

SHORT COMMUNICATION

Ethnobotanical study of anti-inflammatory medicinal plants in the region of El Bayadh (Western Algeria)

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ABSTRACT

This ethnobotanical study aimed to document the traditional use of anti-inflammatory medicinal plants by the inhabitants of El Bayadh province in Algeria. Data was collected using a questionnaire consisting of a series of questions, which yielded information on the use of plants by the local population. The study identified 100 medicinal plant species belonging to 50 families, with Lamiaceae being the most commonly used family. Results showed that women use roots more frequently than men, and infusions are the preferred method of preparation for medicinal remedies. The most commonly treated ailments were related to digestive system disorders, followed by sarcoidosis, Buerger's disease, Lupus skin inflammation, and other skin disorders. The Floweraceae family was found to be the most commonly used family.

Keywords: Anti-inflammatory, El Bayadh, ethnobotanical study, traditional use

INTRODUCTION

Plants have been used for medicinal purposes for centuries, and they contain bioactive compounds with various therapeutic properties, such as anti-inflammatory, antioxidant, antimicrobial, and anticancer activities. Alkaloids, phenolic acids, terpenes, vitamins, and minerals are among the bioactive compounds found in medicinal plants, which possess anti-inflammatory properties. Additionally, the use of medicinal plants for treating inflammatory diseases has gained popularity due to their perceived safety and natural origins (Atik Bekkara *et al.*, 2007).

Inflammation is a necessary physiological response to injury, infection, or tissue damage. However, chronic inflammation can lead to various diseases, including cancer, arthritis, and cardiovascular diseases. Therefore, the evaluation of phytotherapeutic properties, such as anti-inflammatory activity, is essential and valuable, especially for plants that are commonly used in traditional medicine. These plants represent a vast source of biologically active substances (Boudjida and Sahnoun, 2017).

Ethnobotanical studies are commonly used to identify plants used in traditional medicine for various ailments, including inflammation. El Bayadh, a region in Western Algeria, has a rich diversity of plant species used in traditional medicine (Hcds, 2017). Therefore, this study aims to identify anti-inflammatory plants in the region using ethnobotanical methods and to evaluate their potential as sources of new drugs for treating inflammatory diseases.

Presentation of the study area

The wilaya of EL Bayadh, located in southwestern Algeria, plays a crucial role in the region's Great Steppe Fields. Bordered by several wilayas, including Saida, Tairt, Laghouat, Ghardaïa, Sidi Bel Abbès, Naàma, Bechar, and Adrar, it covers a vast area of 71 697 km². In 2008, the wilaya's population was estimated at 228,624, a significant increase from 168,789 in 1998, with numerous communities exceeding 10,000 inhabitants. The bone-dry environment of the district is characterized by a significant temperature difference, making it a unique and challenging habitat for plant life (ANAT, 2003).

Investigation process

For information assortment, an ethnobotanical review was completed during the long periods of March and April 2022 utilizing a survey sheet, including explicit inquiries concerning the source and the restorative plant utilized. The overviews endured just about 10 to 20 min. The examination began at first by reaching the different nearby friendly entertainers, who have a nearby association with restorative plants, the most perceived, regarded, and experienced locally. During each interview, we gathered all the data on the respondent and the restorative plants utilized by him. Subsequently, from the factors examined, specifically age, orientation, level of instruction, and family circumstances. Information gathered for every medicinal plant incorporates normal neighbourhood name, utilizes, part(s) utilized, method of arrangement, state of the plant, portion utilized, utilization of the plant, sicknesses.

Analyses of ethnobotanical data

In statistical analysis, we utilized Microsoft Office Excel rendition 2010 for measurable examination. Examines of differences and means were performed for every variable. Through the ethnobotanical study completed among the number of inhabitants in the districts, it just so happens, that there is a variety of practices, with respect to the species and parts utilized. As well as an assortment of data concerning individuals studied; Gender, age bunch, family circumstances, level of study, State of the plants, Parts utilized, Mode of planning, Dose utilized, Use of the plant, and Diseases treated by the plant.

