Ethnobotanical survey of medicinal plants in Taounate, Pre-Rif of Morocco

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Research

Abstract

Background: Moroccan Pre-Rif is characterized by the abundance of its vegetable resources, especially its aromatic and medicinal plants. The Medicinal plants are used to treat certain diseases, as they have therapeutic properties. However, the region is not sufficiently studied, particularly in terms of its flora.

Objectives: The ethnobotanical study carried out in the province of Taounate (Pre-rif of Morocco) aims to collect information on the medicinal and aromatic plants used in phytotherapy in order to draw up a floristic inventory of the region, and to highlight this plant heritage.

Methods: An ethnobotanical survey was conducted among the population of some communes of the province of Taounate between May 2020 and May 2021. The study targeted people belonging to different categories of age, sex and family status. Data were collected using questionnaire forms based on structured interviews and analysed through the relative frequency of citation (RFC), the family importance value index (FIV) and the value of the plant part used (VPP).

Results: The analysis of the results obtained revealed a total of 111 medicinal plant species belonging to 52 botanical families, the most abundant of which are the Lamiaceae (FIV=13.327%), the Asteraceae (FIV=6.164%), the Apiaceae (2.878%), the Fabaceae (FIV=5.07%) and the Rosaceae (FIV=2.998%). The most cited species are *Origanum compactum* Benth (RFC= 43.81%), *Mentha pulegium* L. (RFC=36.39%), *Rosmarinus officinalis* L. (RFC=30.85%), *Chenopodium ambrosioides* L. (RFC= 22.27%). This analysis also allowed to determine that most of the diseases, especially digestive, are treated by the leaves of the plants which represent the most used plant part and also by decoction which constitutes the most frequent mode of preparation.

Conclusion: According to the present survey, the population of the province of Taounate relies mainly on medicinal plants for treatment despite the development of modern medicine.

Keywords: Pre-rif of Morocco, Taounate, Medicinal plants, Ethnobotanical surveys, Traditional medicine.

Background

The use of medicinal plants to treat and cure diseases is an age-old practice that has developed in recent years (Benkhnigue *et al.* 2010; Jaadan *et al.* 2020). This development is generally due to both the increasing need for these plants, especially in developing countries, and their affordable cost compared to other synthetic medicines (El Hilah *et al.* 2016; Jaadan *et al.* 2020). In fact, these medicinal plants have therapeutic properties provided mainly by its active compounds that directly affect the body (Belyagoubi-Benhammou *et al.* 2017). The medicinal plants contain a wide variety of secondary metabolites such as tannins, alkaloids, phenolic compounds, and flavonoids (Djeussi *et al.* 2013). As the first source of new drugs, medicinal plants are used thanks to their antibacterial, antifungal, antioxidant, and antiviral activities, which are due to the phytochemicals synthesized in the secondary metabolism in the plants (Manandhar *et al.* 2019). Furthermore, A numbers of herbal textbooks mention various usages of medicinal plants to treat infectious diseases including urinary tract infections, gastrointestinal disorders, respiratory diseases, and cutaneous infections (Manandhar *et al.* 2019).

In African countries, namely Morocco, a major part of the population depends on these Medicinal plants as a source of healing (Tahri *et al.* 2012). Moreover, Morocco is one of the considerable floristic areas of North Africa due to its geographical position, topography, geology, climate, and its composite and differentiated environment (El Assri *et al.* 2021). Morocco contains a rich and diverse flora with approximately 743 taxa, 40 of them are endemic medicinal plants (Jamaleddine *et al.* 2017).

In view of this wealth, efforts are being made to preserve and enhance it. Thus, ethnobotanical surveys contribute to collecting the largest amount of information with a view to constituting a database for researchers in various fields, such as pharmacology, phytochemistry and toxicology (Jaadan *et al.* 2020). For the above reasons, the current study focused on the ethnobotanical survey of medicinal plants in the province of Taounate, and more particularly in six communes, four of which are rural; Bni Ounjel, Khlalfa, Jbabra, Ouartzagh and two are urban; Tissa and Taounate, for the main objective is the discovery of the richness of medicinal plants in the province of Taounate in view of a better valorization of these plants in the future.

Materials and Methods

Study area

The information concerning the study area was provided by the Regional Direction of Water and Forests and the Fight against Desertification of the north-eastern province of Taounate, Morocco. The province of Taounate is located in the Pre-Rif of Morocco (Figure 1). It covers an area of 5616 km² within the Fez-Meknes region, divided between 44 rural and 5 urban communes. The population of this province amounts to 662,246 inhabitants (census, 2014) with a density of 117 inh/km². About 87% of the population live in rural and spread over more than 1600 customs. The religion of the people is Islam, and Arabic is the official language of the country. In addition, the inhabitants of this region share a set of particular practices, and traditions, including speech, music, food, clothing, etc. The province is divided into two different parts: a northern part with mountainous terrain and a southern part with hilly terrain. The first part, which represents about 40% of the province's surface area, is linked to the Rifian domain, which is essentially made up of the forestry domain and covers an area of 40,690.96 ha (7% of the province's surface area). As for the southern part, which constitutes about 60% of the province's surface area, it is attached to the pre-Rifian zone. Taounate has a considerable hydrographic reserve, thanks to the Ouergha and of Inaouen rivers, and to the existence of reservoirs, such as Wahda, Idriss premier, Bouhouda, Sahla and Asfalou. This makes it possible to store a significant volume of water (5.3 billion m³). The climate of this area is Mediterranean, characterised by the alternation of two seasons, one winter, wet and cold and the other summer, dry and hot. The average temperature is around 16.9 °C and can exceed 45 °C in summer, and the average rainfall is around 790 mm and can reach 1800 mm at Jebel Outka. Taounate is also characterized by its wealth of plant resources, particularly aromatic and medicinal plants.
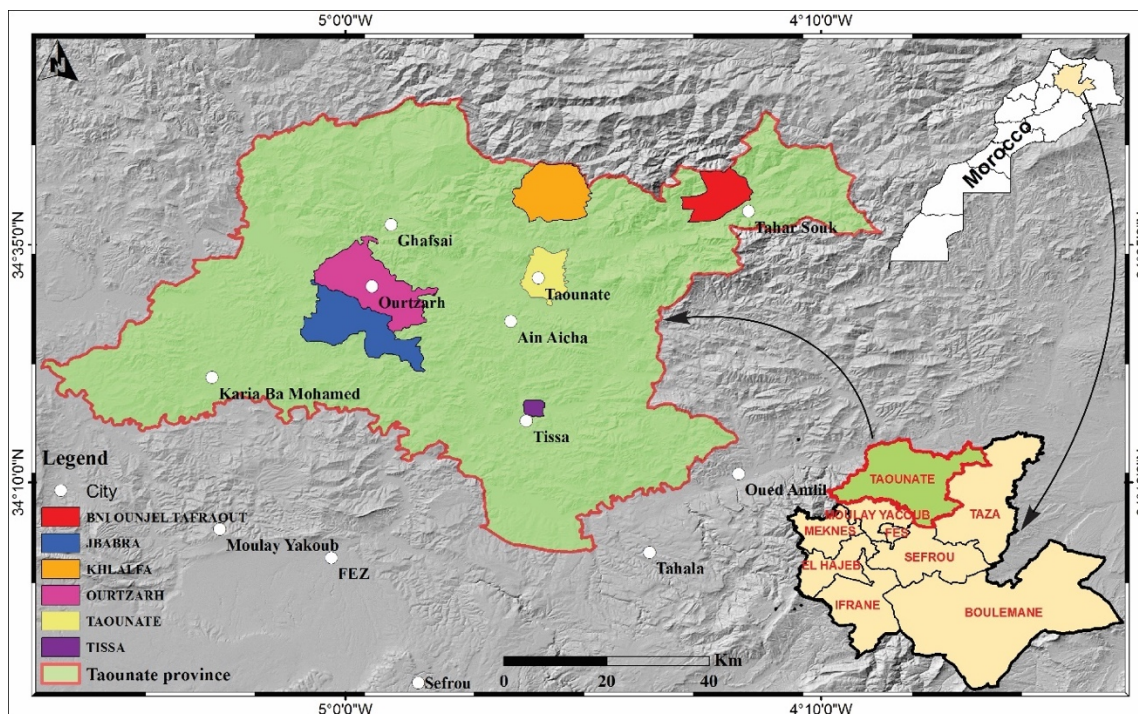
Figure 1. Map of the location of the study area. The map was prepared by QGIS software.

