

Ethnobotanical Survey of Some Plants Used in Traditional Medicine in Southern Algeria (Ouargla, El-Oued, Adrar, Illizi)

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KEYWORDS Algerian Sahara. Diseases. Ethnomedicinal. Medicinal Plants. Traditional Medicine. Therapeutic

ABSTRACT The present study aims to census the ethnomedicinal plants occurring within the native traditional drugs of four regions within the Algerian Sahara, to determine a catalog of medicative plants, and to collect all the knowledge regarding their therapeutic uses practiced by the native population within the studied regions. The information on medicative uses of plants relies on a field survey, interviews, structured questionnaires, and discussion with ancient healers and knowledgeable persons. Using 243 questionnaire cards, the ethnobotanical field surveys were conducted with satisfactory results for two years (2016 and 2017). This investigation created its potential to inventory 102 species happiness to thirty-eight botanical families distributed over ninety-one genera. The family Lamiaceae is the most dominant family that was wont to treat numerous diseases, followed by the family of Asteraceae and Apiaceae. These healthful plants square measure ready in numerous forms like stewing, infusion, compress, inhalation, and herbal tea, that square measure made of leaves, stems, flowers, boughs, fruits, and roots. The dominant diseases that may be treated with over 2 plants square measure dyspepsia, constipation, abdomen pain, diabetes, wounds, skin diseases, and symptom. The results obtained represent a very valuable source of knowledge for the regions studied and for the medicative flora of Algeria.

INTRODUCTION

Since ancient times, plants are a section of human life, from living with as to obtain foods and needs, to consuming and using them for medicinal and nutritional purposes (Bouzabata 2017; Yassine et al. 2021). Plants stay necessary in traditional cultures wherever they're used from birth to death, and other people use plants in a form of ways that to survive, as plants are the most necessary food resource for humans, and mistreatment the various plant species houses are engineered. Also, plant-derived medication is employed to treat sicknesses and to improve health, and it's necessary in the primary attention healthcare world (Phumthum et al. 2018).

Although trendy medicine is wide utilized in all countries, traditional drugs continue to be important to a high proportion of the population. Currently, many drugs using modern medicines were originally synthesized or extracted from the different parts of plants that had therapeutic properties. Searching for bioactive compounds from plants consumes massive amounts of time, specialists, and funding, thus looking for traditional

healthful plants will therefore facilitate reducing prices for drug discoveries (Phumthum et al. 2018).

Medicinal plants are accustomed treat many various types of diseases and health conditions, and these are classified in many classes, for example, in WHO's International Classifications of illness, that may be adapted to ethnobotanical studies and meta-analyses (Phumthum et al. 2018). The medicinal plants remain a source of medicinal healthcare in the countries of the Maghreb, where the use of medicinal plants occupies an important place in traditional Algerian medicine and continues to be developed especially among the local population. According to the geographical location of Algeria and its large surface area, there are Saharan plants, which are known by their resistance to several stress factors, under extreme climatic conditions (Boucherita 2018; Skalli et al. 2019; Baziz et al. 2020), and have been subjected to some works such as those of Quazal and Santa, Ozenda and Chehma (Quézel and Santa 1962; Ozenda 1977; Chehma 2006). It was a desert plant carpet in composition in the Algeria Saharan.

The Algerian population remained attached to this knowledge, which results from local cul-

tural influences, and the contribution of Arab-Muslim academic medicine (Baziz et al. 2020). Today, healthful plants became imperative to document the traditional uses of life. Recently many ethnobotanical and ethnopharmacological studies were undertaken in several regions of the country to preserve the endemic information on one hand, and in another hand to develop a technique to shield biodiversity and plant species, particularly rare, endangered, or extinct in the wild ones from excessive human use (Bouasla and Bouasla 2017). The study of medicinal plants is one of the methods of examining the interaction and relationships between biological and cultural components of the environment.

Ethnobotanical studies today are recognized because the most viable methodology of characteristic new healthful plants or focalization on those earlier according to for bioactive constituents, only some studies are conducted in the assessment, chemical constituents of healthful plants species within the identification of the structure of bioactive constituents of traditional healthful plants country wise (Lakhdari et al. 2016).

