Original Article

Ethnobotany, traditional knowledge, and nutritional value of Argan (*Argania spinosa* (L.) Skeels) in Western Anti-Atlas of Morocco

Etnobotânica, conhecimento tradicional e valor nutricional do Argan [*Argania spinosa* (L.) Skeels] no Anti-Atlas Ocidental de Marrocos

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Abstract

The Souss region in Morocco is known nationally and internationally for its essential knowledge of traditional herbal medicine and the cultural heritage of nutrition. The endemic species *Argania spinosa* (L.) Skeels is an important crucial plant used by the local population to treat many diseases and prepare some authentic foods. To identify the therapeutic uses of the Argan tree [*Argania spinosa* (L.) Skeels] and their benefits in preparing authentic foods, the survey was conducted using semi-structured questionnaires. We have achieved 450 interviews with traditional health practitioners and knowledgeable villagers. In the region of Chtouka Aït Baha and Tiznit (Western Anti-Atlas). In parallel with this survey, we collected some old local manuscripts from conventional practitioners in the region. The data obtained were analyzed using specific ethnobotanical indices such as Use Value (UV), Fidelity Level (FL), and Relative Frequency of Citation (RFC). In parallel, we analyzed the nutritional value of some authentic foods derived the argan oil (*Amlou*, *Tagoulla,* and *Labsis*). All 450 interviewees use the argan oil in food or for the preparation of their authentic foods derived (*Amlou*, *Tagoulla,* and *Labsis*); among them, 100 persons use Argan, in addition to food, in the treatment of various diseases with UV and RFC at 1.94 and 0.22, respectively. Among eight treated diseases by argan tree, the treatment of skin and subcutaneous diseases had a very highly significant value of the FL index (98%). Similarly, the analysis of the manuscripts collected in the study area revealed an ancient therapeutic use of the argan tree. The results also show that the Argan oil extracted from the seed is used to prepare authentic foods with significant nutritional value, especially *Amlou*.

Keywords: *Argania spinosa* (L.) skeels, ethnobotanical study, nutritional value, Western Anti-Atlas.

Resumo

A região de Souss em Marrocos é conhecida nacional e internacionalmente pelo seu conhecimento essencial da medicina tradicional à base de plantas e pela herança cultural da nutrição. A espécie endêmica *Argania spinosa* (L.) Skeels é uma importante planta crucial utilizada pela população local para tratar muitas doenças e preparar alguns alimentos autênticos. Para identificar os usos terapêuticos da árvore de argan [*Argania spinosa* (L.) Skeels] e seus benefícios na preparação de alimentos autênticos, a pesquisa foi realizada por meio de questionários semiestruturados. Conseguimos 450 entrevistas com profissionais de saúde tradicionais e aldeões experientes na região de Chtouka Aït Baha e Tiznit (Anti-Atlas Ocidental). Paralelamente a esta pesquisa, coletamos alguns manuscritos locais antigos de praticantes convencionais da região. Os dados obtidos foram analisados por meio de índices etnobotânicos específicos, como Valor de Uso (UV), Nível de Fidelidade (FL) e Frequência Relativa de Citação (RFC). Paralelamente, analisamos o valor nutricional de alguns alimentos autênticos derivados do óleo de argan (Amlou, Tagoulla e Labsis). Todos os 450 entrevistados utilizam o óleo de argan na alimentação ou para o preparo de seus autênticos alimentos derivados (Amlou, Tagoulla e Labsis); entre eles, 100 pessoas utilizam o argan, além da alimentação, no tratamento de diversas doenças com UV e RFC a 1,94 e 0,22, respectivamente. Entre oito doenças tratadas pela árvore de argan, o tratamento de doenças de pele e subcutâneas teve um valor muito significativo do índice FL (98%). Da mesma forma, a análise dos manuscritos coletados na área de estudo revelou um antigo uso terapêutico da árvore de argan. Os resultados também mostram que o óleo de argan extraído da semente é utilizado para preparar alimentos autênticos com valor nutricional significativo, especialmente Amlou.