Ethnobotanical survey
An ethnobotanical survey was carried out in six communes of the province of Taounate (Bni Ounjel, Khlalfa, Jbabra, Ouartzagh, Tissa and Taounate) between May 2020 to May 2021. Closed-ended questionnaire was used to collect ethnobotanical data. The survey carried out from natives' residents. The questionnaire is divided into two parts; the first part concerns the profile of the informant, including age (under 20 years, 20 - 35 years, 35 - 55 years and over 55 years), gender (male and female), level of education, family situation, socio-economic level, place of residence, occupation, and the origin of the information. The second part concerns the plants used, the nature of use, the parts used, the diagnostic, the method of preparation, administration and conservation, the dosage, the type of plant, the collection period, the risk of toxicity, the results obtained and the side effects.

Plant collection, handling, and identification
The plant species collected in the field and then preserved in the herbarium. The collected plant species were identified at the Laboratory of Biotechnology, Environment, Agri-food and Health, Faculty of Sciences Dhar El-Mahraz, Sidi Mohamed Ben Abdellah University, Fez, Morocco.

Data analysis
The data collected on the survey sheets were entered into a computer, processed, and analyzed statistically by GraphPad Prism 8.0.1 (Graph Pad Software Inc., San Diego, United States) and Microsoft Office "Excel 2016". The socio-demographic data of the participants were analyzed by a simple descriptive statistical analysis using percentages and frequencies. Ethnobotanical data were analyzed using relative frequency of citation (RFC), family importance value (FIV), and value of the plant part (VPP).

Relative frequency of citation (RFC)
RFC is an index that shows the importance of each species in the region studied. It is obtained by dividing the number of respondents having cited the species (FC), by the total number of respondents (N) (Tardío and Pardo-de Santayana, 2008):

RFC = FC/N (0 < RFC < 1)

Family Importance Value (FIV)
FIV represents the relative importance of families. It is used to assess the biological taxonomic value of plants, and is determined by dividing the number of respondents revealing the family (FC family) by the number of species within each family (N_S) (Sreekeesoon and Mahomoodally, 2014):

$$FIV = FC_{family} / N_S$$

Value of the plant part (VPP)
VPP indicates the frequency of use of each of the plant parts. It is calculated by dividing the number of reported uses for all plant parts (RU $_{plant\ part}$) by the sum of reported uses per plant part (RU) (Gomez-Beloz, 2002):

$$VPP = RU_{plant\ part} / RU$$

Results and Discussion
Socio-demographic profile of informants
Six hundred eighty-seven (687) randomly selected natives and/or residents of the communes in six provinces of Taounate participated in the present study.

Age and Gender
In the survey area (Taounate region), most of the informants (46%) were recorded in the 35-55 years age group followed by 20-34 years age group (29%). The people who were under 20 and over 55 years old represent the lowest rate of users, with the percentage of 9% for the under 20 years old and a percentage of 16% for the over 55 years old (Table 1). These results were done by ethnobotanical surveys conducted at the national level by Eddouks *et al.* (2002), Abouri *et al.* (2012) and Barkaoui et *al.* (2017), and at the international level by Skinner & Rangasami (2002), Samake *et al.* (2012) and Silva *et al.* (2015). Therefore, the above 55 years group shows great interest in the use of herbal medicines, in contrast to the younger age group who seem to be unaware or even indifferent to this type of medication.

The use of medicinal plants in Taounate varies also according to gender. Females are in the lead with a percentage of 57% against 43% for males (Table 1). These data are similar to other studies by El Hilah *et al.* (2016), Jdaidi & Hasnaoui (2016), Hamel *et al.* (2018) and Boutabia *et al.* (2020). This means that women attached great importance to traditional medicine contrary to men, because they believe that medicinal plants are effective in treating diseases from their cultural perception.

Study level, family situation and socio-economic level
The use of medicinal plants is very abundant among illiterate people. They had the highest rate of users (44%), while university students have the lowest rate (8%), because students do not believe that the using of medicinal plants can heal them. The remaining 48% of respondents are divided between primary (23%) and secondary (25%) level (Table 1). These results are similar to those reported by El hilah *et al.* (2016), Barkaoui *et al.* (2017) and Skalli *et al.* (2019).

In Taounate, married people used medicinal plants with a rate of 65%, while single people had limited interest in these plants with a rate of 35% (Table 1). The results obtained by Lahsissene *et al.* (2010) and Mechchate *et al.* (2020) also showed that married people are the most knowledgeable about traditional herbal medicine.

The use of medicinal plants is more frequent among people with a low socioeconomic level than other with (53%), because they believe that it is more effective. Moreover, the high socio-economic level used medicinal plants (10%) (Table 1), due to the fact that they do not believe the effective of the medicinal plants. In contrast, it is less frequent among people with a medium socioeconomic level (37%). These data are similar to the results of Alami Merrouni *et al.* (2021) and Jaddi *et al.* (2021).

Profession and information origin
Housewives are the category that uses medicinal plants most frequently, with a percentage of 37% of the people surveyed. Herbalists with a percentage of 8% have the lowest percentage. As for the other categories, 13% do not have a profession, 29% are farmers and the remaining 13% are civil servants (Table 1). Housewives used herbal medicines more than other categories of profession because they see that herbal medicine are effective, cheaper, and better than medication manufactured, and because they have great experiences, and because the impact on health is low compared to manufactured drugs. The current results are almost similar to the study of Jaadan *et al.* (2020) which focused on other regions of Morocco.

The majority of respondents (61%) get information from the experience of others, 13% from their own reading and 21% from herbalists, while only 5% get their information from pharmacists, several factors could motivate this

decision such as, beliefs, level of education, and living situation (Table 1). These results are in accordance with other studies done in the same region and in other regions of Morocco by Bellakhdar *et al.* (1991), Eddouks *et al.* (2002) and Es-Safi *et al.* (2020).

Table 1. Socio-demographic profile of the province of Taounate (Pre-rif of Morocco).

Variable	Sub-group	Number	Percentage (%)
Age	< 20 years	60	9
	20 - 35 years	197	29
	35 - 55 years	320	47
	> 55 years	110	16
Gender	Female	389	57
	Male	298	43
Study level	Analphabetic	305	44
	Primary	155	23
	Secondary (College)	93	14
	Secondary (High School)	79	11
	University	55	8
Family status	Single	242	35
	Married	445	65
Socio-economic level	High	70	10
	Medium	256	37
	Low	361	53
Profession	Without	89	13
	Farmer	201	29
	Herbalist	53	8
	Civil servant	91	13
	Housewife	253	37
Information source	Bibliography	87	13
	Herbalist	146	21
	Pharmacist	33	5
	Experience of others	421	61

Correlation between the information source and socio-demographic characteristics

Table 2 shows a correlation between the information source and socio-demographic parameters. This result is in agreement with our study where there is a significant correlation (R = 0.879, *P* = 0.0001) between the oldest informants and the experiences of others as a source of information. The current results are in accord with several ethnobotanical studies in Morocco which, shows the use of bibliography, such as books and/or visits to herbalists to provide information on plants (Haddad *et al.* 2003; Barkaoui *et al.* 2017).

Table 2. Correlation between information source and sociodemographic parameters.

		Information source				R Pearson	*P value*
		Bibliography	Herbalist	Pharmacist	Experience of others		
Age	< 20 years (N=60)	60	0	0	0	0.879	0.0001
	20 - 35 years (N=197)	27	146	24	0		
	35 - 55 years (N=320)	0	0	9	311		
	> 55 years (N=110)	0	0	0	110		
Study level	Analphabetic (N=305)	87	146	33	39	0.657	0.0003
	Primary (N=155)	0	0	0	155		
	Secondary (College) (N=93)	0	0	0	93		
	Secondary (High School) (N=79)	0	0	0	79		
	University (N=55)	0	0	0	55		
Socio-economic level	High (N=70)	70	0	0	0	0.871	0.0001
	Medium (N=256)	17	146	33	60		
	Low (N=361	0	0	0	361		

Floristic analysis

The different plant species inventoried are presented in Table 3 with their scientific name, vernacular name, genus, type, part used as well as data on the frequency of citation (RFC) and the family importance value (FIV). The present study collected 111 medicinal plant species belonging to fifty-two botanical families. Moreover, in Morocco, the number of medicinal plants is limited to 600 species (Rejdali, 1996; Bammi *et al.* 2002), that is 14.28% of all Moroccan plants (4200 species) (Fennane & Ibn Tatou, 1991 and Bammi *et al.* 2002). Comparing the selected medicinal flora with the total flora, the study area has a rich biodiversity with a considerable number of medicinal plants.

