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Assessment Biodiversity of Medicinal Plants Used in Treatments for Native People in Adrar, Algeria

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ABSTRACT

Medicinal plants are well known to natives and healers of the Adrar province located in the south of Algeria. These plants are used for medical purposes seasoning, cooking, and also by the researchers studying biology, chemistry, and pharmacology for discovering new molecules of medicaments applying in the treatment of diseases. This study aims to gather information related to utilizing therapeutic plants for health needs from the local populace. This research allowed us to identify fifty species used by the local population. The most common among these are the Asteraceae and *Lameleacea* and the highest use values were recorded for the species *Thymus vulgaris*, *Mentha piperita*, *Ocimum basilicum*, while the highest Fic was observed for the respiratory diseases. It also allowed us to familiarise ourselves with the methods and practices and the therapeutic uses of medicinal plants in the region. It was noted that the most used parts were the leaves, followed by the flowers. Furthermore, the most common method was found to be an infusion, followed by a decoction. This study confirmed that the Adrar region has several plants that are medicinal purposes and are used for the treatment of many diseases.

1. INTRODUCTION

Medicinal herbs and their products have always held basic combinations that were the primary principal healing agents used by humans and it's still relevant in medical roles even today [1-3]. Furthermore, it interesting several walks of people's life. The application of plants as remedies predates written anthropological antiquity. Awareness of medicinal herb use was popular among the ancient civilizations. In the middle of the 19th century, this medicinal plant is a natural resource with excellence. The apparition of these plants is periodically and continually in nature (nature is also of biology, ecology. etc.). Additionally, it is a source of inhalation to pharmacology to research and decovert a new molecule active. The local people have always made use of their original ora herbs as a source of nutrition, fuel, medicines, and cosmetics production. It has been passed to new generations through daily uses [4-6].

The technics of infusions and decoctions are applied to difficult respiratory. Other diseases were used for gastrointestinal, and skin diseases and to control diabetes and the metabolic system, including cholesterol, and also for the seasoning [5]. The benefits of the medicinal plants are not only for food consumption but also to serve different ailments by providing remedial factors [7].

Algeria includes more than 600 species of medical plants [8]. The majority of the local people of Adrar province used the medical plants for nourishment and medical purposes. This study was focused to identify the wild plants, local names and field uses by local people and especially for medical purposes.

2. MATERIALS AND METHODS

2.1 Study of area

The present study was carried out in Adrar province located in southwest Algeria within coordinate (2752N017W) at 276 m above sea level. The province covers an area of (424 948) km^2 with a height of around 276 m (Figure 1). According to the results of the address-based population census conducted in 2021, the total population of Adrar is 399 712 sited around an oasis (djnanate). This predominantly agricultural town is characterized by its traditional irrigation 35 system called Foggara. Adrar is composed of three natural and cultural regions: Touat (Adrar, Zaouiet Kounta), Gourara (Aougrout, Timimoune), and Tidikelt (Aoulef) and 299 ksours. The local languages are Arabic and Zenata [8, 9].

2.2 Statistical study of area

A questionnaire form of interviews (Appendix A) was used in a series of campaigns in Adrar. This allowed us to have a wide assortment of data on the conventional utilization of therapeutic plants. Our survey performed from 2013 to 2015 helped distinguish several species used by local people in traditional medicine [10-12].

2.3 Category of aliments

The revealed diseases were regrouped into 06 Based on the

data collected from the interviewees, the revealed diseases were grouped into 06 categories: Diabetes, Diarrhea, Cough, Cold, Hypertension, Anemia, and Headache. The Demographic features of the respondents were prepared and registered through face-to-face interviews with Adrar citizens. The mean age of the respondents was (37.5) years (25-60 years range). The interviews were conducted with randomly selected persons. It was noted that (35.11%) of men and (64.89%) of women asked in the survey had an experience with the plants. Regarding education, (10.45%) of the sample were illiterate, and those with primary and secondary education made up, respectively, (32.81%) and (17.98%) of the respondents, while the persons who attended to university were (38.76%). the obtained results of our investigation are shown in (Table 1).

Table 1. Demographic characteristic (N=100)

Demographical characteristic	%
Age	14.32
20-25	39.32
20-30	25.28
30-40	12.92
40-50 Above50	8.16
sex	
Male	35.11
Female	64.89
Education level	10.45
Literate	32.81
Primary school	17. 98
Secondary school	38.76
University	10.45
Family status	
Married	67.51
Single	32.49

2.4 Data analysis

Plant use values (UV) and informants consensus factor (Fic): Relative significance of each plant species referred locally to be utilized as an herbal remedy was accounted as use value (UV) [2]. The use-value (UV) is determined as follows:

$$UV=\frac{\sum U}{N}$$

where the species the number were coded with UV, and for a number of informants with N. The UV is useful in revealing highest use (most habitually showed) in the treatment of any illnesses (or infirmity category) with a given Fic value [13], where determined with the following formula:

$$FIC=\frac{Nur\_Nt}{Nur\_1}$$

where, Nur refers to the number of use citations in each category and Nt to the number of the species used. This Data regarding preparation by infusion confirm that this method reduces or eliminates the effect of some diseases.

