

## **Ethnopharmacological prospecting of medicinal plants from the Province of Guercif (NE of Morocco)**

T. Benali<sup>1</sup>, A. Khabbach<sup>2</sup>, A. Ennabili<sup>3</sup>, K. Hammani<sup>1</sup>

<sup>1</sup>Laboratory of Natural Resources and Environment, Polydisciplinary Faculty, Sidi Mohamed Ben Abdellah University, Taza 35 000 Morocco

<sup>2</sup>Provincial Direction, Regional Academy of Education and Training, Taza 35 000 Morocco

<sup>3</sup>High School of Technology, Sidi Mohamed Ben Abdellah University, Fez 30 000 Morocco

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### **Abstract**

An ethnopharmacological survey was carried out between December 2012 and May 2013 in eleven different locations dependent on the Guercif Province (NE of Morocco). The names of plants, their mode of preparation and administration, and their parts used have been inventoried for various local uses in traditional medicine. Our survey allowed us to identify one hundred plant species used in that Province, belonging to 49 botanical families. *Rosmarinus officinalis*, *Origanum compactum*, *Artemisia herba-alba*, *Thymus* spp., *Mentha pulegium*, *Nigella sativa*, *Lavandula* spp., *Visnaga daucoides*, *Aristolochia longa* and *Cenchrus spicatus* are the most used taxa by the local population. This study showed that the plant leaves are the most commonly used parts, and the remedies prepared are mostly based on decoction. The endocrine system, especially the diabetes, and the digestive one are the most frequent among the body systems treated by the local traditional medicine.

**Keywords:** Guercif, Morocco, Medicinal plants, Ethnopharmacology, Decoction.

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### **Introduction**

Phytotherapy, including traditional phytomedicine, has long been used by different cultures and civilizations in Egypt, the Middle East, India and China (Ybert & de Laage de Meux, 2001). This ancient relationship between human being and nature, which promoted medicinal plants, played a very important role in the discovery of drugs (Akerele, 1990; Patwardhan, 2005). Most drugs are of plant origin; many others are synthesized analogues based on plant discovered compounds (Patwardhan, 2005; Verma & Singh, 2008).

According to the World Health Organization (WHO), three-quarters of the world's population use medicinal plants as a source of remedy (Gilani & Atta-ur-Rahman, 2005). Moreover, in developing countries suffering from a delay in the modernization of the medical system, the

use of herbal remedies is widespread (Heywood, 1992).

Regarding to its biogeographical position, Morocco presents very wide ecological and floristic diversities. Among more than 4,500 taxa of vascular plants, native or naturalized, 800 to 951 taxa are endemic (Bellakhdar, 1997, Benrahmoune Idrissi & Dubruille, 2003, Fougrach *et al.*, 2007). Morocco is among the Mediterranean countries that have experienced remarkable use of medicinal plants. Indeed, Bellakhdar (1997) has reported that the Moroccan pharmacopoeia originated from know-how was transmitted by different ethnic groups who settled in the country, after their emigration from several regions, including the Arabs of the Middle East, Andalusians and the Jews of Europe.

On the other hand, the cumulative nature of this knowledge is more likely not to be transmitted, especially in the absence of measures to safeguard this heritage (Ennabili *et al.*, 2000; Tabuti, 2006). Moreover, several works concur to preserve this know-how and to highlight it, in particular ethnobotanical and/or ethnopharmacological studies, such as described by Bellakhdar (1978, 1997), Bellakhdar *et al.* (1982, 1991), Boulos (1983), Claisse (1990) and Ziyat *et al.* (1997).

In the Eastern Region of Morocco (Oriental), other studies have focused on floristic richness, forest and preforestry

## Materials and methods

### Study area

Situated in the NE of the country, overlapping on the North side of the Rif and the South one of the Atlas, the Province of Guercif was recently created, following a dismemberment from the Taza Province, depending formerly on the Taza-Al Hoceima-Taounate Region (BO, 2009 ; HCP, 2013). Currently, the Province of Guercif depends on the Oriental Region, and consists of 10 Communes including the only Urban Commune of Guercif. It covers an area of 7, 310 km<sup>2</sup> and is bounded by the Nador and Driouach provinces (N), Taza Province (W), Taourirt Province (E) and Boulemane Province (S) (INDH, 2016).

The Eastern Region is influenced by two types of climate, a Mediterranean climate in the North with an average annual rainfall exceeding 400 mm, and a continental one in the South where precipitation does not exceed 100 mm (HCP, 2012). The Province of Guercif has three main geographical areas: the Rif and the pre-Rif in the North, the middle Atlas in the South, and the Guercif plain in the Center. The plain of Guercif, a transition zone between the Middle and the lower Moulouya, is composed of four subplains: Jel in the West, Tafrata in the East, Sangal

groups, pastoral facies and the ethnobotany of medicinal plants (Kahouadji, 1986 ; Quezel *et al.*, 1992 ; Kahouadji, 1995 ; Acherkouk *et al.*, 2011 ; Acherkouk, 2013 and Fakchich & Elachouri, 2014), although there have been no ethnopharmacological studies in the Province of Guercif (NE of Morocco).