In this study, Lamiaceae (16 species) represent the most used family with FIV=13.327%, followed by Asteraceae (9 species) with FIV=6.149%, Apiaceae (9 species) with FIV=2.878%, Fabaceae (6 species) with FIV=5.07%, and Rosaceae (5 species) with FIV=2.998% (Figure 2). The representativeness of these families has also been observed in another ethnobotanical. Surveys conducted in the same region of Fez-Meknes (Es-Safi *et al.* 2020; El-Hilaly *et al.* 2003), and in other regions of Morocco (Barkaoui *et al.* 2017; Belhaj *et al.* 2020; El Hachlafi *et al.* 2020).
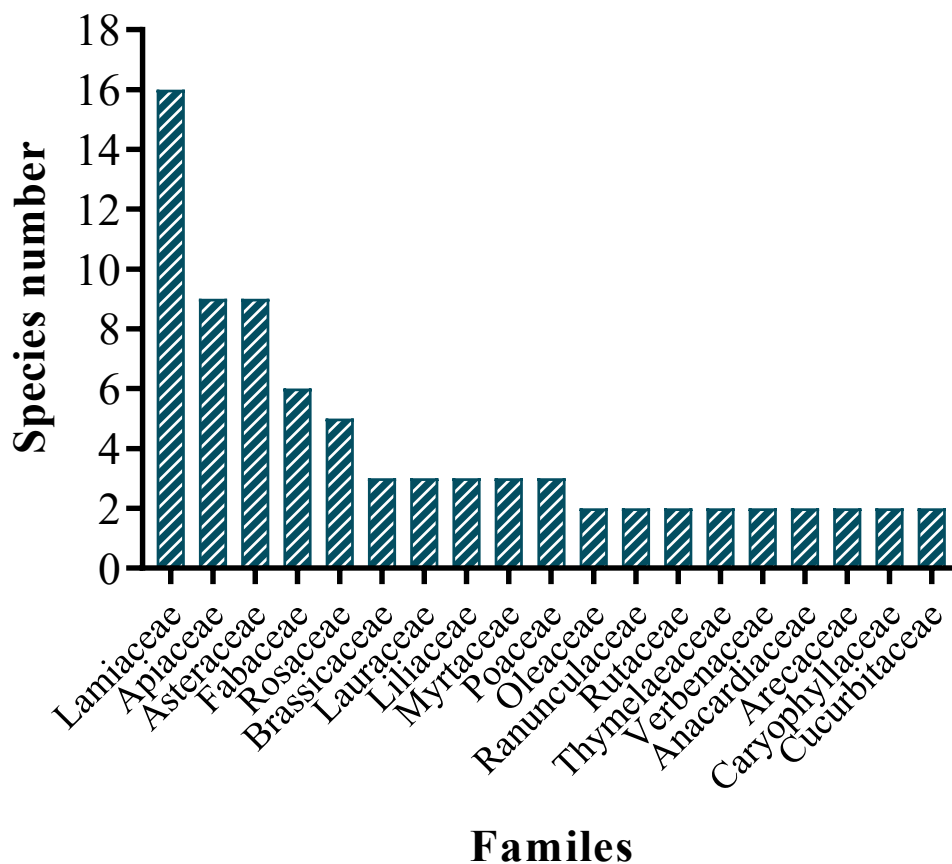

Figure 2. Botanical families most present in the province of Taounate.

The citation frequencies (CFR) of the plant species listed in the study area, vary from 0.29% to 43.81% with a predominance of the species *Origanum compactum* Benth (43.81%), followed by *Mentha pulegium* L. (36.39%), *Rosmarinus officinalis* L. (30.85%), *Chenopodium ambrosioides* L. (22.27%), *Aloysia citriodora* Palau (17.9%), *Allium sativum* L. (17.61%), *Capparis spinosa* L. (14.84%), *Artemisia herba-alba* Asso (14.26%), *Mentha rotundifolia* Muds (13.56%) (Figure 3). These results are in accordance with those of Rhattas *et al.* (2016) and Mechchate *et al.* (2020).
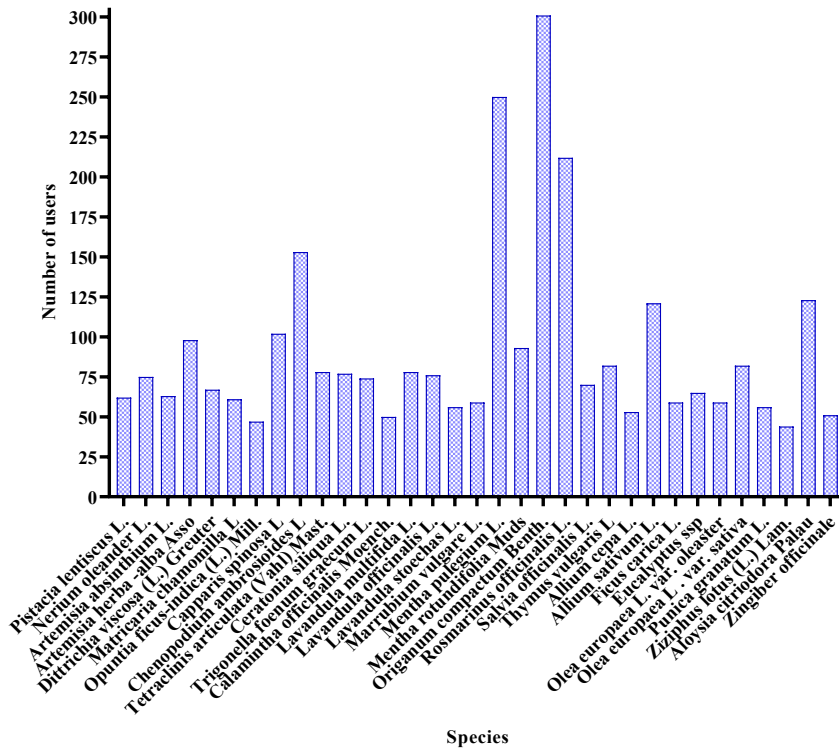
Figure 3. Frequency of use of plant species in northern Morocco (Taounate).

Diagnosis

In fact, most of the informants in the present study (74.80%) diagnose their diseases themselves, as opposed to 2.77% who consult a doctor. while 22.43% go to an herbalist to recognize their ailments (Figure 4). These data are comparable with the study performed by Jaddi *et al.* (2021).
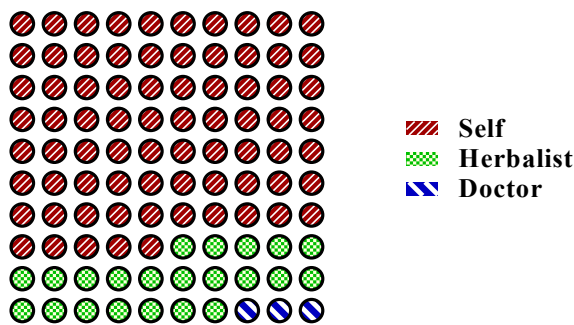
Diagnosis