In this study, the researchers have focused on an ethnobotanical study in the four regions of

Algerian Sahara (Ouargla, El-Oued, Adrar, and Ilizi) to spot the healthful plants that are utilized by the native population in traditional medicine to tell regarding their importance in therapeutic uses practiced in the regions chosen. this is often in all probability drawing the attention of and biologists, medical specialty management researchers, for further scientific and significant validation.

MATERIAL AND METHODS

Study Area

The study was conducted in four regions of Algerian Sahara (Fig. 1), and also the depression of this area may be a geographical entity is in south-eastern Algeria.

Ouargla's Wilaya

Ouargla is geographically located north of the Algerian Sahara, in the arid domain of the great African desert. Administratively, the Wilaya of Ouargla is located in the southeast of the country in the lower Sahara within the limits of latitude

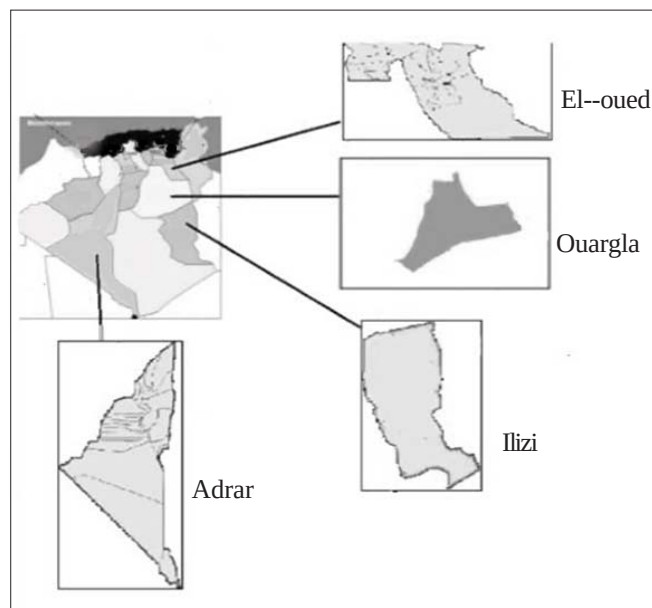


Fig. 1. Geographical Location of the study area
Source: Google maps

28° 45' and 33° 55' and longitude 3° and 9° 35' covering a territory of 163,230 square kilometers. It is located at a 128-meter altitude, 190 km east of Ghardaïa, 388 km south of Biskra and 160 km southwest of Touggourt. It is bounded by the Wilaya of El-Oued in the north, the Wilaya of Illizi in the south, the Wilayat of Djelfa Biskra, and Ghardaïa in the northwest and west, the Wilaya of Tamanrasset in the south-west. The Wilaya is administratively organized into 21 municipalities and 10 Daïrates (Salhi 2018).

El-Oued's Wilaya

El-Oued is found in the southeast of Algeria, between 33° and 34° north latitude, and 6° and 8° of the east meridian, with a region of regarding 350,000 ha, touching the Tunisian and Libyan borders. On the opposite hand, at equal distances are the Gulf of Gabes on the east and also the Saharan Atlas on the west. The immediate surroundings of the El-Oued are the Tozeur region in the east, the Biskra region, the Touggourt region within the west, and also the Oriental work unit within the south. Covering a region of eighty, 000 km², the Souf forms a dune formation stretching 650 kilometers from the Libyan border to the neighbor northern Sebkhas, with a breadth of regarding one hundred sixty kilometers (Abdaoui et al. 2020).

Illizi's Wilaya

Illizi is located in the southeast of Algeria over 1,758 km from the Algerian capital. The province borders Libya, Niger and Tunisia. Within Algeria, it borders with Ouargla in the north, and Tamanrasset in the west, and covers an area of 284,618 km² (one-ninth of the total area of Algeria). The total population of Illizi is estimated at 57,100 inhabitants (Miara et al. 2019).

Adrar's Wilaya

Adrar is located in the southwest of Algeria (27° 59' N, 0° 17' W), and it covers an area of 427,968 km², with a population of 336,046 inhabitants. Adrar is located in the central north of the Wilaya of which is the capital. The town of Adrar is located approximately 600 km south-east of Bechar, by road, and 429 km as the crow flies, 1,200 km east of Tindouf, by road (via Béchar) and 777 km as the crow flies, and 1,400 km southwest of Algiers, by

road, and 1,087 km as the crow flies (Yebouk et al. 2020).