2.5 Diversity of medicinal plants and their uses

Twenty-one families were recorded and recognized to be of medicinal importance with their family name and scientific name, vernacular name, preparation, and utilization methods in Adrar province. Recorded interviews were followed up for a period of two years. The local people of Adar declare in interviews that the total of plants used was 50 for therapeutic purposes (Table 2). The technique is to check the agreement of the data: FIC values will be low (close to 0 values) in the event that plants are picked arbitrarily or if Informants Don't trade data about them. The results also show that the most common families utilized by local people are: *Apiaceae* (10 plants -20%), *Lamieceae* (6 plants-12%), *Asteraceae* (05 plants-10%), *Fabaceae*, and *Myrteacae* (3 plants- 6%), *Labiatae*, *Poaceae*, *Cupressaceae*, *Thymeleaceae*, *Asteraceae*, *Urticaceae*, *Caesalpiniaceae*, *Capparaceae*, *Lauraceae and Lythareae* (one plant of each family-2%). On the other hand, the most used parts were leaves, roots, flowers, and fruits. *Thymus vulgaris*, *Mentha piperita*, *Ocimum basilicum*, *Rosmarinus*, *Officinalis*, *Cuminum*, *cyminum*, *herbaalba*, and *Trigonelle Fenugrec*, are names of 95 plants reported to be mostly used by local people. The *thymus Vulgaris* is used for the cold and *Mentha piperita* for the flu [14].

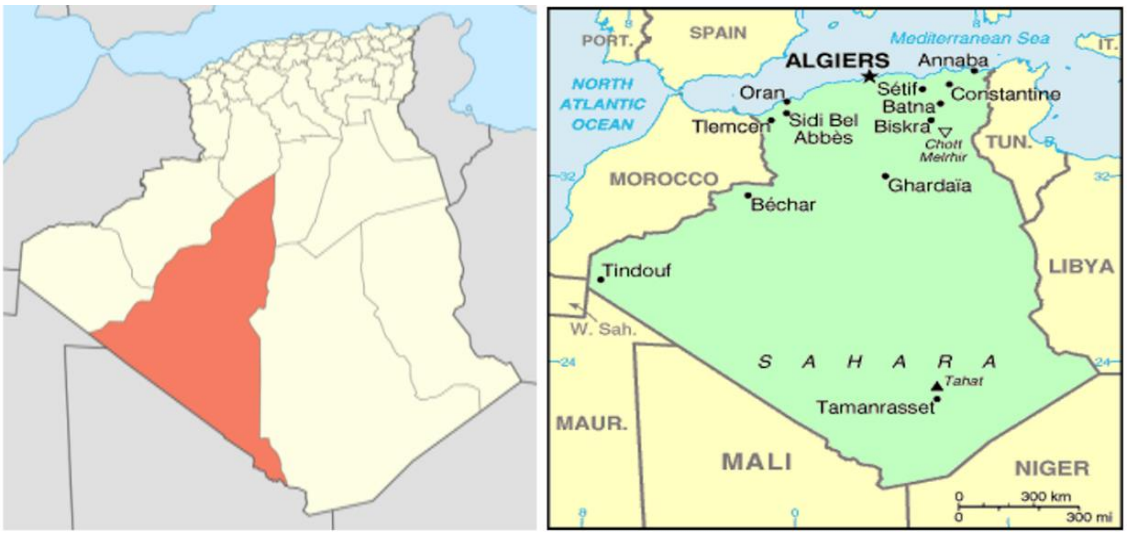

Figure 1. Geographical location of study area (Adrar)

Table 2. List of wild medicinal plants investigated with their related information