Figure 4. Distribution of medicinal plant users by type of diagnosis

Plant parts used

In the study area the leaves are the most used part with PPV=0.277. The aerial part comes second with VPP=0.202, followed by fruits (VPP=0.097), then stems (VPP=0.091), seeds (VPP=0.068), roots (VPP=0.066). For the other parts (whole plant, bulb, bark, rhizome), they are represented by a cumulative PPV=0.115 (Figure 5). Although these results show some similarities with those of (Salhi *et al.* 2010; Labiad *et al.* 2020), they are in contrast with those of (Mechchate *et al.* 2020) who show that seeds are the most frequently used parts with a percentage of 33%. Indeed, the use of leaves is explained by the fact that they are easy to harvest, and that they constitute the centre of photosynthesis and storage of secondary metabolites responsible for biological properties (Tahri *et al.* 2012; Slimani *et al.* 2016).
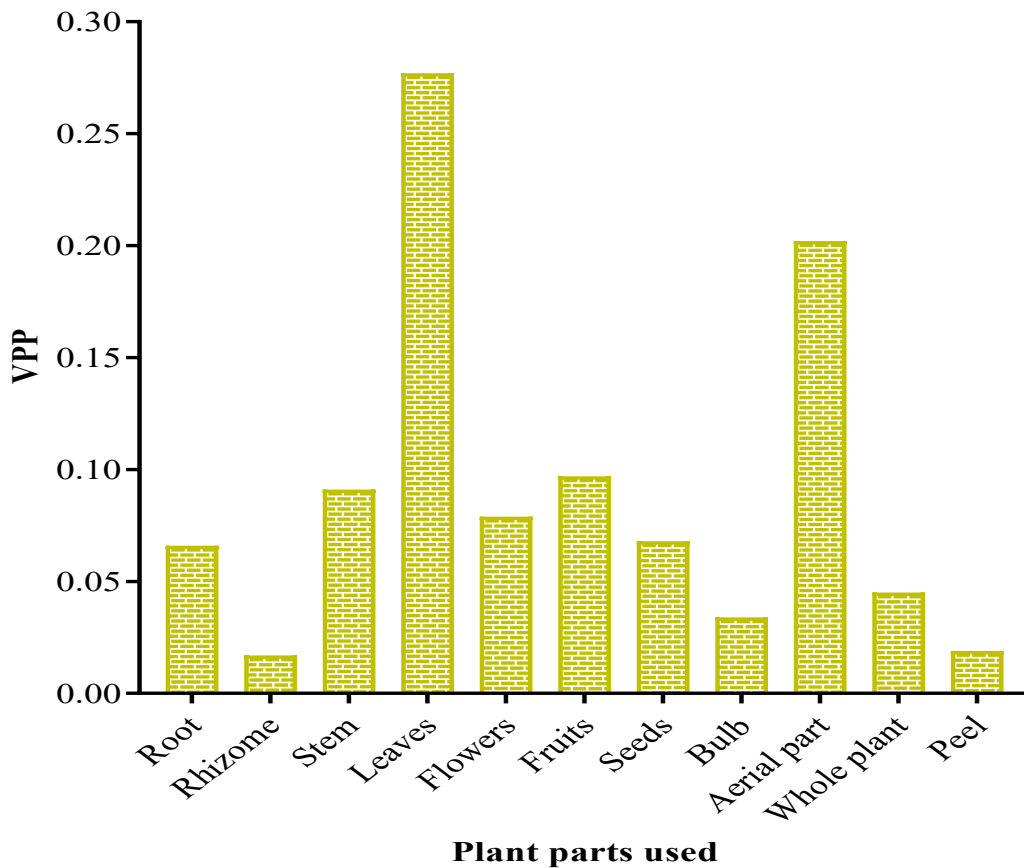
Figure 5. Different parts used of medicinal plants in the survey area.

Method of preparation and mode of administration
The local population of Taounate practices different techniques of preparation of medicinal plants, especially, decoction, infusion, maceration, fumigation. The decoction is the method of preparation used to extract the active principles of plants, with a percentage of 25.18%. Infusion comes second with a percentage of 22.50%, followed by cataplasm with 11.94%. As for the other methods of preparation, fumigation is used with 9.99%, maceration with 9.36%, consumption of the powdered and crushed plant with 8.61% and 5.13% respectively. The remaining methods (use of raw plant, cooked plant, etc) represent a cumulative percentage of 7.29% (Figure 6). These results are broadly similar to those of other studies conducted in other regions of Morocco by Belhaj *et al.* (2020), El Hachlafi *et al.* (2020) and Alami *et al.* (2021).

The methods of administration of medicinal plants depend on the nature of the active ingredients and the degree of their toxicity. They can be administered internally (Orally, inhalation), or externally (Massage, rinsing). In this survey, most plants (57.61%) are taken orally, 16.17% by rinsing and 11.56% by inhalation. The other modes of use, namely massage, represent a rate of 7.38% (Figure 7A). Moreover, other studies by El Alami *et al.* (2017) and El Hachlafi *et al.* (2020) reported the same results, especially regarding the preponderance of the oral mode of administration. Furthermore, as shown (Figure 7B), water is the most commonly used solvent for herbal preparations with a rate of 45.66%, followed by olive oil with a rate of 21.28%. For the other solvents (Milk and honey), they share a rate of 20.39%. The remaining 12.67% of the population do not use any solvent. Moreover, the study by Labiad *et al.* (2020) shares the same results.
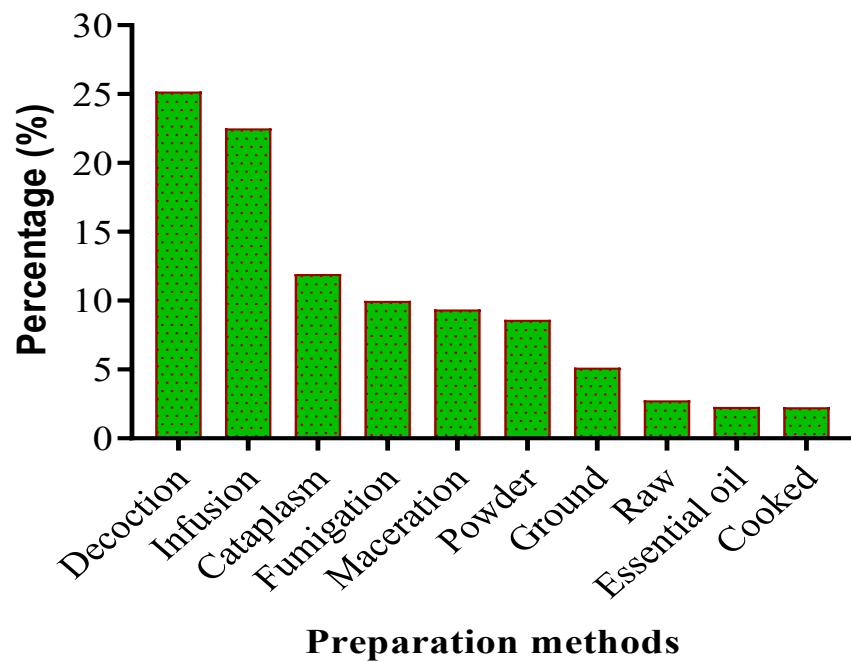
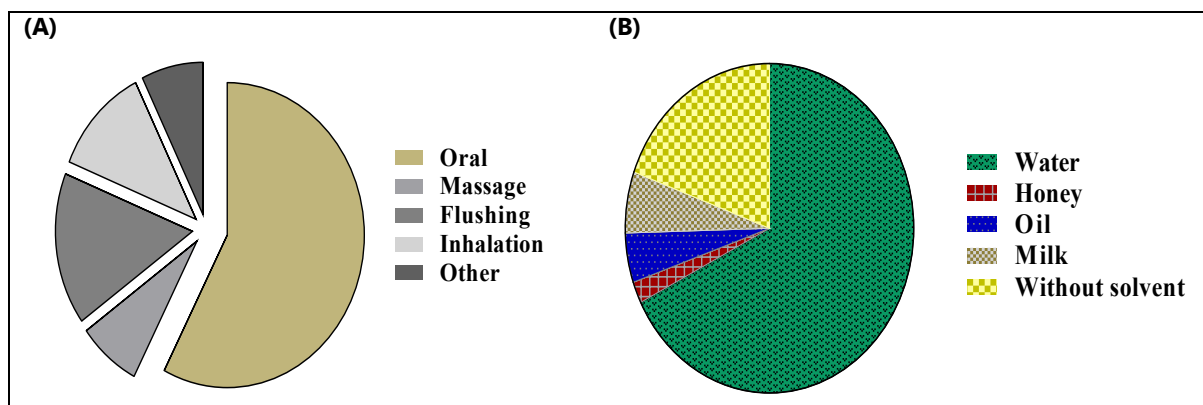Figure 6. Different preparation methods of the plants used in the study area

Figure 7. Mode of administration and solvents used. **A.** Different ways of medicinal plant administration, **B.** Proportions of solvents used in the preparation of medicinal plants.

Posology
In this survey area, a high number of respondents use medicinal plants without any specific dose. In fact, according to the results obtained, the spoonful is the most used dose with a percentage of 32.67%, followed by the glass with a percentage of 32.02% (Figure 8). In addition to these doses, the pinch with a percentage of 18.39% and the handful with a percentage of 16.92% (Figure 8). Concerning the duration of using medicinal plants by the local population was 48.84% use for one week. As well as 35.67% for one day, and 5.79% for one month, for others the duration was not specific. The use of medicinal plants in unspecified dosages can lead to adverse effects as some plant species become toxic if misused (Benkhnigue *et al.* 2010; El Hachlafi *et al.* 2020).

Diseases treated
The analysis of the data collected reveals that the majority of the local population (68.98%) uses medicinal plants for therapeutic purposes and 8.20% of this population uses them for food purposes (Figure 9). The most common diseases treated with medicinal plants are digestive diseases with a rate of 25%. Respiratory diseases come next with a rate of 19.10%, followed by dermatological diseases (10.79%), metabolic disorders (7.29%) and osteoarticular diseases (7.29%). Other diseases, such as neurological diseases, hair diseases, ENT diseases, cardiovascular diseases, genitourinary diseases and dental diseases are moderately cited, with rates varying between 4.56% and 2.45%.