Palavras-chave: *Argania spinosa* (L.) skeels, estudo etnobotânico, valor nutricional, Anti-Atlas Ocidental.

1. Introduction

Since antiquity, humans have used plants to relieve their pains and cure their diseases. From generation to generation, they passed their knowledge and simple experiences orally or in writing when they could record them (Benkhnigue et al., 2010; Dogara et al., 2021a; Magalhães et al., 2021). Despite the many advances in modern medicine, there is a marked resurgence of interest in traditional medicine (Abba and Dogara, 2021). These traditional practices are still widely used globally, especially in developing countries, where it is the only available therapeutic remedy (Abdulrahman et al., 2018; Tabuti et al., 2003). Moreover, in some communities, the culture of writing in manuscripts is chosen to ensure the preservation of knowledge because it is possible to reuse knowledge far beyond the death of its promoter (Dogara et al., 2021b; Mahmoud et al., 2020).

Morocco is one country that possesses essential ancestral knowledge in herbal medicine (Bellakhdar, 1997). It presents rich and diverse forest ecosystems: 41 ecosystems made up of more than 4200 wild species, of which 600 species have aromatic or medicinal properties of which only 80 species are currently exploited (Bouayyadi et al., 2015).

The biodiversity of the massifs from the west of the Anti-Atlas is exceptional, and there are many endemic species (*Argania spinosa, Thymus leptobotrys, Dracaena draco* …) (Msanda et al., 2005). Indeed, the originality of this region rests in the presence of the endemic genus *Argania*, succulent elements, and *Quercus ilex* subsp. *rotundifolia* (Msanda et al., 2002). The argan is located in southwestern Morocco and covers an area of about 800,000 hectares (Bani-Aameur, 2000; Msanda, et al., 2005). Argan is a perennial tree that belongs to the Sapotaceae family and holds the hermaphrodite flowers and fleshy berry fruit (Baehni and Bonner, 1948; Bani-Aameur, 2000). It is named Argan by local people or Harjan or Louz Albarabir (Berber almond) by Ibn Al-Baytar. This precious tree plays a crucial role in the socio-economic, ecological, and cultural life of the inhabitants of southwestern Morocco. Therapeutic, cosmetics, and food purposes are major using fields (Moukal, 2004).

To safeguard the local population's knowledge and revive the local empirical knowledge inherited on the medicinal use of the argan tree in the Souss region (Western Anti-Atlas) Morocco, we carried out an ethnobotanical study between January 2013 and June 2017. This study was conducted in structured and semi-structured surveys using questionnaire sheets. In parallel with the ethnobotanical research, we collected several ancient manuscripts and texts from traditional practitioners. These manuscripts carry essential information about the doctrinaire conventional medicine culture practiced in the region. They allow us to get an idea of ancient practices and compare them with the results of the ethnobotanical field survey.

2. Materials and Methods

2.1. Study area

The region studied is located in the Western Anti-Atlas; it corresponds to the two provinces: Chtouka Aït Baha and Tiznit (Figure 1). It has 30°12′N, 9°50′E and 29°06′N, 8°47′E latitude and longitude, respectively. The study area is geographically limited to the east by the province of Taroudannt and Tata. The west is by the Chtouka and Tiznit plains. The north is by the Souss plain, and in the south is the province of Sidi Ifni and Guelmim (Figure 1). The study area has a population of 194,575 as of 2014, with an area of 2600 km².