Profile of the respondent

Membership sex

In the locale examined, all kinds of people practice conventional medication. Notwithstanding, the female sex prevails with a level of 53%. Besides, this rate is just 47% for the male sex (Fig. 1). This makes sense in the way that ladies are more worried about phytotherapeutic treatment and the planning of plant-based recipes. The outcomes acquired in the locale show that ladies hold more conventional phytotherapeutic information than men. The outcomes got through this ethnobotanical study uncover that the female sex prevails with a level of 53%. Also, this rate is just 47% in the male sex

(Fig. 1). This makes sense of the way that ladies are more worried about phytotherapeutic treatment and the readiness of vegetable-based recipes, for themselves as well as for the entire family. The outcomes acquired by Benkhniue (2011) El Hafian *et al.* (2014), Adouane (2016), Fah *et al.* (2013) (Morocco) and in the districts of Aurès (Algeria); in Mechraâ Bel Ksiri (Beskra) and Kabylia (Lahsissene, 2009) show that ladies hold more conventional phytotherapeutic information than men. Accordingly, Aribi (2013) likewise finds in an ethnobotanical investigation of restorative plants in the Jijel locale that it is ladies (68%) who have more information on therapeutics species contrasted with men (32%).

Age class

The utilization of restorative plants at the level of the area examined is far and wide among all age bunches (Fig. 2). The age gatherings of 20 to 30 years (8.7%) don't utilize the conventional medication for their clinical wellbeing. Nonetheless, individuals in the age bunch 30 to 50 (30.1%) and age 50 to 80 (61.2%). These qualities affirm the outcomes got in different chips away at the utilization of restorative plants, which show that the old realize conventional homegrown medication all around contrasted with other age gatherings, correspondingly, the apathy toward Phytotherapy among individuals in the age gathering of 20 to 30 years is made sense of by the question, especially of youngsters who tend not to trust a lot in this customary medication. The outcomes got through this ethnobotanical study uncover that most of the respondents are beyond fifty years old, which makes sense why these old individuals have more information about the utilization of restorative plants contrasted with youngsters. These qualities affirm the outcomes got in different examinations on the utilization of restorative plants (Benlamdini *et al.*, 2014; Orch *et al.*, 2015; Aribi (2013) ; Ait, 2015) which successfully show that the old realize customary homegrown medication all around contrasted with other age gatherings, likewise, the indifference toward natural medication among individuals in the age gathering of 21 to 30 years makes sense by doubt, especially of youngsters who tend not to trust a lot in this conventional medication.

Familysituation

The utilization of restorative plants by married people addresses 67.33%. Then again, single individuals address just 32.67%. This is made sense by the way that wedded individuals are dependable as guardians for giving first the helpful consideration to the entire family, subsequently diminishing the material cost expected by the specialist and drug specialist.

The outcomes got are affirmed by other ethnobotanical studies done by El Hafian *et al.* (2014) (Beskra), the last options show that 70% of clients of restorative plants are hitched individuals. We can presume that restorative plants are utilized considerably more by wedded individuals than by single individuals because of multiple factors; family encounter exhibit at times the shortcoming of present-day medication to treat basic everyday pathology, and the symptoms of specific medicines, especially in youngsters. Yet in addition, this distinction could be because of the monetary means; today, current medication has turned into a significant weight on little families.

Academiclevel

Out of the relative multitude of clients of conventional medication, illiterate people rule with a level of 43.7%. This level of purpose is not insignificant among individuals with an essential level (22.67%). While scholastics utilize restorative plants less with a level of 33.63% (Fig. 3). The outcomes got in an investigation discovered that 43.7 that is certified in specific uneducated individuals who utilize the restorative plants by a nonsensical method of individuals utilize the restorative plants are unskilled. In this review, we can see that the various degrees of investigation of the populace are keen on customary medication. Asper El Hilah *et al.* (2016) (Beskra), restorative plants can be hazardous when utilized unknowingly, and this is affirmed by a few unskilled individuals who unreasonably utilize therapeutic plants, different uneducated people can't exactly comprehend the verbal directions communicated by cultivators and healers. This high pace of ignorance among clients of restorative plants is a genuine hindrance to neighbourhood improvement. The outcomes acquired by Fah *et al.* (2013) (Western Morocco), demonstrate that

famous information is right now held by a couple of individuals, among which there is a high pace of ignorance. Benlamdini *et al.* (2014) in a review at the Eastern High Chartbook (Beskra) level see that 41% of individuals utilizing restorative plants are uneducated, 26% have an essential level, 24% have an optional level and 9% are college graduates. Comparably, Orchet *et al.* (2015), in an ethnobotanical investigation of restorative plants utilized in the locale of Izarène (northern Morocco), see that 75% of individuals reviewed were unskilled or had an elementary school level. Baba Aissa (1999) finds that in the Jijel District most clients of restorative plants are ignorant (52%).