This study is the first contribution to our knowledge on the inventory of plants used by the local population (Province of Guercif) in traditional pharmacopoeia on the one hand, and their ethnopharmacological characterization on the other.

in the North, and Mahrouf in the South (Ahamrouni, 1996; INDH, 2016).

According to the 2014-Moroccan General Census of Population and Housing, the population of the Guercif Province is 216,717 inhabitants, composed of two ethnic groups: Arab and Amazigh (HCP, 2013; APDN, 2016). Although the population of Guercif is poor, with a 2007-rate of vulnerability to poverty of 21%, that Province has considerable potential, namely the textile and clothing sector, mechanical metallurgy, and agri-food industry (HCP, 2012 ; Saad Alami, 2015).

In agriculture, agro-pastoral activity is the main economic resource for the rural population. Fodder and arboriculture production came first, followed by cereals, legumes and market gardening produces. There is also an interest to livestock breeding. Olive growing is expanding rapidly and is the fundamental resource of farmers (Saad Alami, 2015; INDH, 2016).

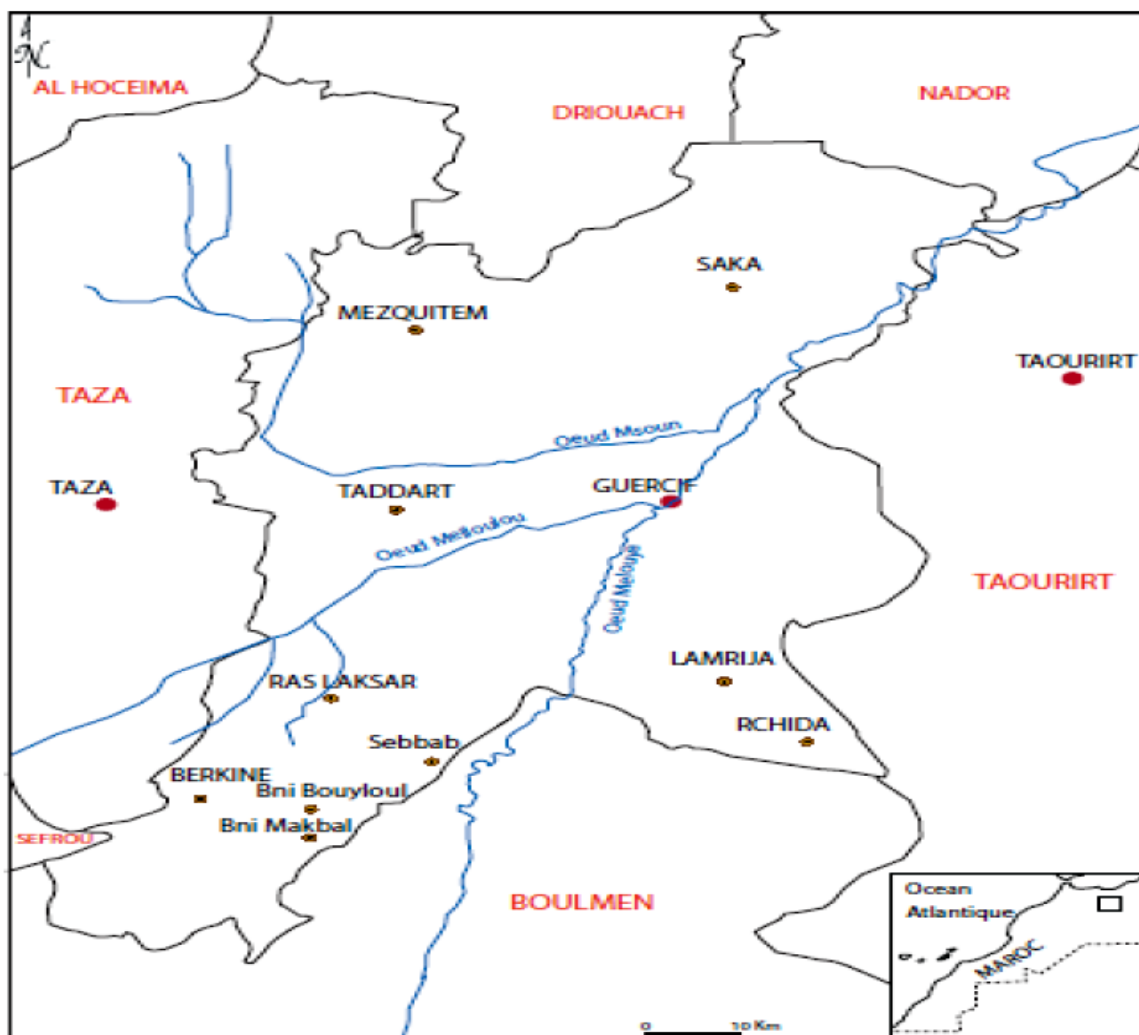
### Methodology

This ethnopharmacological prospecting of medicinal plants was carried out during “December 2012-May 2013” period in eleven locations of the Province of Guercif (Figure 1).