2.2. Sampling and interview sessions

An ethnobotanical study of argan trees was conducted among the local population of eighteen municipalities in Chtouka Ait Baha and Tiznit province (Figure 1). Twenty-five people from each municipality city are interviewed to carry out this survey. Thus, 450 survey sheets are drawn up, each containing the profile of the person being surveyed (sex, age, level of study, the origin of information…) and data concerning medicinal plants (use, parts used, method of preparation). The data collected in the questionnaire were managed and analyzed statistically by the "Access" software. In parallel with the ethnobotanical survey, we organized several manuscripts and ancient local texts from traditional practitioners, *foqahas* (imams or teachers in Koranic schools), and the region's population. These books carry essential and crucial information about the doctrinaire culture of traditional medicine practiced in the area, and we were able to categorize them into two types:

✓ Manuscripts with known reference: "*Kitab majmaâ al manafeâ âla âelm ateb anafeâ*," known as "*Ateb al-Ba'qil*" (Al-Baaqili, 1853);

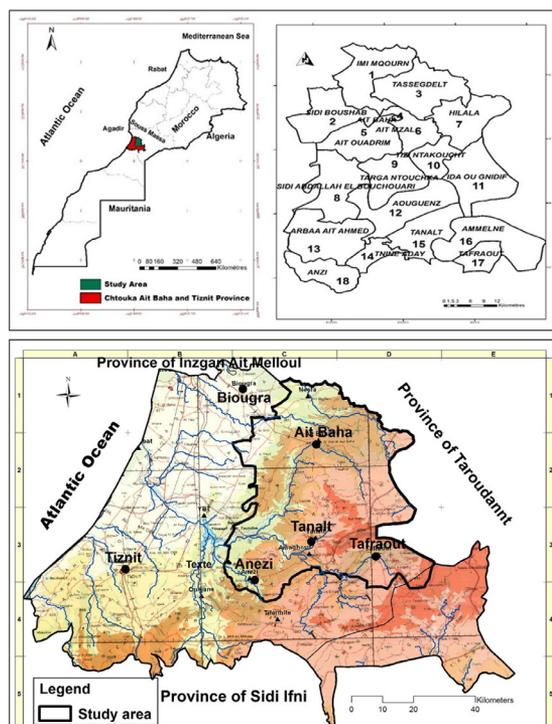✓ Manuscripts with obscure reference: these manuscripts contain traces confirming their appurtenance in the

Figure 1. Study area.

study area, transcribed by the local dialect "*Tachelhit,*" or have the vernacular names of plants used by the region's local population.

2.3. Data analysis

We have collected research data from direct interviews with the local people during this survey. A simple descriptive analysis was employed for the obtained ethnobotanical data to determine the percentage and frequencies based on the following information:
1. Socio-demographic information of the respondents
2. Plant taxonomic information, mode of administration, preparation, and plant parts utilized.
3. The following indices treat quantitative data:

2.3.1. Fidelity Level: FL

This is an index used to calculate the percentage of informants who use certain plants for the same primary purpose (Abdulrahman, et al., 2018; Dogara et al., 2021b; Tardío and Pardo-de-Santayana, 2008). It is calculated using Formula 1

$$FL \; (\%) \; = \; NP / N \; \times \; 100 \qquad (1)$$

NP: number of informants who use the medicinal plant to treat a given disease (or disease category). N: Total number of informants interviewed who use this plant to treat any infection (or disease category).

2.3.2. Relative frequency of Citation: RFC

This index presents the number of informants who mention the use of the species (FC) in the number of informants participating in the survey (N) (Abdulrahman, et al., 2018; Dogara, et al., 2021b; Shuaib et al., 2021; Tardío and Pardo-de-Santayana, 2008); the following Formula 2 calculates the index:

$$RFC = FC \setminus N(0 < RFC < 1) \qquad (2)$$

FC: Citation frequency is the number of informants who mentioned a particular species; N: Total number of informants.
Frequency of citation.

2.3.3. Use Value: UV

It is a quantitative index that demonstrates the relative importance of locally known species (Abdulrahman et al., 2018; Dogara et al., 2021b; Phillips and Gentry, 1993; Shuaib et al., 2021; Tardío and Pardo-de-Santayana, 2008). It is calculated using Formula 3

$$UV \; = \; \sum Ui / n \qquad (3)$$

Ui = the number of uses each informant mentions for a given species, n = the total number of informants.