Plantcondition

44% of the plants are utilized new, they are fundamentally utilized in the planning of mother tinctures, poultices, and soups. Then again, 56% is utilized in dried structure, they comprise the premise of natural teas, powders, and concentrates (Fig. 4). In this review, we can see that 44% of plants are utilized new versus 56% are utilized in dried structure, comparable outcome tracked down in Morocco (Ait Ouakrouch, 2015; El Hilah *et al.*, 2016).

Parts used

The Fig. 5 demonstrates that different plant organs are involved in the populace for the fulfillment of their remedial necessities. In the review region, the leaves comprise the most utilized part with a level of 39%, trailed by the stems (14%), the entire plant (37%), and the seeds (10%). This distinction in extents in the plant parts involved is legitimate by the fluctuation in the convergence of the dynamic standards in each plant organ or even every species. This distinction in extents in the plant parts involved is legitimate by the changeability in the centralization of the dynamic standards in each plant organ or even every species. The predominance of the leaves is legitimate by the way that they are the site of most of the phytochemical responses and repository of the natural matter which gets from them, the leaves supplies most of the alkaloids (Bouallala *et al.*, 2014; Chehma *et al.*, 2005). The leaves give most of the alkaloids. The significance of natural products is because of the convergences of their unpleasant, glucidic or fragrant substances related to specific shades which

give them a trademark shading. The utilization of blossoms is because of their extravagance in natural ointments. The equivalent is valid for roots and seeds plentiful in sugars and nutrients (Babba Aissa, 1999).

Method of preparation

Different remedial practices are utilized by the neighbourhood individuals for the treatment. The mode most applied in the district is infusion (44.33%) trailed by a decoction (18.67%), maceration (15.79%), powder (11.54%) poultice (9.67%) (Fig. 6). Clients are continuously searching for the least difficult technique to plan phytomedicines, which affirm the strength of the imbue mode for our situation. To work with the organization of the dynamic fixing, a few remedial practices are utilized, to be specific decoction, and mixture. The best utilization of a plant is what might protect every one of its properties while permitting the extraction and digestion of the dynamic fixings (Dextreit, 1984). The implantation is the technique for an arrangement that saves the plant's dynamic standards (Moatti *et al.*, 1983). The decoction warms the body and cleans the plant to drop the poisonous impact of specific recipes, however, it can obliterate specific dynamic standards of the species utilized. Moreover, natural meds have antagonistic impacts when polished mistakenly by patients. Accordingly, conventional medication should be drilled with care and unmistakable boundaries and measures.

As per Salhi *et al.* (2010), clients are continuously searching for the easiest technique to get ready phytomedicines, which affirms the predominance of the imbue mode for our situation. Crafted by Chehma and Djebbar (2005) (Algerian Sahara, instance of Ouargla) and El Hilah *et al.* (2016) (Morocco) record that the imbue mode is the prevailing and address spaces of (half), (20.45%) and (72.50%) separately. The rest (33%) is ready in another mode; grinding, steam distillation, maceration, mixing, omen, and cauterization.

Rates (dose) used

76% of medicinal plants announced are utilized with unknown portions. The portion is as yet irregular, which shows its self-antagonistic

well-being impacts at times. Therapeutic plants are utilized with unknown portions; 9% per squeeze, 11% per spoonful, and 4% per small bunch (Fig. 7). The portion stays unsure, which is appeared by destructive consequences for well-being in specific cases, since it is said: "no substance is harming itself, the portion makes the toxin". This outcome is reliable with different outcomes got somewhere else by different creators Benkhni *et al.* (2011) who showed that 85.12% of therapeutic plants are utilized with undefined portions; 8.8% per squeeze, 26.20% per scoop, and 50.12% per small bunch 11.56%.