Diabetes (2.02%), eye diseases (1.84%) and cancer (0.45%) are the least treated diseases with very low rates (Figure 10). These findings are almost in line with those already obtained in the Pre-rif of Morocco by El-Hilaly *et al.* (2003), in the North-East of Morocco by Alami *et al.* (2021), in the province of Laâyoune by Yahyaoui *et al.* (2015), and in the region of Gharb by Bouayyadi *et al.* (2015).
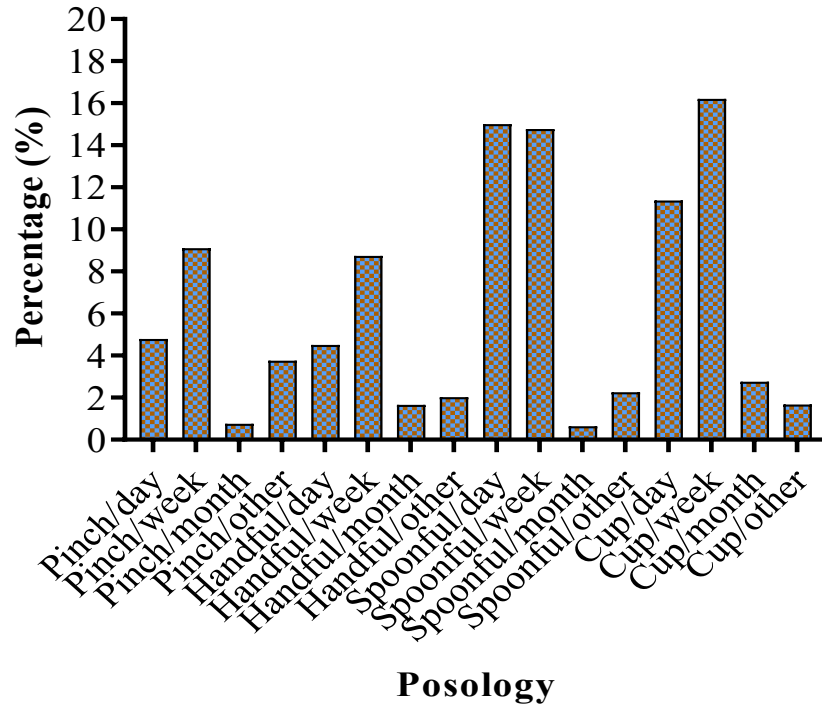

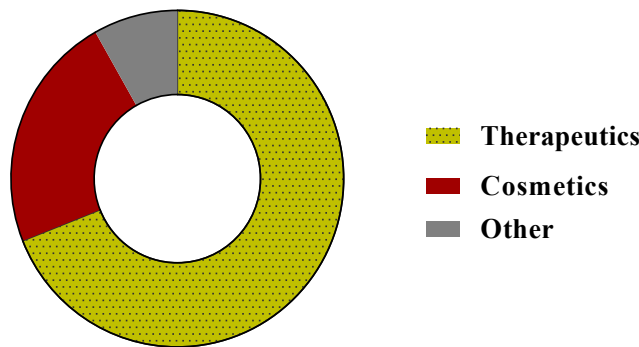Figure 8. Distribution of herbal medicine users by dose and duration of treatment.

Figure 9. Medicinal and aromatic plant utilisation in the study area.

Women's knowledge about the use of medicinal and aromatic plants
Among the surveyed women, 50.64% believe that medicinal plants have a relieving effect, while 41.12% believe in the healing power of these plants. The rest (8.25%) assumed that these plants do not have any desirable effect (Figure 11). These results are identical to those obtained by Benkhnigue *et al.* (2010) who show that 52% of the respondents recorded a simple improvement, while 40% declared to be cured, against 8% who noticed some side effects.
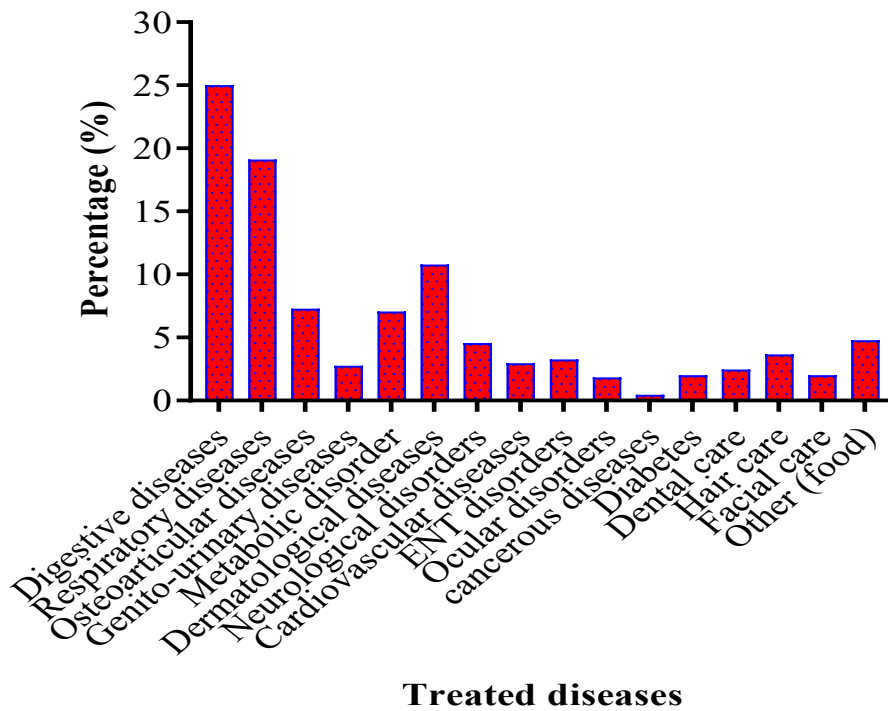
Figure 10. Treated diseases by medicinal plants in the province of Taounate.
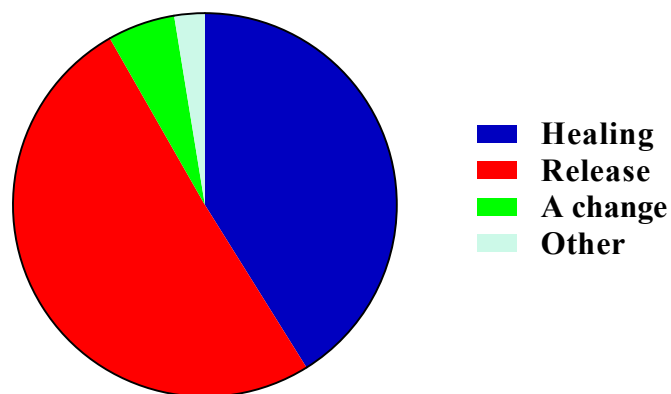

Figure 11. Women's knowledge about the use of medicinal and aromatic plants.

Conclusion

The ethnobotanical survey carried out in the province of Taounate revealed a good deal of information related to the use of medicinal plants in traditional phytotherapy. The results reveal that the local population mainly treats themselves with medicinal plants. it should be noted that there is a close link between the frequency of use of plants and the profile of the people interviewed. Thus, people between the 35-55 years years and women make the most use of medicinal plants. In addition, people with no schooling and from a low socio-economic level also choose traditional medicine. It should also be noted that the floristic analysis carried out identified 52 families with a clear predominance of Lamiaceae, Asteraceae, Apiaceae, Fabaceae and Rosaceae. and 111 species with a strong preponderance of *Origanum compactum* Benth, *Mentha pulegium* L., *Rosmarinus officinalis* L., *Chenopodium ambrosioides* L., *Aloysia citriodora* Palau, *Allium sativum* L., *Capparis spinosa* L., *Artemisia herba alba* Asso, *Mentha rotundifolia* Muds. This analysis also showed that the leaves are the most used parts, decoction is the most frequent mode of preparation, and the oral route is the most common mode of administration. In terms of the pathologies treated, the majority of medicinal plants are used to treat digestive diseases.

In view of the conclusions obtained in the current survey, it appears that the use of medicinal and aromatic plants in the treatment of diseases by the local population is very important, despite the improved accessibility to care and modern medicine. Ultimately, the present study could be used as a source of information that will help in the knowledge of the medicinal flora of the province of Taounate and in the conservation of the knowledge and the practice of the local population.