3. Results and Discussion

3.1. Ethnobotanical uses of Argan

3.1.1. Socio-demographic analysis of argan user

3.1.1.1. Sex and age class

An ethnobotanical survey was conducted among 450 people from the local population; One hundred use argan trees for therapeutic purposes. However, the female sex predominates with 65 women (65%), compared to 35 men (35%) (Table 1). Similarly, Argan is used among all age groups, with people over 50 years of age present at 45%, followed by the [41-50], [31-40], and [17-30] age groups with a respective percentage of 23%, 24%, and 8% (Table 1).

Indeed, the experience accumulated with age is the primary source of local information about the use of Argan in traditional medicine, especially among women. They are more concerned with the maternal health system (Abouri et al., 2012; Abba and Dogara, 2021) and use argan oil for these cosmetic benefits (hair care, skin hydration, skin stretch marks, etc.) (Bejaoui et al., 2021; Soheir and Sirine, 2019). Recently, some people can explain a loss of data distrust of medicinal plants. The young tend to no longer believe too much in this traditional medicine and are more attached to urbanization (Bellakhdar, 1997; Dogara et al., 2021b).

3.1.1.2. Family Situation and Education Level

The analysis of the ethnobotanical survey results shows that married persons use more Argan (56%) compared to other categories of family situations (divorced, widowed, single) (Table 1). Indeed, married people have tended to use the argan tree and medicinal plants in general for their care to minimize the expansive costs required by modern medicine. According to the level of study, most users are illiterate about the use of argan trees, with a percentage of

Table 1. Profile of argan users (sex, age, family situation, and education).

Socio-demographic variables		Percentage (%)
Sex	Female	65%
	Male	35%
Age (years)	[17-30]	08%
	[31-40]	24%
	[41-50]	23%
	[51-87]	45%
Family situation	Married	56%
	Single	12%
	Divorce	05%
	Widower	27%
Education	Illiterate	57%
	Primary	25%
	Secondary	18%

57%. Persons with primary and secondary education have a significant use percentage (25% and 18%, respectively). These results are similar to other works (Ouhaddou et al., 2015; Zaher et al., 2018).

3.1.2. Therapeutic use of argan tree

The results show that the local population uses Argan to treat various diseases such as skin and subcutaneous tissue, digestive disorders, diabetes, muscle tears, conjunctivitis, ear infections, rheumatism, and wound healing (Table 2). Furthermore, several ethnobotanical studies prove the anti-hyperglycemic action of Argan at the rate of taking on one crude almond per day (Barkaoui et al., 2017; Benkhnigue et al., 2014; Skalli et al., 2019) or in association with fenugreek (El Azzouzi and Zidane, 2015). In addition, argan oil treats skin cancer (Kabbaj et al., 2012) and is a fortifier and aphrodisiac (Bellakhdar, 1997). Additionally, argan oil and bark contain several saponins (Berrougui et al., 2003; El Fakhar et al., 2007), which decrease the intestinal absorption of cholesterol (Berrougui et al., 2003). Moreover, the essential oil of leaves demonstrated enjoyable antifungal and antibacterial activities against several bacteria and fungi strains (Mechqoq et al., 2021).

This study revealed new uses and parts of the argan tree, which were never reported in ethnobotanical studies at the regional level or elsewhere (Table 2). These new uses of argan trees could guide research in phytochemical and pharmacological studies to accurately determine the chemical composition and the active substances responsible for the therapeutic effect.

3.1.3. Quantitative ethnobotany

To increase the indicative value of our study, data from 450 questionnaire sheets were analyzed using specific ethnobotanical indices such as usage value (UV), relative citation frequency (RFC), and fidelity level (FL).