Use of the plant

The outcomes acquired through this ethnobotanical study uncover that most of the respondents utilized 70% restorative plants, 15% consumable, 12% beauty care products, and 3% harmful (Fig. 8). The outcomes got are affirmed by other ethnobotanical studies completed by El Hafian *et al.* (2014) Beskra. These show that 73% restorative and 17% consumable, 12% corrective and 3% for grain assets, and 5% for unrefined components for industry and artworks. 12% for beauty care products and fragrant items, and finally (1%) therapeutic plants are fancy and developed for improvement purposes.

Inflammatory diseases treated by medicinal plants

Ethnobotanical analysis has identified several diseases treated by medicinal plants as illustrated in fig. 9. We observed that the most treated pathologies are: Ulcerative colitis (24%) and Crohn's disease (18%), followed by the diseases Sarcoidosis (16), Buerger's disease (14%) and chronic lupus erythematosus (13%), then the other diseases which present by small percentages Inflammation of the tonsils (10%), and Eczema (5%). In general, the results obtained show that the most treated symptoms are inflammatory diseases. The dominance of inflammation is confirmed by several other authors. Indeed, Chesham *et al.*, (2005) showed that the most widely treated symptoms are chronic inflammation representing respectively 26% and 24%. These same results were found by Tari *et al.* (2012) in the province of Settat (Beskra), who showed that most species are used in the care of inflammatory diseases.