Declarations

List of abbreviations: RFC: The relative frequency of citation, FIV: The family importance value index, VPP: The value of the plant part used, FC: The number of respondents having cited the species, N: The total number of respondents, FC family: The number of respondents revealing the family, N_S: The number of species within each family, RU $_{plant\ part}$: The number of reported uses for all plant parts, RU: The sum of reported uses per plant part, CFR: The citation frequencies.

Ethics approval and consent to participate: Informed prior consent was obtained from all respondents before commencement of the interview. All data were collected with respect to confidentiality, anonymity and consent.
Consent for publication: Not applicable.
Availability of data and materials: The data was not deposited in public repositories.
Competing interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
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Authors' contributions: El-mehdi El-Asri and Azeddin El Barnossi: Study design, Ethnobotanical survey conduction, active participation in structuring of the methodology, data analysis and interpretation, writing, original draft and review-editing. Mohamed Chebaibi, Anouar Hmamou and Hicham El Asmi: Methodology description and botanical identification, contribution to the study design and data analysis. Abdelhak Bouia and Noureddine Eloutassi: Work supervising, manuscript improving and review-editing. All authors read, reviewed, and approved the manuscript.

Acknowledgements

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Table 3. List of medicinal and aromatic plant species used by the local population in the province of Taouante (Pre-rif of Morocco).

Families and Species	Vernacular name	Part used	Solvent	Plant type	FC	RFC	FIV	Related references
Agavaceae							4,512	
Agave americana L.	Sabera صبرة	lv, st	ws	S	31	4,51		(Hachi *et al.* 2015, Alami *et al.* 2021)
Amaranthaceae							1,018	
Beta vulgaris L.	L-barba البربة	bl	h,ws	C	7	1,01		(Benkhnigue *et al.* 2010, Alami *et al.* 2021)
Anacardiaceae							5,385	
Pistacia atlantica Desf	El- btem البطم	lv	w,ws	S	12	1,74		(Bellakhdar *et al.* 1991, El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Pistacia lentiscus L.	Drou درو	lv	w,ws	S	62	9,02		(Bellakhdar *et al.* 1991, El-Hilaly *et al.* 2003, Es-Safi *et al.* 2020)
Apiaceae							2,878	
Apium graveolens L.	Krafas كرافص	ap, lv,sd, wp	w	C / I	16	2,3		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Bouayyadi *et al.* 2015, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Carum carvi L.	El-karwiya القروية	fr, sd	w	I	2	0,29		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, El Hachlafi *et al.* 2020, Mechchate *et al.* 2020)
Coriandrum sativum L.	Quasbor قسبور	ap ,lv, sd	w	C / I	37	5,38		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Es-Safi *et al.* 2020)
Cuminum cyminum L.	El-kamoun الكمون	sd	w	I	21	3,05		(Bellakhdar, 1997, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Eryngium maritimum L.	Zarnij زرنيج	rt, st	w, ws	S	11	1,6		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Rhattas *et al.* 2016, Alami *et al.* 2021)
Foeniculum vulgare Mill.	Nafaâ, Besbass نافع	sd	w	I	15	2,18		(Bellakhdar, 1997, Chebat *et al.* 2014, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Petroselinum crispum Mill.	Maâdnous معندوس	ap ,lv,sd, wp	w	C / I	40	5,82		(Bellakhdar, 1997, Tahraoui *et al.* 2007, Bouayyadi *et al.* 2015, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020)
Pimpinella anisum L.	Habat hlawa حبة حلاوة	fr ,lv, sd	w	I	12	1,74		(El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, Benkhnigue *et al.* 2014, El Hachlafi *et al.* 2020, Alami *et al.* 2021)
Visnaga daucoides Gaertn.	Bouchnikha بوشنيخة	ap ,fr, sd, st	w,ws	S	24	3,49		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Apocynaceae							10,917	
Nerium oleander L.	Dafla دفلة	ap , lv , st	w,ws	S	75	10,91		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Jaadan *et al.* 2020, Alami *et al.* 2021)

Arecaceae							2,692	
Arum maculatum L	Yerna يرنة	rt	ws	S	22	3,2		(El-Hilaly *et al.* 2003, Jaadan *et al* 2020, Alami *et al.* 2021)
Chamaerops humilis L.	Dom (lâzaf) الدوم (لعزف)	fr , lv	m , w , ws	S	15	2,18		(El-Hilaly *et al.* 2003, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Aristolochiaceae							1,164	
Aristolochia longa L.	Berez'tem برزطم	lv, rt, sd , rh	w , ws	S	8	1,16		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Chebat *et al.* 2014, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020)
Asteraceae							6,194	
Artemisia absinthium L.	Chiba شيبة	ap , lv , st	w , ws	C	63	9,17		(El-Hilaly *et al.* 2003, Jaadan *et al.* 2020, Mechchate *et al.* 2020, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Alami *et al.* 2021)
Artemisia herba-alba Asso	Chih شيح	fl, lv , rt	m , w ,ws	C / I	98	14,26		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Chamaemelum nobile (L.)	All. Babounj romi البابونج رومي	fl , lv	w	S	41	5,96		(Bellakhdar, 1997, Tahraoui *et al.* 2007, Salhi *et al.* 2010, Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Conyza canadenis L	El âtassa العطاسة	lv	w , ws	S	13	1,89		(Bellakhdar *et al.* 1991, El-Hilaly *et al.* 2003)
Cynara scolymus L.	Khorchef خرشف (القوق)	fl, rt	w	C	19	2,76		(Bellakhdar, 1997, Benkhnigue *et al.* 2010, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Dittrichia viscosa (L.) Greuter	Tareeklan تركلان Magraman مغرمان	lv , rt, sd	w , ws	S	67	9,75		(Bellakhdar, 1997, Bouayyadi *et al.* 2015, Es-Safi *et al.* 2020, Alami *et al.* 2021)
Lactuca sativa L.	Khoss خص	ap , lv	m , w ,ws	C	6	0,87		(Benkhnigue *et al.* 2010, El Alami *et al.* 2017, Alami *et al.* 2021)
Matricaria chamomilla L	All babounj البابونج	fl , lv	w	S	61	8,87		(Labiad *et al.* 2020, Jaadan et al. 2020 Alami *et al.* 2021, EL-assri *et al.* 2021)
Silybum marianum (L.) Gaertn.	Chouklahmir. شوك لحمار	lv , sd	ws	S	15	2,18		(Bellakhdar, 1997, Bouayyadi *et al.* 2015, Orch *et al.* 2015, El Hachlafi *et al.* 2020)
Boraginaceae								
Borago officinalis L.	lisan at-tur لسان الثور	fl , lv, rh	w	S	18	2,62		(El-Hilaly *et al.* 2003, El Hassani *et al.* 2013, Jaadan *et al.* 2020, Alami *et al.* 2021)
Brassicaceae							0,873	
Brassica rapa L.	Left	lv	m,w	C	6	0,87		(Bellakhdar, 1997; Bouayyadi *et al.* 2015)
Lepidium sativum L	Habb er- chad حبة الرشاد (الحرف)	sd	w	I	9	1,31		(Bellakhdar, 1997, Tahraoui *et al.* 2007, Bouayyadi *et al.* 2015, Eddouks *et al.* 2017, Mechchate *et al.* 2020)
Sinapis arvensis L.	Bouhamo بوحمو	lv	w	S	3	0,43		(Bellakhdar 1997; Bouayyadi *et al.* 2015)