3.1.3.1. Fidelity Level (FL)

The results show that argan trees treat eight categories of diseases with a very highly significant value (98%) for treating skin and subcutaneous cell tissue (Figure 2). Traditionally, argan oil is used primarily for its dermatological action in the treatment of skin irritations, juvenile acne, varicella, brittle nails, and retardation of the appearance of wrinkles, but also explicitly used in the biomedical field for the treatment of psoriasis, eczema, joint pain, skin inflammation, scabies and for the healing of burns and wounds (Charrouf and Guillaume, 1999). Recent scientific discoveries confirm some traditional uses and have approved that the skin protection properties of the argan tree probably come from its main components, palmitic and linoleic acids, that have emollient and nourishing properties for the skin (Chelaru et al., 2016). In addition, argan oil has a
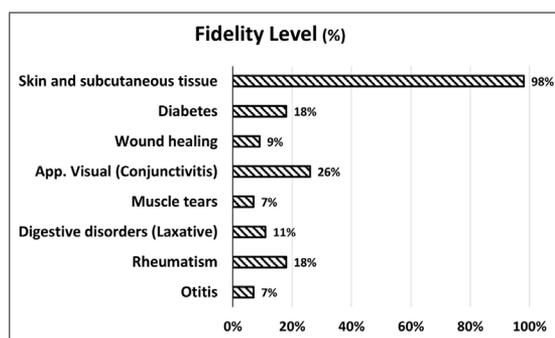

Figure 2. Fidelity level of the categories of diseases treated by the argan tree.

Table 2. Traditional use of the argan tree used by the local population of Chtouka Ait Baha and Tiznit.

Part used	Method of preparation	Administration mode	Therapeutic indications	References
Leaf	Raw and cataplasm	Applied Externally	Hemostatic and wound healing	(Saadi et al., 2013)
Almond	Decoction	Applied Externally	Anti-venom	No data
	Raw and cataplasm	Applied Externally	Conjunctivitis	No data
	Raw	Oral	Diabetes	(Abouri et al., 2012; Barkaoui et al., 2017; Benkhnigue et al., 2014)
Argan Oil	Raw and friction	Applied Externally	Skin and hair care, freckles, acne pimples, abscesses, muscle tears, rheumatic pain	(Abouri et al., 2012; Idm'hand et al., 2020; Ouhaddou et al., 2015; Saadi et al., 2013)
	Raw	Ear drops	Otitis	No data
	Raw	Oral	Laxative and stomachic	(Abouri et al., 2012; Ouhaddou et al., 2020)
Pericarp	Raw and cataplasm	Applied Externally	Hemostatic and wound healing	No data

beneficial action against hair loss (Karabacak and Doğan, 2014). It regulates the association between inflammation downregulation and reactive oxygen species emission-related genes (Bejaoui et al., 2021). Furthermore, many plant products are rich in polyphenols, some of which have potent anti-inflammatory and antioxidant properties (Gorzynik-Debicka et al., 2018). Indeed, argan oil contains polyphenols and affects reducing edema in the different phases of the inflammatory response (Kamal et al., 2019).

3.1.3.2. Use value (UV) and Relative Frequency of Citation (RFC)

In this study, we have arranged the UV values of the plants identified between [2.60 and 1.00], and we found that 12 plants out of 180 inventoried have a significant value for the UV value (UVmoy >1.80), of which the argan tree occupies the fifth place with a considerable use value of 1.94. Indeed, *Argania spinosa* (L.) is an endemic species and covers an extensive area in southwest Morocco. Therefore, it pushes the local population to make the most of this tree in therapy and the cosmetic field, especially for women who hold the fundamental ancestral knowledge of the uses of argan oil (Boucetta et al., 2014).

The RFC value of Argan is the ratio of the number of surveys that identified this species (100 people) to the total number of investigations (450 people). The results show that all informants who participated in this study (450 people) used the argan tree for food or prepared authentic foods with a very significant value of RFC (RFC=1.00). However, one hundred use the argan tree simultaneously in traditional medicine and food with a frequency of 0.22 less than the average (< 0.5). The probable explanation for this result is that the argan tree is used in human food in the form of oil (the only derivative of argan tree used in human food) directly consumed or constitutes the main ingredient of tagine, couscous, soup, salad, or enters more original recipes such as "*Amlou*"," "*Tagoulla*," "*Lamris*"," "*Toumit*" and "*Labsis*" (Moukal, 2004).