Information				Species Name
UV	**Methods**	**Parts**	**Scientific name**	**Family**
0.77	Decoction	Aerial parts	*Thymus vulgaris*	*Labiatae*
0.50	Decoction	Aerial parts	*Mentha piperita*	
0.48	Infusion	Leaves and flowers	*Ocimum basilicum*	*Lamieceae*
0.05	Infusion	Leaves	*Lavandula Officinalis*	
0.02	Infusion	Whole Plant	*Origanum Majorana*	
0.011	Infusion	Leaves	*Mentha Pulegium*	
0.44	Inhale	Leaves, fruits	*rosmarinus officinalis*	
0.19	Poultice	Leaves and fruits	*Marrubium Vulgare*	
0.25	Poultice, infusion	Fruits	*Foeniculum Piperitum*	*Apiaceae*
0.21	Infusion	Seeds	*Daucus Carota*	
0.05	Decoction	Leaves fruits	*Ammo dacus leucotrichus Coss*	
0.08	Incenses	Leaves or whole plant	*Ferula assa-foetida L*	
0.07	Decoction	Leaves or whole plant	*Petroselinum*	
0.03	Decoction	Seeds	*Thapsia Garganica*	
0.19	Infusion	Seeds	*Apium Graveolens*	
0.02	Skim	Seeds	*Cuminum cyminum*	
0.05	Poultice	Leaves	*petroselinum sativum*	
0.1	Infusion	Seeds	*Carum Carvi*	
0.2	Infusion	Leaves, wahle plant,	*Silybum Marianum*	*Astéraceae*
0.08	Infusion,	Flowers	*Chamaemelum*	
0.07	Infusion	Flowers	*Artemisia herba-alba*	
0.03	Infusion	Roots poultice	*Artimiausias Lithium*	
0.19	Extraction	Leaves or rods	*Anacyclus Valentinus*	
0.02	skim	Leaves	*Glycyrrhiza Glabra*	*Fabaceae*
0.02	Infusion	Roots	*Ervum lens*	
0.5	Decoction	Roots	*Trigonelle Fenugrec*	
0.06	Poultice	Seeds	*Panicum miliaceum L*	*Poaceae*
0.06	Distillation	Seeds	*Zea mays*	
0.06	Infusion	Whole plant	*Atriplex*	*Amaranthaceae*
0.05	Decoction	Whole plant	*Hammada Scoparia*	*Lythraceae*
0.06	Incenses	Roots or whole plant	*Lawsonia Inermis*	
0.05	Decoction	Leaves,	*Punica Granatum*	*Zingibéraceae*
0.08	Infusion	fruits leaves,	*zingiber officinal*	
0.07	Infusion	Seeds	*Nigella sp*	*Ranunculaceae*
0.05	Extraction	Seeds, whole plant,	*Nigella sativa*	
0.09	Decoction	leaves	*Camellia sinensis*	*Théaceae*
0.05	Decoction	leaves	*Eucalyptus globulus*	*Myrtaceae*
0.04	Infusion	Leaves,	*Myrtus Communis*	
0.07	Infusion	Leaves	*eugenia caryophyllata*	
0.05	infusion	Leaves, whole plant	*Parietaire officinalis*	*Urticaceae*
0.08	Infusion	Roots, flowers	*Cassia angustifolia*	*Caesalpiniaceae*
0.1	Dired & Dicoction	Leaves or Rods	*Cleome africana DC*	*Capparaceae*
0.2	Infusion	Leaves	*Laurusnobilis*	*Lauraceae*
0.09	Infusion	Leaves. Roots	*Peganum harmala*	*Zygophyllaceae*
0.06	Infusion	Aerial parts	*Zygophyllum fabago*	
0.04	Extraction	Aerial parts	*Zizyphus lotus*	*Rhamnaceae*
0.07	Decoction	Leaves and flowers	*rhamnus alaternus*	*Cupressaceae*
0.05	Infusion	Leaves	*Tetraclinis Articulata/ Juniperus*	
0.03	Infusion, poultice	Whole plant	*Daphnégnidium*	*Thymelaeaceae*
0.1	abrade	Leaves	*atractylis gummifera*	*Asteraceae*

Table 3. The most used medicinal species in Adrar region

SN	Ailment category	Spices	All species%	Use citations	All use citations	FIC
1	Respiratory problem	19	26.76	48	33.33	0.61
2	Kidney problems	05	7.04	10	6.94	0.55
3	Digestive problems	25	3.52	50	34.72	0.51
4	Vascular System problem	09	1.26	16	11.11	0.46
5	Diabetes	08	1.12	13	9.02	0.41
6	Cancer	05	7.04	7	4.86	0.33

2.6 Mode of preparation

In order to facilitate the utilization of this drug for medical purposes, various methods of preparation are employed by local people such as decoction, infusion, poultice and others. The preparation methods presented in (Figure 2) show that

native people favor the easiest and most straight forward method to prepare the herbal medicines. In this regard, infusion holds the highest percentage rate (50%), followed by decoction with (22%), Poultice with (10%) and (18%) abrasion for other methods (skimming, extraction, distillation).