Collection of Information

The main aspect of the study focused on the ethnobotanical investigation of medicinal plants, and during this study, the researchers have chosen four stations.

The ethnobotanical survey was carried out through the use of a questionnaire. The users were questioned either in Arabic or in the French language. The investigations took place from the year 2016 to 2017.

Questionnaire

The study method is based on an ethnobotanical questionnaire submitted to the survey during individual interviews. The file ethnobotanical survey was completed among 243 people. This questionnaire concerns the profile of each investigated and the ethnopharmacological data collected for each plant used by the population for treatment by traditional medicine (the profile of the informant, medicinal plants, cured diseases).

Data Collection

The duration of the ethnobotanical survey period was from 2016 to 2017. To collect ethnobotanical data 243 people were randomly asked 43 points of surveys including towns, villages, douars, and popular markets.

The respondents were questioned individually using a completed questionnaire form by speech examination. Certain socio-economic demographic data like age, sex, level of education, family situation, habitat, profession, and others related to medicinal plants such as the local name of the species, the parts used, their modes of preparation and use, were collected.

Identification of the Medicinal Plants Included

In the four regions (Ouargla, El-Oued, Adrar, Illizi), the researchers have used reference materials to identify the medicinal plant uses in folk medicine. The identification of plant materials was ensured with the assistance from specialised per-

son and healers, after confirming it with totally different floras and cross-checking with published data (including (Quézel and Santa 1962; Ozenda 1977; Chehma 2006; Halis 2007; Ould El Hadj et al. 2003; El Hafed et al. 2010).

Data Analysis

After the data was collected the ethnobotanical surveys and the analysis of the questionnaires, it was analyzed using Excel (Microsoft Office).

RESULTS AND DISCUSSION

Distribution of Number of People Surveyed by Type Popular

Of using 243 questionnaire sheets, ethnobotanical field surveys were allotted throughout two campaigns in 2016 and 2017. The placement of the various ethnobotanical survey environments in the study space was known by the stratified probability sampling technique (Kahouadji 1986). The collected samples were divided into four strata based on the various study space of the Algerian Sahara (Table 1). By continuing with straightforward sampling, samples of little numbers are then formed for each of the four strata, and they are placed along to create the sample (243 people). This study focuses on the drafting of a catalog as thoroughgoing as the potential of the medicative plants employed in the study areas. 243 sheets were completed, comprising sixty-six herbalists, twenty-two herbal doctors, and a hundred thirty-five people victimization of medicative plants in traditional medical care in several strata of the world study.

Different Categories of Users of Medicinal Plants According to the Profile of the Survey

Ethnobotanical surveys in the four regions (Ouargla, El-Oued, Adrar, Ilizi) allowed the re-

searchers to classify the different users of medicinal plants interviewed by category (Table 2).

Table 2: Different categories of uses of medicinal plants (Ages, sex, education level, profession, Saharan population)

Categories	Percentage %
<i>Percentage (%) of Medicinal Uses by Age</i>	
≤ 20 years old	06
20-30 years old	43
30-40 years old	22
40-50 years old	12
50-60 years old	10
≥ 60 years old	07
<i>Percentage (%) of Medicinal Uses by Sex</i>	
Male	37
Female	63
<i>Percentage (%) of Medicinal Uses by Education</i>	
Illiterate level	05
Primary level	15
Medium level	20
Secondary level	18
University level	42
<i>Percentage (%) of Medicinal Uses by Profession</i>	
Unemployed	60
Herbalists	24
In medicinal field	02
Other jobs	14
<i>Percentage (%) of Medicinal Uses by Sahara Population</i>	
Herb users	94
Herb non-users	06

Categories by Age

People between 20 to 30 years of age have frequented these medicinal plants by forty-three percent, followed by the age groups of 30 to 40, 40 to 50, and 50 to 60 years with twenty-two percent, twelve percent, and ten percent, respectively. People over the age of 60 years have seven percent, and finally, those less than 20 years have six percent. The results, therefore, revealed that young people aged 20 to 30 years old were the

Table 1: Distribution of questionnaires according to strata

Strata	Name of strata	Number of questionnaires			
		Ordinary people	Herbalists	Herbal doctors	Total
1	Ouargla	60	30	6	96
2	Adrar	20	10	1	31
3	Ilizi	7	00	00	7
4	El-Oued	68	26	15	109
	All total		243		

age group with the highest rate of usage of such medicinal plants. On other hand, the age group of less than 20 had the lowest rate of users.