3.1.4. Used argan parts, modes of preparation, and routes of administration

In this work, we tried to detect the different parts of the organ used by the local population in traditional medication. The percentage of use of these other parts (Figure 3) shows that the oil extracted from argan almonds is the most used (72%); a cumulative percentage of 28% represents the other parts. Furthermore, these parts of the argan tree are prepared by different methods of preparation depending on the type of use (cataplasm, friction, injection, decoction, or raw). Indeed, the data analysis shows that friction is the dominant method of preparation with 54% (Figure 4), and administration is done mainly through external applications with 73% of the modes of administration (Figure 5).

3.1.5. Argan prescriptions described in ancient manuscripts

The manuscripts and ancient texts have enabled us to detect ancestral knowledge inherited from the Souss region and transmitted and transcribed from ancient
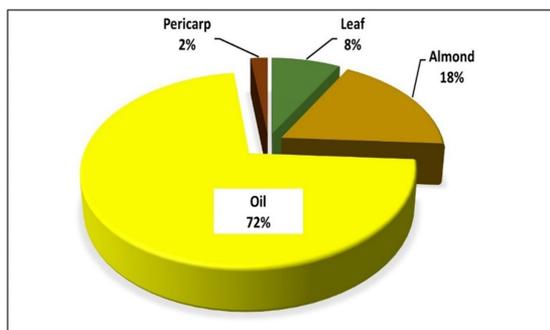

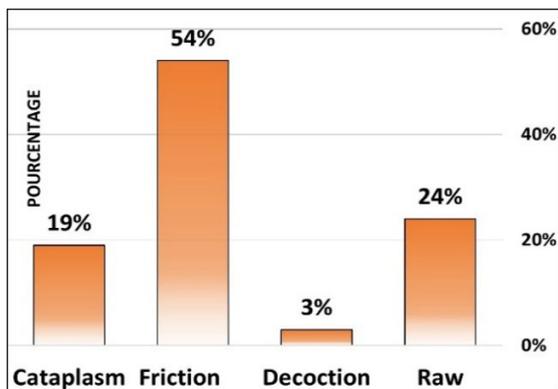**Figure 3.** Different parts of the argan tree used in the study area.

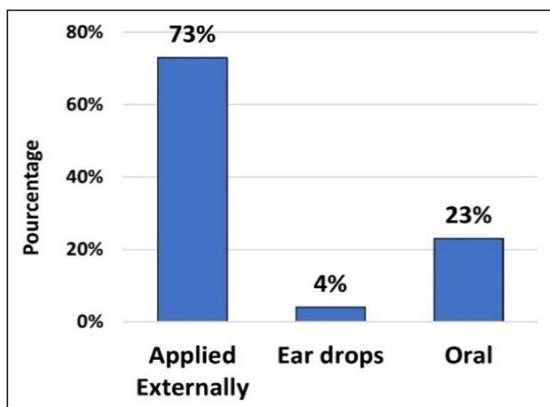**Figure 4.** Preparation methods.

Figure 5. Mode of adminastation.

manuscripts. Furthermore, treating these manuscripts has permitted us to identify several ethnomedical prescriptions for Argan combined with other medicinal plants (Table 3). The results show that the manuscripts and ancient texts contain the uses of Argan's uses to treat various diseases (scrofula, infertility, etc.). Furthermore, the use of other parts of Argan or its oil and the combination of some plants shows that the region's local population practices the art of pharmacies by taking advantage of endogenous sources.

Table 3. The argan prescriptions described in ancient manuscripts.