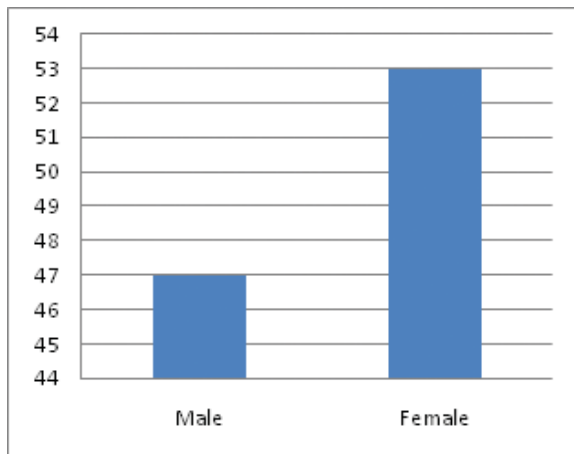


Fig.1: Use of medicinal plants by gender

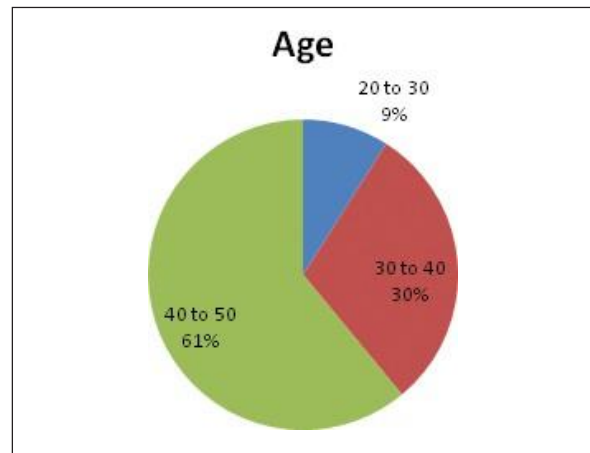


Fig.2: Use of medicinal plants according to age of respondent

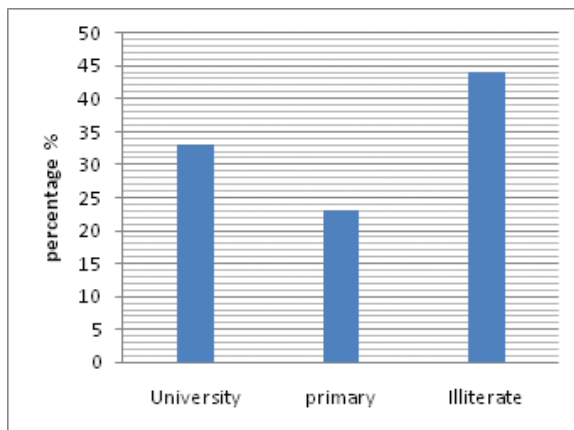


Fig.3: Use of plants according to level of education

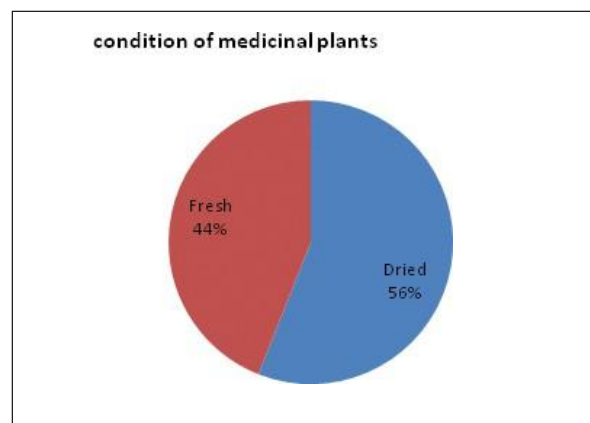


Fig.4: Use of medicinal plants according to their condition

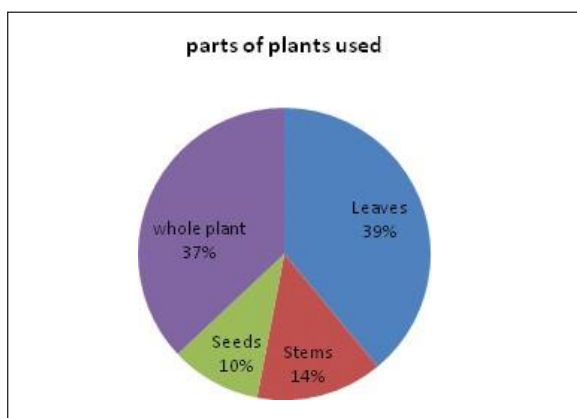


Fig.5: Different parts of medicinal plants used

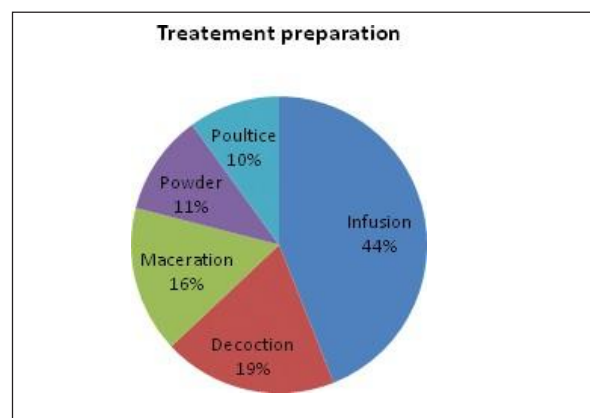


Fig.6: Different treatment preparation methods

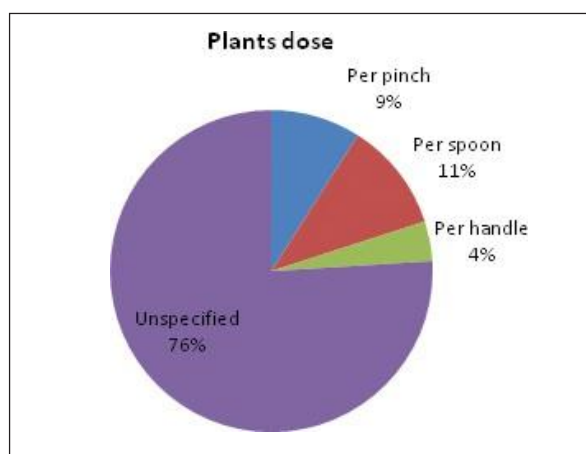


Fig.7: Use of plants according to dose

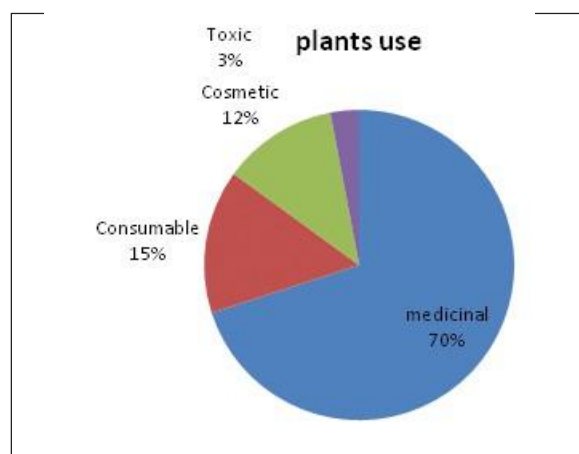


Fig.8: Use of the plant

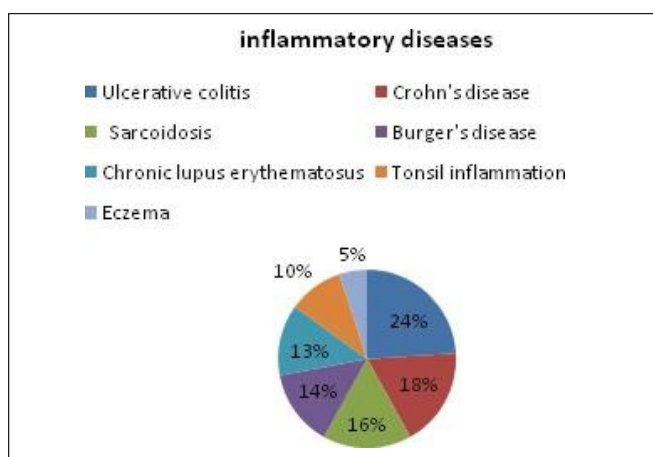


Fig.9: Pie chart represents inflammatory diseases treated by medicinal plants in the study area

El Rhaffari and Zaid (2002), find in a similar study that in Tafilalet (South-East of Morocco) plants are used for the treatment of the main dysfunctions as follows: Hemorrhagic proctocolitis (19.3%),dermato-cosmetology(14%),Sarcoidosis (9%),osteo-articularaffections(7%),metabolism and secretion (4.9%). Several species are used against several diseases, such as thyme, mugwort, and rosemary, they are used against chronic lupus erythematosus, respiratory and skin diseases, which explains the particular pressure exerted on these plants in the region studied.

According to the most used plant

During our ethnobotanical study, we figured out how to recognize a sum of 36 restorative plants with their remedial purposes. Among the species that are better utilized, some end up being all the more as often as possible referred to. This vouches