Categories by Sex

The users who have recourse to traditional medicine are of the order of 243 people in the questionnaire. Besides, two categories of females and male people are concerned with traditional medicinal plants. Among them, sixty-three percent of plant users for medicinal purposes are females, compared to thirty-seven percent of males. Study results showed that women were the category that used the most medicinal plants.

Categories by Profession

In the field of using medicinal plants, the results of the survey showed that the highest rate was recorded among unemployed people, with sixty percent, followed by herbalists with twenty-four percent, and fourteen percent among those with people who have other professions (other jobs).

As for the lowest percentage recorded among those working in the field of medicine, their uses were limited to two percent of the medicinal plants used.

Categories by Education Level

Forty-two percent of users of medicinal plants are educated at university levels and followed by the medium levels of education with twenty percent. Secondary and illiterate levels were at a percentage of eighteen percent, and fifteen percent, respectively. Finally, the less percentage registered in the primary levels with five percent.

Sahara Population Users' Categories

The result has shown that ninety-four percent of the Saharan population use herbals or medicinal plants in their daily life, and six percent of them never used the herbs.

List of Medicinal Plants and Their Uses in the Four Regions of Sahara

Sahara Algeria has many herbal plants with different medicinal properties, which indigenous

people acquire, preserve and pass on to their next generation. In the four regions chosen, the surveys of the population have identified 102 medicinal plant species belonging to 38 families, grouped into 91 genera (Table 3).

The species most used by the local population are *Menth aspicata* L., *Lippia citriodora*, *Trigonella foenumgraecum* L., *Ricinus communis*, *Allium sativum* L., *Ocimum basilicum* L., and *Zizyphus lotus* L.

Table 3 shows the plants used by the population to treat different disease conditions. For each plant identified, the researchers give the scientific name, the family, the common name, the Arabic or Tamazight name, and the frequency of use.

Lamiaceae is the most dominant family used to treat various diseases, and it was presented with 14 species included in 9 genera (*Mellissa*, *Rosmarinus*, *Thymus*, *Mentha*, *Salvia*, *Marrubium*, *Lavandula*, *Ocimum*, *Ajuga*), followed by the family Asteraceae and Apiaceae, Fabaceae, and Poaceae with 6 genera (*Cynodon*, *Artistida*, *Hordeum*, *triticum*, *Avena*, *Stipa*).

The surveys result indicated that most medicinal plants were used to treat different illnesses and health problems like digestive, respiratory infection, skin problems, diabetes, anaemia, stomach concerns, cough, fever, ulcers, and diarrhoea. Some of the results obtained from medicinal uses were reported in the literature data (Gali-Muhtasib et al. 2006; Argypoulou et al. 2007; Benedek and Kopp 2007; Kamatou et al. 2008; Al-Rawashdeh 2011).

The leaves, seeds, fruits, aerial elements, roots, and flowers were the foremost common plant elements used for healthful preparation, that was processed in various forms like boiling, infusion, maceration, cataplasm, powder, herb tea, inhalation, or victimization them within the form of oil. These were administered through varied routes like an oral, abdominal, bandage, and different body elements, thus, the oral administration was recognized as the most important style of usage, as it was in drink kind, by homogenized plant part with water that the common type used in herbal preparation for humans.

CONCLUSION

Through all the ethnobotanical surveys carried out in the four regions of Sahara Algerian (Ouargla, El-Oued, Adrar, Illizi), the researchers

Table 3: List of medicinal plants known to the local population of the studied areas