Plant composition of prescriptions (Latin binomial and family)	vernacular name	Part used of each plant	Method of preparation	Administration mode	Therapeutic indications
Argania spinosa (L.) Skeels (*Sapotaceae*)	Argan	Argan almonds	Decoction	Applied Externally	Anti-venom
Argania spinosa (L.) Skeels (*Sapotaceae*)	Argan	Oil	Cataplasm (the ash of stem the *A. donax* L. mixed with argan oil and olive oil)	Applied Externally (for one hour)	The aches of broken teeth
Olea europaea L. (*Oleaceae*)	Zitoun	Oil			
Arundo donax L. (*Poacea*)	Qseb/ Aghanim	Stem (Ash)			
Argania spinosa (L.) Skeels (*Sapotaceae*	Argan	Argan almonds	Cataplasm (The mixture of laurel leaves with argan almonds and powder leaves of henna)	Applied Externally	Scrofula
Nerium oleander L. (*Apocynaceae*)	Alili / Defla	Leaf			
Lawsonia inermis L. (*Lythraceae*)	Lhenna	Leaf			
Argania spinosa (L.) Skeels (*Sapotaceae*)	Argan	Leaf	Powder (in equal parts, milled and mixed with olive oil and then prepared in small balls)	Vaginal suppositories	infertility caused by cold
Olea europaea L. (*Oleaceae*)	Zitoun	Oil			
Artemisia herba-alba (*Asteraceae*)	Izri/ Chih	Leaf			
Lavandula dentata L. (*Lamiaceae*)	Timzeria	Leaf			
Marrubium vulgare L. (*Lamiaceae*)	Mriwt/ Ifzi	Leaf			
Lawsonia inermis L. (*Lythraceae*)	Lhenna	Leaf			
Corrigiola telephiifolia Pourr. (*Caryophyllaceae*)	Tasserghent	Root			

3.2. Use of argan in human food

3.2.1. Place the argan oil in the region's diet

All 450 informants who participated in this study use the argan tree for food or prepare authentic foods (RFC=1.00) such as; *Amlou*, *Tagoulla,* and *Labsis*. The argan oil obtained from *A. spinosa* L. seeds is eaten raw almost daily for breakfast or snacks in Morocco's Souss region. Therefore, it is an essential source of lipids for the population who live in poor and complex areas (Adlouni, 2010); it represents 25% of their daily lipid diet (Berrougui et al., 2003). Moreover, the argan tree occupies a critical area (more than half of the region's total area), pushing the local population to benefit from this biodiversity.

3.2.2. Nutritional value of the argan oil and their original foods derived Amlou, Tagoulla, and Labsis

Argan oil has been used as a food and food ingredient for centuries. It is the only derivative of the argan tree used in human nutrition. Argan oil may be served alone as a dip for bread at breakfast or used to cook Tagine, Couscous, and other meals (El Abbassi et al., 2014). The chemical analysis of the argan oil highlighted a glycerides fraction of 99% (including 95% of triglycerides), which is mainly rich in polyunsaturated fatty acids (together, oleic and linoleic acids constitute 80% of the fatty acids) (Berrougui et al., 2003; Charrouf and Guillaume, 1999; Mechqoq et al., 2021).

Our survey showed that the local people use argan oil in the preparation of several original foods (Table 4), such as

Amlou: is the main ingredient made from argan oil. It is a viscous liquid preparation, a Nutella-like spread that combines the oil with ground almonds and honey (Morse, 2003). *Amlou* is present at all tables, during special occasions (religious holidays, baptism, marriage), or simply at the reception of friends.

Labsis: It is a snack served on the occasion of a baptism, a wedding, the complete learning of the Koran, religious festivals, or simply at the end of the extraction of argan oil (Moukal, 2004; Stroomer, 2008).

Tagoulla: it is a traditional preparation served on the occasion of the Amazigh New Year. It is a meal prepared with barley and argan oil.

The results obtained (Table 4) show that the nutritional and energy value of the *Amlou* food has the energy value and the content of lipids. This food is a highly nutritive preparation (El Monfalouti et al., 2010), and it uses as a potent aphrodisiac or believed to fortify women who have just given birth (Morse, 2003). In the study region, the local people eat daily *Amlou* with warm bread (*Tafrnout*) or may also be an ambrosial topping for saucer-sized, leavened pancakes called *Baghrir* (Morse, 2003). It is the most used food compared to other foods (*Lbsis* and *Tagoulla*). Indeed, significant carbohydrate content is added after eating *Amlou* with bread (47 g/100 g) (Anses-Ciqual, 2017). Generally,

Table 4. Proximate nutritional composition and method of preparation of the *Amlou*, *Lbsis*, and *Tagoulla*.