for their extraordinary handiness being taken care of by conventional medication around here. Among the species referenced are Lemon verbena (*Aloysia citrodora*) 20.95%, Lavanders (*Lavandula angustifolia*) 17.26%, Eucalyptus (*Eucalyptus globulus*) 15.18%, Ocean purslane (*Atriplex halimus* L) 12.69%, white mugwort (*Artemisia absinthium*) 11.55 %, Harmal (*Peganum harmala* L.) 5.8%.

From every one of the outcomes acquired, we have accumulated the restorative plants most utilized by the nearby populace. The vast majority of the plants developing are *Lavandula angustifolia*, *Lemon verbena*, *Eucalyptus*, *Ocean purslane*, *Rosemary*, *white mugwort*, *Harmal*, in the review region. The recurrence of *Lemon verbena* is the most noteworthy, this demonstrates that *rosemary* is the restorative plant most utilized by the nearby populace considered, trailed by *Eucalyptus*.

Table 1: Lists of the species identified in the study region

Nbr	Family	Scientific nomenclature	Common arabic name
1	Apiaceae	<i>Carum carvi</i>	كروية
		<i>Foeniculum vulgare</i>	بسباس
		<i>Cuminum cyminum</i>	كمون
		<i>Pimpinella anisum</i>	حبة الحلاوة
		<i>Thapsia garganica</i>	بونافع درياس
		<i>Petroselinum crispum</i>	معدنوس
2	Amaranthaceae	<i>Artiplex halimus</i>	قطف
		<i>Arthrophytum scoparium</i>	رمت
		<i>Spinacia oleracea</i>	سلك
3	Asteraceae	<i>Artemisia absinthium</i>	شيع
		<i>Matricaria chamomilla</i>	بابونج
		<i>Matricaria pathenium</i>	أقحوات
		<i>Artemisia campestris</i>	دقوفت
		<i>Silybum marianum</i>	شوك الجمل
		<i>Ocimum basilicum</i>	هباغ
		<i>Helianthus annus</i>	دوار الشمس
		<i>Launaea resedifolia</i>	روقيام
		<i>Anvillea radiata</i>	نقد
		<i>Cynaraca rdunculus</i>	خرشوف

Contd.