Vernacular name	Scientific name	Family	Type of plant	Part used	Preparation	Administration	Pathologies treated
<i>Zeriat el basbas</i> (Habet-hlawa Yanson)	<i>Pimpinella anisum</i> L.	Apiaceae	Cultivated	Seeds	Decoction	Oral	Digestive, and genitourinary
<i>Arg-alsous</i>	<i>Glycyrrhiza glabra</i> L.	Fabaceae	Savage	Rhizome root, leaves stems, boughs	Maceration, infusion, decoction	Oral	Digestive, respiratory infections
<i>Halba</i>	<i>Trigonella foenum- graecum</i> L.	Fabaceae	Savage, Cultivated	Seeds	Decoction plasm	Oral, whitening	Digestive tract, care of skin, metabolic
<i>Alanda</i>	<i>Ephedra alataspp.</i> Alenda. Dec.	Ephedraceae	Savage	Leaves, aerial parts	Infusion, maceration, inhalation	Oral	Cancer treatment, Cold, influenza.
<i>Gtaf</i>	<i>Atriplex halimus</i> L.	Chenopodiaceae	Savage	Leaves	Decoction, powder	Oral	Genital, uterus cysts, diabetes
<i>Chajret Meriem</i> <i>Nugd</i>	<i>Artemisia absinthium</i> L. <i>Anvillea radiata</i> Coss. and Dur	Asteraceae Asteraceae	Savage Savage	Aerial parts Aerial parts	Decoction Infusion	Oral Oral	Genital Diabetes, Oral
<i>Chih</i>	<i>Artemisia herba-alba</i> Asso.	Asteraceae	Perennial	Aerial parts	Decoction, powder	Oral, cataplasma	Digestive tract wound treatment
<i>Babounj</i>	<i>Matricaria chamomilla</i>	Asteraceae	Cultivated	Flowering tops of flower heads	Decoction	Oral	Colon treatment, hair treatment
<i>Handbabaria</i>	<i>Cichorium intybus</i> L.	Asteraceae	Cultivated, Savage	Roots, leaves, flowers	Decoction	Oral	Urinary tract infections, liver problems, gallstones
<i>Gants</i> <i>Tazia</i>	<i>Anacyclus pyrethrum</i> (D.C.) <i>Asphodelus refractus</i> Boiss. Liliaceae	Asteraceae	Savage Savage	Roots Aerial parts	Decoction Decoction	Oral Oral	Dental pain Back pain, indigestion, equilibrium the body, constipation, wound of stomach, skin diseases
<i>El Kranka</i>	<i>Ricinus communis</i>	Euphorbiaceae	Savage	Aerial parts	Decoction	Oral	For fatigue, anxiety, and exhaustion

Table 3: Contd...

Vernacular name	Scientific name	Family	Type of plant	Part used	Preparation	Adminis- tration	Pathologies treated
<i>Elhenna</i>	<i>Lawsonia nermis</i> L.	Lythraceae	Cultivated	Leaves	Infusion, powder	Oral, cataplasma	Digestive, tract skin sores, ulcers
<i>El-Jerjir</i>	<i>Moricandia arvensis</i>	Asteraceae	Cultivated	Aerial parts	Decoction	Oral, colon treatment	Genital, hair treatment
<i>Hab-Erchad</i>	<i>Lepidium sativum</i> L.	Asteraceae	Savage, Cultivated	Seeds	Decoction	Oral	Arthritis, cosmetic, urogenital
<i>Lharmel</i>	<i>Peganum harmala</i> L.	Zygophyllaceae	Savage	Seeds, roots	Powder, decoction	Oral	Treat magic, Abdominal distension, urinary tract
<i>Sedra</i>	<i>Zizyphus lotus</i> L.	Rhamnaceae	Cultivated	Leaves	Powder	Oral	Stomach
<i>Fowa</i>	<i>Rubiatin ctorum</i> L.	Rubiaceae	Cultivated	Roots	Decoction	Oral	Anemia
<i>Elfijel</i>	<i>Rutatuber culata</i> Forssk.	Rutaceae	Savage	Leaves	Decoction, infusion	Oral	The nervous system
<i>Eroman</i>	<i>Punica granatum</i> L.	Lythraceae	Cultivated	Fruit peels	Powder	Oral	Colon treatment, gastric ulcers
<i>Luisa</i>	<i>Lippia citriodora</i>	Verbenaceae	Cultivated	Leaves	Decoction	Oral	Digestive tract
<i>Anebedibe</i>	<i>Solanum nigrum</i> L.	Solanaceae	Savage	Plant	Infusion entirely	Oral	Digestive tract, skin disease
<i>Enjem</i>	<i>Cynodond actylon</i> (L.)	Poaceae	Savage	Plant entirely	Decoction	Oral	Urinary system
<i>El kherwaa</i>	<i>Ricinus communis</i>	Euphorbiaceae	Savage	Leaves, seeds	Oils	Transcutaneous and scalp	Beautify the skin and hair
<i>Chendgoura</i>	<i>Ajugaiva</i> (L.)	Lamiaceae	Savage	Leaves	Powder	Oral	Food poisoning
<i>Damrane</i>	<i>Traganum nudatum</i> Del.	Chenopodiaceae	Savage	Leaves	Powder	Bandage	Skin infections, rheumatism
<i>Dgouftelala</i>	<i>Artemisia campestris</i> L.	Asteraceae	Savage	Aerial parts	Powder or decoction	Oral	Fever, stomach
<i>Gartofa</i>	<i>Cotula cinerea</i> Delle.	Asteraceae	Savage	Aerial parts	Powder or decoction	Oral	Fever and Respiratory