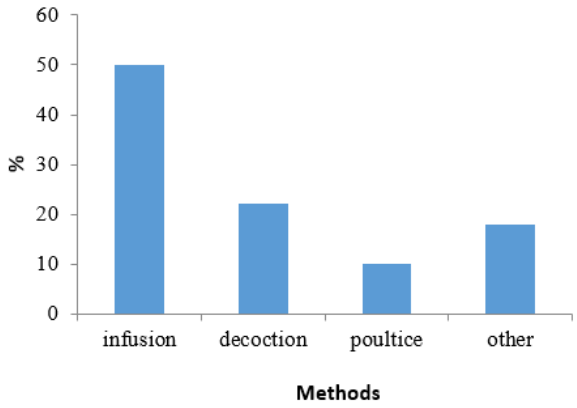

Figure 2. The methods of the preparation of the plants

2.7 Plant utilized part

Local people were registered to use the leaves (25 of use-whole plants (10 of use-reports), seeds (8 of use-reports), the fruits (5 of use-reports) the roots (5 of use-reports), the stems (2 of use-reports), and flowers (4 of use-reports), aerial parts (4 of use-reports).

2.8 The high frequency used data analysis

According to the calculation based on the use-value (UV) [7]. The *Thymus vulgaris* (0.77), *Mentha piperita* (0.50), *Ocimum basilicum* (0.48), *Rosmarinus officinalis* (0.44), *Cuminum cyminum* (0.33), *Zygophyllum fabago* (0.30), have the highest value (Table 2). Use values give a good indication of the reliability of these plants and their pharmacological features [12].

In this respect, conducting an actionable study on the plants used by local people may be useful. The present utilization. They are actively used. Currently, some plants are not utilized for medicinal purposes but may have, nevertheless, therapeutic effects [15, 16].

Native people used the medicals plants most frequently for the treatment of respiratory problems (19 of use-reports), digestive problems (25 of use-reports), vascular system problems (09 of use-reports), diabetes (08 of use reports), kidney problems (05of use-reports) and cancer (05 of use-reports). The information collected from interviewees indicates the related ailments were classified into 06 categories (Table 3) [17].

Fifty of the species were recognized as being important plants for medical purposes, which was confirmed by informants in the Adrar area [15].

The results of (UV) show that the most crucial use (0.77) was measured for *Thymus vulgaris* and is attributed to remedial use in respiratory problems (a cold cough,) and vascular problems (Hypertension), The second highest value was recorded for kidney problems (Fic: 0.55), which include under this category, urinary tract, urethritis, calculus. We find *Cleome Africana* DC (locally known as alemakhaneza) as the plant with the highest UV (0, 10). The third-rated category was digestive problems (Fic: 0,051) which include indigestion, stomachache, flatulence, vomiting, constipation, and abdominal pain. Gasses, colon, diarrhea. *Mentha Piperita* (UV: 0.50), and *Anacyclus Valentinus* (UV: 0.19) are the plants used for anti-abdominal pains and indigestion (a decoction prepared from aerial parts). The fourth highest value is that of vascular system problems with a Fic of (0.0.46). This comprises hypertension, menstruation disorders, Cardiac tonic, heart attack, anemia, and cholesterol. *Thapsia Garganica* (UV: 0.03) *Zygophyllum, Fabago* (UV: 0.03) *Laurusnobilis* (UV: 0.3) are the plants most usually practiced under the recent category. The fifth category with a Fic of 0.41was recorded for diabetes. We find in this category: *Artemisia herbalba* (UV: 0.07), *Trigonelle fenugrec* (UV: 0.5), and *zingiber* with the lowest value (UV: 0.08). The last category of ailments concerns cancer with a Fic (0.33). The plants reported having anticancer activity are *Atriplex* (locally known as elgtef) with a UV of (0.06) and *Nigella* sativa with (0.05).

3. CONCLUSION

In our study, we investigated the herb's medicinal use by native peoples of the Adrar area. The latter is a biodiversity area with a variety of wild plant species. Calculated UV and Fic indicate that the remedies using herbs are medicinal as a traditional culture which is the utmost respect. These plants are used in the treatment of many diseases such as cancer, constipation, dermal diseases, hypertension, cough, and allergy. The drying is the method most employed by local people to preserve them and use them in all seasons. The measurement of the data collected in this investigation with another study proves that the curative plants of Adrar province are used in other parts of the world in the treatment of the same or similar diseases. Finally, this ethnobotanical list due to creating a databank of herbs medicinal applied in traditional medicine can choose to develop new medications in medicine modern [14].

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APPENDIX A

- Name and surname of the participant
- Age and sex of the participant
- Address of the participant
- Educational level of the participant
- Date of interview
- Duration of residence of the participant
- What is the local name of the plant used?
- For which diseases do you use the plant?
- Which parts of the plant do you use? (Root, flower, leaves, whole plant etc...)
- How do you prepare the plant for use?
- How and when do you use the plant?
- Approximately what doses do you use?