Foods	Composition	Nutritional composition			Energy (kcal/100 g)	Method of preparation
		Total fat (g/100g)	Carbohydrate (g/100g)	Protein (g/100g)		
Amlou	45 g of argan oil	98.7 g (Harhar et al., 2011); 98.7 g (Anses-Ciqual, 2017)	---	---	703	The ripe almonds are crushed with a traditional hand mill and homogenized with argan oil and honey
	45 g of almonds	51.3 g (Anses-Ciqual, 2017); 48.62–61.62 g (Houmy et al., 2016)	5.5 g (Yada et al., 2011); 9.51 g (Anses-Ciqual, 2017)	19.79 g (Summo et al., 2018); 18.8 g (Anses-Ciqual, 2017)		
	10 g of honey	---	79.7 g (Hasam et al., 2020); 81.7 g (Anses-Ciqual, 2017)	0.5 g (Hasam et al., 2020); 0.56 g (Anses-Ciqual, 2017)		
Lbsis	25 g of argan oil	98.7 g (Harhar, et al., 2011); 98.7 g (Anses-Ciqual, 2017)	---	---	607	The honey and argan oil added to toasted barley flour
	65 g toasted barley flour	1.18–3.09 g (Guo et al., 2020); 2.3 g (Anses-Ciqual, 2017)	49.14–68.6 g (Guo et al., 2020); 64.5 g (Anses-Ciqual, 2017)	6.35–23.4 g (Guo et al., 2020); 9.91 g (Anses-Ciqual, 2017)		
	10 g of honey	---	79.7 g (Hasam et al., 2020); 81.7 g (Anses-Ciqual, 2017)	0.5 g (Hasam et al., 2020); 0.56 g (Anses-Ciqual, 2017)		
Tagoulla	10 g of argan oil	98.7 g (Harhar et al., 2011); 98.7 g (Anses-Ciqual, 2017)	---	---	375	The semolina of barley is added to boiling salted water and seasoned with argan oil
	90 g of barley semolina	1.18–3.09 g (Guo et al., 2020); 2.3 g (Anses-Ciqual, 2017)	49.14–68.6 g (Guo et al., 2020); 64.5 g (Anses-Ciqual, 2017)	6.35–23.4 g (Guo et al., 2020); 9.91 g (Anses-Ciqual, 2017)		

a food of 3/4 bread and 1/4 of *Amlou* provides 59% of carbohydrates, 27% of fat, and 14% of protein. Similarly, some studies have shown that an athlete needs a balanced healthy food proportion of 60% carbohydrates, 25% fat, and 15% protein from total needs or energy output per day (Rahayu and Rustiadi, 2020)

4. Conclusion

This study is the first to focus on ethnopharmacological knowledge of the argan tree and the nutritional value of authentic foods derived from the argan oil (*Amlou*, *Tagoulla*, and *Labsis*) in the Souss region (Western Anti-Atlas). The investigation revealed that folk medicine and food continue to play an essential role in the culture of the local people. Unfortunately, this knowledge is increasingly menaced; the transmission from generation to generation is no longer assured. Preliminary results show the dependence of the Western Anti-Atlas population on the use of argan oil in food in the first place and therapeutic care in the second place. In addition, *Amlou* food is a healthy and balanced diet that contains essential macronutrients and micronutrients. This study shows that ancient manuscripts constitute a necessary part of the national cultural heritage and include traditional practices and ethnopharmacological prescriptions that may guide us in integrating these resources into the list of the intangible cultural heritage of humanity. This study is indispensable in researching nutritional and pharmacological argan oil studies and their authentic foods, especially *Amlou* food.

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