Table 3: Contd...

Vernacular name	Scientific name	Family	Type of plant	Part used	Preparation	Adminis- tration	Pathologies treated
Arar	<i>Tetradleini sariculata</i> (Vahl) Masters.	Cupressaceae	Savage	Aerial parts	Powder	Oral	Digestive tract, stomach
Remth	<i>Haloxylon articulatum</i> Boiss.	Chenopodiaceae	Savage	Leaves, flowers, boughs	Decoction, maceration cataplasma	Oral	Indigestion, skin diseases, scorpion stings, diarrhoea
Kebbar	<i>Capparis spinosa</i> L.	Caparidaceae	Savage	Leaves	Powder or Decoction	Cataplasma	Romatizem
Tarfā	<i>Tamarix gallica</i> L.	Tamaricaceae	Savage	Leaves, roots	Decoction	Oral	Diabetic edema
Zeriat Elketane	<i>Linum usitatissimum</i> L.	Linaceae	Cultivated	Seeds	Powder	Oral	Relieve of the spleen
Drin	<i>Aristida pungens</i> Desf.	Poaceae	Savage	Aerial part	Decoction, maceration, herb tea	Oral	Relieve cholesterol, Opening of appetite and fattening
Fagouslehmir	<i>Ecballium elaterium</i> (L.) A.Rich.	Cucurbitaceae	Savage	Fruits, roots	Fruit juice	Put in the nose	Weight loss
Jejlane, semsem	<i>Sesamum indicum</i> L.	Pedaliaceae	Cultivated	Seeds	Powder	Oral	constipation, Jaundice
Lahbak	<i>Ocimum basilicum</i> L.	Lamiaceae	Cultivated	Flowers	Decoction, oil	Oral, lubrication	Treatment of anaemia and fattening
							Losing weight, gas elimination, hair loss treatment

were able to record a certain number of information on the use of medicinal plants in traditional herbal medicine. The results obtained showed that the local population continues to treat themselves against certain diseases using medicinal plants. The researchers selected 102 species of medicinal plants for the study, belonging to 38 families, which were classified into several species, with the Lamiaceae family majorly presented followed by the Asteraceae family. Among other information collected at the end of this study, the researchers, therefore, find the leaves to be the most used parts, and the decoction method and that of the oral route are respectively the methods used most frequently for preparation and administration, whereas, the highest number of medicinal plants were used in the treatment of digestive and respiratory diseases. The survey is now clearer to identify the different categories of users of medicinal plants. The highest rate of users in the age category is 20 to 30 years old and in the sex category, women have the highest rate of use. In the categories of the level of education and profession, the researchers found that respectively the university levels and unemployed people had the highest rate. In this study, one could see that traditional medicine in the regions studied persists and continues to develop, despite the accessibility to modern medicine, which is within the reach of all the inhabitants.

In the end, it ought to be noted however necessary it's to be able to extend this type of study and investigations to different parts of the country to get any unknown potential use several medicative plants that haven't been mentioned before however is being employed for the centuries to treat many troublesome of illness diseases.

ACKNOWLEDGMENTS

The researchers would like to thank the entire population of Ouargla, el-Oued, Adrar, and Illizi, who kindly participated in the survey.

CONFLICTS OF INTEREST

No conflict of interest is associated with this work.

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Paper received for publication in July, 2021
Paper accepted for publication in October, 2021