4	Lauraceae	<i>Laurus nobilis</i>	رند
		<i>Cinnamomum verum</i>	قرفة
5	Lamiaceae	<i>Lavandula angustifolia</i>	خزامة
		<i>Mentha pulegium</i>	فليو
		<i>Mentha spicata</i>	نعناع
		<i>Thymus vulgaris</i>	زعترا
		<i>Salvia rosmariinus</i>	الأزير
		<i>Sage officinale</i>	مرامية
6	Zingiberaceae	<i>Zingiber officinale</i>	زنجبيل
		<i>Curcuma longa</i>	كركم
		<i>Elettaria cardamomum</i>	الهيل
		<i>Alpinia purpurata</i>	اللبنية
7	Cactaceae	<i>Cereus repandus</i>	الصبار
		<i>Opuntia ficus indica</i>	هندي
8	Caryophyllaceae	<i>Syzygium aromaticum</i>	قرنفل
9	Cupressaceae	<i>Juniperus communis</i>	عرعار
10	Cucurbitaceae	<i>Citrullus colocynthis</i>	هندهل
		<i>Colocynthis vulgaris</i>	هدج
		<i>Ecballium elaterium</i>	فقوس الحمير
11	Crocoideae	<i>Crocus sativus</i>	زعفران

12	Myrtaceae	<i>Callistemon viminalis</i>	فراش الزجاج
		<i>Eucalyptus globulus</i>	كالبيتوس
		<i>Syzygium aromaticum</i>	طب
13	Malvaceae	<i>Tiliato mentosa</i>	زيزفون
		<i>Malva sylvestris</i>	خبيز
		<i>Hibiscus sabdariffa</i>	كركدية
14	Nitrariaceae	<i>Pegamum hermala</i>	حرمل
		<i>Lnula helenium</i>	غسن
15	Poaceae	<i>Zea mays</i>	بشنة
		<i>Stipa tenacissima</i>	حلفاء
		<i>Avena sativa</i>	الشوفان
		<i>Hordeum vulgare</i>	الشعير
		<i>Triticum vulgare</i>	قمح
16	Fabaceae	<i>Retama raetam</i>	رتم
		<i>Glycyrrhiza glabra</i>	عرق سوس
		<i>Tetrapleura tetraptera</i>	خروب
		<i>Cassia angustifolia</i>	سنا مكى
		<i>Lupinus luteus</i>	ترمس
		<i>Astragalus armatus</i>	لقداد
		<i>Trigonella foenum-graecum</i>	حلبة
17	Rosaceae	<i>Tormentilla officinalis</i>	لنجبار
		<i>Crataegus azarolus</i>	زعرور
		<i>Punus myrtifolia</i>	ورك الخوخ
		<i>Rosa acicularis</i>	ورد

18	Rhamnaceae	<i>Ziziphus lotus</i>	سدرة
19	Rutaceae	<i>Ruta montana</i>	فيجل
20	Rubiaceae	<i>Rubia tinctorum</i>	فوة
		<i>Trachyspermum ammi</i>	نوخة
21	Ranunculaceae	<i>Nigeria sativa</i>	حبة البركة
22	Vebenaceae	<i>Aloysio citriodora</i>	لوزية
23	Araliaceae	<i>Panax ginseng</i>	جنسينغ
24	Amaryllidaceae	<i>Allium vineale</i>	ثوم
		<i>Alchemilla vulgaris</i>	خميلة
25	Piperaceae	<i>Piper nigrum</i>	فلفل أسود
26	Solanaceae	<i>Capsi cumannum</i>	فليفلة حريفية
		<i>Capsicum frutescens</i>	فلفل حار
27	Salicaceae	<i>Salix alba</i>	صفصاف
28	Astereneae	<i>Petroselinum cripum</i>	بكرونس
29	Brassicaceae	<i>Lepidium sativum</i>	حب الرشاد
30	Padaliaceae	<i>Sesamum indicum</i>	جلجلان
31	Leguminoseae	<i>Glycine max</i>	فول الصوجا
32	Urticaceae	<i>Urtica dioica</i>	حريق
		<i>Paretaria Judaica</i>	حشيشة الجراح
33	Anacardiceae	<i>Rhus glauca</i>	سماك
34	Apiaceae	<i>Apium graveolens</i>	كرافس
35	Lilaceae	<i>Oncostema peruviana</i>	بسباس بروفي
36	Geraniaceae	<i>Pelargonisum graveolens</i>	عطرشة
37	Ginkgoaceae	<i>Ginkgo biloba</i>	جنكة