Cactaceae							6,841	
Opuntia ficus-indica (L.) Mill.	Handiya هندية	fl, fr , lv	w,ws	C	47	6,84		(El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, Bouayyadi *et al.* 2015, Eddouks *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Cannabaceae							3,347	
Cannabis sativa L.	El-kif الكيف	ap ,lv , sd ,st	ws	C / I	23	3,34		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Capparaceae							14,847	
Capparis spinosa L	Kabbar كبار	fl, fr	m ,w	S / I	102	14,84		(El-Hilaly *et al.* 2003, Chebat *et al.* 2014, Bouayyadi *et al.* 2015, Jaadan *et al.* 2020, Alami *et al.* 2021)
Caryophyllaceae							3,566	
Arenaria rubra L.	Harass elhajer حراس الحجار	ap ,fl	w	S / I	40	5,82		(Benkhnigue *et al.* 2010)
Saponaria officinalis L.	Tighicht تغيشت	lv ,rt , sd	w	S	9	1,31		(Benkhnigue *et al.* 2010, Salhi *et al.* 2010)
Chenopodiaceae							22,27	
Chenopodium ambrosioides L	Mkhinza مخينزة	ap , lv	w,ws	S	153	22,27		(Bellakhdar, 1997, Hilaly *et al.* 2003, Salhi *et al.* 2010, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, El- Mechchate *et al.* 2020)
Cistaceae							1,746	
Cistus ladanifer L.	Touzal	fe, fl	ws	S	12	1,74		(Najem *et al.* 2018)
Cucurbitaceae							2,183	
Bryona dioica L.	enab dib عنب ديب	rt	ws	S	21	3,05		(El-Hilaly *et al.* 2003)
Cucurbita pepo L.	Garâa lhamra كرعة الحمر	fr, sd	ws	C	9	1,31		(El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Cupressaceae							11,353	
Tetraclinis articulata (Vahl) Mast.	El-âarâar العرعار	fr, lv	w ,ws	S	78	11,35		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, El Hassani *et al.* 2013, Bouayyadi *et al.* 2015, Jaadan *et al.* 2020, Alami *et al.* 2021)
Ericaceae							3,056	
Arbutus unedo L.	Bakhano باخنو	fr ,lv	m ,w,ws	Sauvage	21	3,05		(El-Hilaly *et al.* 2003, Es-Safi *et al.* 2020, Alami *et al.* 2021)
Fabaceae							5,07	
Ceratonia siliqua L.	El kharob لخروب	fr, lv	w ,ws	C	77	11,2		(El-Hilaly *et al.* 2003, El Hassani *et al.* 2013, Barkaoui *et al.* 2017, Bouyahya *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Glycyrrhiza glabra L	ark sous عرق سوس	rt, rh	ws	I	21	3,05		(Ghourri *et al.* 2013, El Yahyaoui *et al.* 2015, Bouayyadi *et al.* 2015, El Hilah *et al.* 2016, Es-Safi *et al.* 2020, Alami *et al.* 2021)
Medicago sativa L.	Lfasa الفصة	ap , lv, st	w ,ws	C	3	0,43		(El-Hilaly *et al.* 2003, Alami *et al.* 2021)

Ononis natrix L.	Fazaza فزازة	ap, lv rt	ws	S	32	4,65		(El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Retama raetam (Forssk.)	Ratam رم	lv , st	ws	S	2	0,29		(El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Trigonella foenum graecum L.	L-halba الحلبة	sd	m , o , w	C / I	74	10,77		(El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, Lahsissene *et al.* 2009, Barkaoui *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Fagaceae							3,639	
Quercus suber L	Al-balot البلوط	fr , lv	w , ws	S / C	25	3,63		(El-Hilaly *et al.* 2003, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Gentianaceae							0,873	
Centaurium erythraea Rafn	Kassat lhaya قصة الحية	ap, fl , lv	ws	S	6	0,87		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, El Hassani *et al.* 2013, Bouayyadi *et al.* 2015)
Iridaceae							1,601	
Crocus sativus L.	Zaâfran l'horr زعفران الحر	fl	w	I	11	1,6		(Bellakhdar, 1997, Benlamdini *et al.* 2014)
Juglandaceae							5,967	
Juglans regia L.	Sswâk, El gargaâ الكركاع	fl, fr, pe ,rt	w ,ws	C / I	41	5,96		(Ziyyat *et al.* 1997, Bellakhdar, 1997, El-Hilaly *et al.* 2003, Benkhnigue *et al.* 2010, Ghourri *et al.* 2013, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Juncaceae							4,221	
Juncus acutus L.	Assemar السمار	ap	ws	S	29	4,22		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Lamiaceae							13,327	
Ajuga iva (L.)	Chendgûra شندكورة	lv, rt	ws	S	31	4,51		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Khabbach *et al.* 2012, Ghourri *et al.* 2013, Bouayyadi *et al.* 2015, Es-Safi *et al.* 2020)
Calamintha officinalis Moench.	Manta مانتة	fe, pa, tg	m , w	S	50	7,27		(El-Hilaly *et al.* 2003, Bouayyadi *et al.* 2015, Mechchate *et al.* 2020)
Lavandula multifida L.	Hlihla حليحلة	ap, lv ,rt	w , ws	S	78	11,35		(El-Hilaly *et al.* 2003, Es-Safi *et al.* 2020)
Lavandula officinalis L.	Lakhzama الخزامة	ap , lv	m , w	S	76	11,06		(El-Hilaly *et al.* 2003, Bouayyadi *et al.* 2015)
Lavandula stoechas L.	Lhalhal الحلحال	fl , lv	m , w , ws	S	56	8,15		(Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Marrubium vulgare L.	Meriwa مريوة	ap , lv , st	m , w	S	59	8,58		(El-Hilaly *et al.* 2003, Salhi *et al.* 2010, Khabbach *et al.* 2012, Tahri *et al.* 2012, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Mentha pulegium L.	Flayou فلايو	ap , lv ,st	m , w	S	250	36,39		(El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, Khabbach *et al.* 2012, Benlamdini *et al.* 2014, Mechchate *et al.* 2020)
Mentha rotundifolia Muds	Marseta ;Mchachtro مشاشترو	ap , lv ,st	m , w ,ws	S	93	13,56		(El-Hilaly *et al.* 2003, Benkhnigue *et al.* 2010, Salhi *et al.* 2010)
Mentha viridis L	Naânaâ نعناع	ap , lv ,st	w , ws	C	32	4,65		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Benkhnigue *et al.* 2010, Bouayyadi *et al.* 2015, Alami *et al.* 2021)

Ocimum basilicum L.	Lhbak الحباق	ap ,lv , sd	w	C	32	4,65		(Ziyyat *et al.* 1997, El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, Salhi *et al.* 2010, Bouyahya *et al.* 2017, El Hachlafi *et al.* 2020, Alami *et al.* 2021)
Origanum compactum Benth.	Zaâter زعتر	lv ,sd	m,w,ws	S	301	43,81		(El-Hilaly *et al.* 2003, Benlamdini *et al.* 2014, Bouyahya *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Origanum majorana L.	Mardadouch مرددوش	lv	m,w,ws	S	21	3,05		(Ziyyat *et al.* 1997, El-Hilaly *et al.* 2003, Tahraoui *et al.* 2007, Salhi *et al.* 2010, Khabbach *et al.* 2012, Fadil et al. 2015, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Alami *et al.* 2021)
Rosmarinus officinalis L.	Azir أزير	ap , lv , rt	m , w, ws	C/ S	212	30,85		(El-Hilaly *et al.* 2003, Salhi *et al.* 2010, Eddouks *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Salvia officinalis L.	Salmiya سالمية	lv	m , w	C/ S	70	10,18		(Ghourri *et al.* 2013, Orch *et al.* 2015, Bouayyadi *et al.* 2015, Bouyahya *et al.* 2017, Eddouks *et al.* 2017, El Hachlafi *et al.* 2020, Mechchate *et al.* 2020)
Salvia verbenaca L.	Kiyyâta خياطة	lv	w, ws	S / I	22	3,2		(Benlamdini *et al.* 2014, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Thymus vulgaris L	Zaitra زعيترة	ap, fl, , lv	m ,w	S	82	11		(Ghourri *et al.* 2013, Fadil *et al.* 2015, El Hachlafi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Lauraceae							**2,037**	
Cinnamomum verum Berchtold & J. S. Presl	Qarfa, Karfa قرفة	pe , st	w,ws	I	21	3,05		(Benkhnigue *et al.* 2010, El Yahyaoui *et al.* 2015, Orch *et al.* 2015, Yahyaoui *et al.* 2015, Mechchate *et al.* 2020)
Laurus nobilis L	Awrak sidna moussa اوراق سيدنا موسى	lv	w,ws	I	12	1,74		(Bellakhdar, 1997, Hachi *et al.* 2015, Alami *et al.* 2021)
Persea americana Mill.	Avocat	fr	w,ws	I	9	1,31		(Bellakhdar, 1997, Benkhnigue *et al.* 2010, Bouayyadi *et al.* 2015, El Hachlafi *et al.* 2020)
Liliaceae							**9,17**	
Allium cepa L.	El-bassla البصلة	bl	ws	C / I	53	7,71		(El-Hilaly *et al.* 2003, Chebat *et al.* 2014, Youbi *et al.* 2016, Barkaoui *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Allium sativum L.	El touma التومة	bl	o ,w	C / I	121	17,61		(Eddouks *et al.* 2002, El-Hilaly *et al.* 2003, Bouayyadi *et al.* 2015, Orch *et al.* 2015, Barkaoui *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Charybdis maritima (L.) Speta	El basiila البصيلة	bl	ws	S	15	2,18		(El-Hilaly *et al.* 2003, Salhi *et al.* 2010)

