baths as it benefits the skin and helps reduce pain and fever.

The sedative effects of the plant would be attributable to its content of triterpenes. One of the components of the core of its fruit, jujuboside A, is supposed to reduce the hyperactivity of neurons (Yahia *et al.*, 2020).

Jujube can be eaten as a fruit. It can also be dried or made into juice. In some countries, the flesh is pounded with sugar and other fruits into a cake that can dry in the sun (Ouhammou *et al.,* 2022). In Reunion Island, the fruit is used to make rhum, a preparation in which various ingredients like leaves or fruits are macerated. We can make jujube paste with a decoction of the fruit, sugar syrup, orange blossom water and pure water. In Algeria, we produce jujube honey (Derridj *et al.,* 2009).

CONCLUSION

The results obtained from the ethnobotanical survey revealed the following points:

- The use of Z. lotus in traditional medicine is very common in the city and communes of Relizane.
- The plant is much more used in therapeutic treatment (75,33 %) and very less in cosmetics (19,33 %).
- For the state of the plant, the desiccated plant was the most used (72,66 %).
- The leaves and the fruits are the most used parts, with 70,33 % of the leaves.
- The most useful forms for people are herbal tea and powder.
- The most useful methods of preparation are infusion, decoction and cooking.
- The most used method of administration is orally followed by a massage.
- Precise dosage is the most used by the population interviewed (69,33 %).
- The plant is much more used in cases of pain and fever (41,33 %). It is also used for Gastrological and respiratory diseases.

This preliminary study needs to be completed through further research on the content and composition of bioactive compounds. Also, studies on antioxidant, antimicrobial and antifungal activities would be very valuable.

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