38	Droseraceae	<i>Drosera rotundifolia</i>	فراش الندى
39	Ephedraceae	<i>Ephedra foeminea</i>	علندة
40	Tamaricaceae	<i>Tamarix gallica</i>	طرفية
41	Thymeliaceae	<i>Thymelaea hirsuta</i>	مثنان
42	Oléaceae	<i>Olea europaea</i>	زيتون
43	Oxalidaceae	<i>Oxalis pes-caprae</i>	حميضة
44	Papavéraceae	<i>Papaver rhoeas</i>	بوغار عون
45	Lythraceae	<i>Lawsonia inermis</i>	حنة
46	Euphorbiaceae	<i>Ricinus communis</i>	خروة
47	Plantaginaceae	<i>Plantago lanceolata</i>	ناردين
48	Apocynaceae	<i>Vinca major</i>	عنقية
49	Alliaceae	<i>Allium politanum</i>	الثوم الأبيض
50	Brassicaceae	<i>Capsella bursa-pastoris</i>	حندوق حلقى

The low recurrence for restorative plants less utilized by the neighbourhood populace can be made sense of by:

- Significant expense of specific restorative plants sold.
- The harmfulness of specific species which make the populace extremely careful about these plants.
- By and large the species that have a high recurrence of purpose are reconsidered by clients as seeds and nursery vegetables different plants are utilized as flavours, spices, or toppings.

According to the botanical families

Furthermore, the plant recognizable proof showed that among the 50 recorded families, those most addressed are the Asteraceae with 10 species or 17%, trailed by the Lamiaceae and the Apiaceae with the Fabaceae 6 species or 12.15%, the Poaceae (5 species 10.4%) Zingiberaceae and (4 species or 9.8%) the Amaranthaceae with 3 species each (4.83%), Nitrariaceae and Rubiaceae with two species. These families alone hold 41 species or 20.72% of all the

outnumber. While different families are each addressed by just a single species.

Altogether, 100 restorative plants have been distinguished, they are isolated into 50 families. The most addressed families are Asteraceae with 10 species or 17%, trailed by Lamiaceae and Apiaceae with Fabaceae 6 species or 12.15%, Poaceae (5 species 10.4%) Zingiberaceae and (4 species or 9.8%) the Amaranthaceae with 3 species each (for example 4.83%), the Nitrariaceae and Rubiaceae with two species. The other excess families are addressed by three plants all things considered (Table 1). The predominance of the Asteraceae family is made sense of by the biological elements which favour the turn of events and transformation of most of the species in the area of El_Bayadh.

The diversity of species for ethnobotanical use

At the end of the survey, 100 species are identified in the 4 sites sampled mainly in the region of El_Bayadh and which are divided into 50 botanical families (Table 1).

CONCLUSION

The use of traditional herbal medicine remains a popular choice among populations who trust in its effectiveness and cannot afford modern medication. Herbal medicine plays a crucial role in the modern medical field and provides a database through ethnobotanical studies. Studies show that older women possess more knowledge about the use of medicinal plants compared to younger generations, and few academics resort to traditional herbal medicine. The region of El Bayadh utilizes 100 species of medicinal plants, with the families Asteraceae, Lamiaceae, Apiaceae, Fabaceae, and Poaceae being the most popular. It would be interesting to invest in the most commonly used plants in the region to analyze the active molecules that could provide a solution for certain pathologies that cannot be cured by chemical medicine.

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