Linaceae							1,601	
Linum usitatissimum L.	Zarrî'at l-kettân زريعة الكتان	sd	w ,ws	C / I	11	1,6		(Yahyaoui *et al.* 2015, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Lythraceae							4,949	
Lawsonia inermis L.	El-henna الحنة	lv	w	I	34	4,94		(Bellakhdar, 1997, Alami *et al.* 2021)
Malvaceae							2,037	
Malva sylvestris L.	Khobbeyza خبيزة	lv , rt	w , ws	S	14	2,03		(Benkhnigue *et al.* 2010, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Moraceae							8,588	
Ficus carica L.	El karmôss, Chriha الكرموس	fr , lv	h , ws	C	59	8,58		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Bouyahya *et al.* 2017, El Hachlafi *et al.* 2020, Mechchate *et al.* 2020)
Myrtaceae							5,919	
Eucalyptus ssp	El-kalibtouse الكاليبتوس	lv	w , ws	C	65	9,46		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, El Hilah *et al.* 2016, Bouyhaya *et al.* 2017 ;)
Myrtus communis L.	Rihan ريحان	lv	w	S	31	4,51		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Bouyahya *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020)
Syzygium aromaticum (L.) Merr. & Perry	Qronfel قرنفل	fr , lv , sd	w	I	26	3,78		(Salhi *et al.* 2010, Benlamdini *et al.* 2014, Bouayyadi *et al.* 2015, El Hilah *et al.* 2016, Alami *et al.* 2021)
Oleaceae							10,262	
Olea europaea L. var. oleaster	El-barri البري	fr , lv	w , ws	S	59	8,58		(Bellakhdar, 1997, El-Hilaly *et al.* 2003)
Olea europaea L. var. sativa	El-ziton الزيتون	fr , lv	w , ws	C	82	11,93		(El-Hilaly *et al.* 2003, Orch *et al.* 2015, Fadil *et al.* 2015, Bouyahya *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021 ;)
Papaveraceae							1,601	
Papaver rhoeas L.	Balaâman بلعمان	fl, st	w	S	11	1,6		(El-Hilaly *et al.* 2003, El Hassani *et al.* 2013, Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Poaceae							1,649	
Cynodon dactylon (L.) Pers.	Najm نجم	ap ,lv ,rt	ws	S	9	1,31		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Benlamdini *et al.* 2014, Alami *et al.* 2021)
Hordeum vulgare L.	Chaâir شعير	fr, sd	w , ws	Cultivée	3	0,43		(Benkhnigue *et al.* 2010, El Alami *et al.* 2017, Alami *et al.* 2021)
Setaria pallide-fusca	Ilan ايلان	sd	w	I	22	3,2		(Bellakhdar, 1997, El-Hilaly *et al.* 2003)
Polygonaceae							1,892	
Emex spinosa (L.) Campd.	Hommayda حميضة	lv , st	w , ws	S	13	1,89		(El-Hilaly *et al.* 2003, Hassani *et al.* 2013)

Punicaceae							8,151	
Punica granatum L.	Raman رمان	pe (pericarp)	w , ws	C	56	8,15		(El-Hilaly *et al.* 2003, Bouyahya *et al.* 2017, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate *et al.* 2020, Alami *et al.* 2021)
Ranunculaceae							3,86	
Clematis flammula L.	Nar lbarda النار الباردة	fr , lv	w	S	21	3,05		(Benkhnigue *et al.* 2010, Benlamdini *et al.* 2014, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Nigella sativa L.	Haba ssawda حبة السوداء (صانوج)	sd	h , o	I	33	4,8		(El-Hilaly *et al.* 2003, Benkhnigue *et al.* 2010, Benlamdini *et al.* 2014, El Yahyaoui *et al.* 2015, El Hachlafi *et al.* 2020, Es-Safi *et al.* 2020, Mechchate et al. 2020)
Rhamnaceae							4,404	
Ziziphus lotus (L.) Lam.	Sadra السدرة	lv , rt	w , ws	S	44	6,4		(El-Hilaly *et al.* 2003, Benlamdini *et al.* 2014, Khouchlaa *et al.* 2017, El Hachlafi *et al.* 2020, Alami *et al.* 2021)
Rosaceae							2,998	
Crataegus monogyna Jacq	Admam أدمام	fr , lv	w , ws	S	13	1,89		(El-Hilaly *et al.* 2003, Benlamdini *et al.* 2014, Alami *et al.* 2021)
Eriobotrya japonica (Thunb.) Lindl.	Lamzah المزاح	fr , lv	ws	C	9	1,31		(Ziyyat *et al.* 1997, El-Hilaly *et al.* 2003, Ghourri *et al.* 2013, Orch *et al.* 2015, Alami *et al.* 2021)
Rosa centifolia L.	Lward الورد	fl	w , ws	C	29	4,22		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Rubus fruticosus L.	El-aâlig أخليج	fr , lv		S	19	2,76		(Benkhnigue *et al.* 2010)
Prunus amygdalus Stokes var. amara L.	Louze lmor لوز المر	fr, sd	w , ws	C	33	4,8		(Bellakhdar, 1997, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Rutaceae							2,256	
Citrus limon (L.) Burm. F	Limoun ليمون	fl, fr	h , w	C / I	22	3,2		(Bellakhdar, 1997, El-Hilaly *et al.* 2003)
Citrus aurantium L	Laronj لارونج	fr , lv	h , w	C / I.	9	1,31		(El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Salicaceae							2,765	
Populus alba L.	Safsaf الصفصاف	lv	w , ws	S	19	2,76		(Bellakhdar, 1997, El-Hilaly *et al.* 2003, El Hassani *et al.* 2013)
Sapotaceae							1,601	
Argania spinosa (L.) Skeels	Argan اركان	fr, sd	w	I	11	1,6		(El Hafian *et al.* 2014, Bouayyadi *et al.* 2015, El Yahyaoui *et al.* 2015, El Hachlafi *et al.* 2020)
Solanaceae							1,31	
Datura stramonium L.	Kernk كرنك	sd , lv	w	S	9	1,31		(El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Theaceae							1,31	
Camellia sinensis (L.) Kuntze	Atây أتاي	lv	w	I	9	1,31		(El Amrani *et al.* 2010, Doukkali *et al.* 2015, EL Yahyaoui *et al.* 2015, Bouayyadi *et al.* 2015, El Hachlafi *et al.* 2020)

Thymelaeaceae							2,328	
Aquilaria malaccensis	Aghriss أغريس	lv , pe	w	I	29	4,22		(Eddouks *et al.* 2017)
Daphne gnidium L.	Lazzaz لزاز	fr , lv	w	S	3	0,43		(El-Hilaly *et al.* 2003, Alami *et al.* 2021)
Urticaceae							4,949	
Urtica dioica L	Horriqa (zotifa) حريقة	lv	ws	S	34	4,94		(El-Hilaly *et al.* 2003, Benkhnigue *et al.* 2010, Tahri *et al.* 2012, Ghourri *et al.* 2013, Bouayyadi *et al.* 2015)
Verbenaceae							9,825	
Aloysia citriodora Palau	Lwiza لويزة	lv	m,w	C / I	123	17,9		(Alami et al. 2021, Bellakhdar, 1997, Bouayyadi *et al.* 2015)
Vitex agnus-castus L.	Kharwaâ الخرواع	lv	w,ws	I	12	1,74		(El-Hilaly *et al.* 2003, Bouayyadi *et al.* 2015)
Vitaceae							1,164	
Vitis vinifera L.	Dalya الدالية	fr , lv	ws	C	8	1,16		(Benlamdini *et al.* 2014, Bouayyadi *et al.* 2015, Alami *et al.* 2021)
Zingiberaceae							7,423	
Zingiber officinale	zanjabil زنجبيل	rt	W	I	51	7,42		(Benkhnigue *et al.* 2010, Ghourri *et al.* 2013, Bouayyadi *et al.* 2015, El Yahyaoui *et al.* 2015, Alami *et al.* 2021)
Zygophyllaceae							1,164	
Peganum harmala L	Harmel حرمال	sd	W	I	8	1,16		(Hseini & Kahouadji, 2007, Salhi *et al.* 2010, Benkhnigue *et al.* 2010, Doukkali *et al.* 2015)

Part used: **Ap**: Aerial part; **Bl**: Bulbs; **Fl:** Flowers; **Fr**: Fruits; **Lv**: Leaves; **Pe**: peel; **Rh**: Rhizome; **Rt**: Roots; **Sd**: Seeds; **St:** Stem; **Wp**: Whole Plant.
Type of plants: **C**: Cultivated; **I**: Imported; **S**: Spontaneous.
Solvent: **H**: honey; **M**: milk; **O**: oil; **w**: water; **WS**: without solvent.