For data collection, we used an adapted questionnaire, in particular

according to the previous work of Khabbach *et al.* (2012) who worked on the province of Taza, bordering the study area. For each location surveyed, a number of parameters were chosen for the interviewees (sex and age), the plants used

(local and botanical names), the part of the plant used (leaves, root, flower ...), the corresponding therapeutic indications, the symptoms treated, and the methods of preparing the remedies (decoction, infusion, maceration ...).



**Figure 1.** Prospected locations (S) in the Province of Guercif. Modified source (APDN, 2016). **Legend:** Berkine (S<sub>1</sub>), Ras Laksar (S<sub>2</sub>), Rchida (S<sub>3</sub>), Lamrija (S<sub>4</sub>), Guercif Centre (S<sub>5</sub>), Taddart (S<sub>6</sub>), Mezquitem (S<sub>7</sub>), Saka (S<sub>8</sub>), Bni Makbal (S<sub>9</sub>), Sebbab (S<sub>10</sub>) and Bni Bouyloul (S<sub>11</sub>).

In order to have a comprehensive floristic inventory of the medicinal plants used in the Province of Guercif, we carried out a stratified sampling as described by Kahouadji (1986), based on cultural and ethnic descriptors (Arabic and Amazigh) and the environmental ones (climate, soil and vegetation). The plants identified and collected at the studied area were identified and herborised (Laboratory of Natural Resources and Environment,

Polydisciplinary Faculty, Sidi Mohamed Ben Abdellah University, Taza) using available identification keys and databases (Quezel & Santa, 1962-1963; Valdés *et al.*, 2002; African Plant Database, 2016; Tela-botanica, 2016).

The collected ethnobotanical information was recorded on 299 raw data sheets and then transferred to a database, and processed and analyzed.

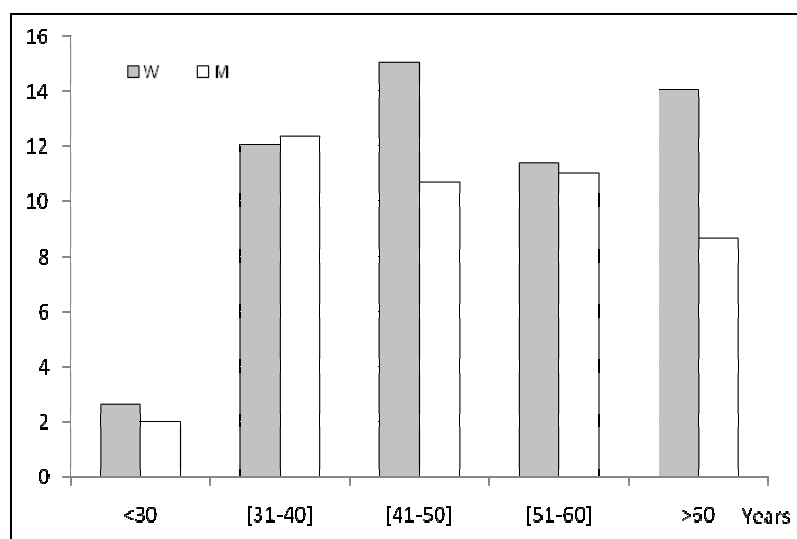
## Results and Discussion

### Interviewees

The interviewees aged 31-40 years use frequently medicinal plants with rates of 27% and 23% respectively for men and women. In the same way, this age group is followed by 41-50 years, 51-60 years and > 60 years groups (Figure 2). Furthermore, the low frequency of use of medicinal plants is observed among younger interviewees (<30 years).

Then, older people have more knowledge about medicinal plants and their uses, compared with the younger age group, which endangers the conservation of local know-how, as has been reported by previous works (e.g. *in* Ennabili *et al.*, 2000; *in* Mehdioui & Kahouadji, 2007).

**Figure 2.** Distribution frequencies (%) of medicinal plants use by local population. W, women, M, men.



In Guercif Province both men and women are concerned with traditional medicine (Figure 2). However, women are more interested (55% v. 45%), as described by other studies such as Ziyat *et al.* (1997), Jouad *et al.* (2001), El Mansouri *et al.* (2011) and Khabbach *et al.* (2012), probably due to the role played by women in the process of drying, storing and preparing recipes for the care of family members (Jouad *et al.*, 2001).

### Medicinal flora

#### *Diversity*

For its daily remedies, the local population uses about one hundred of plant species, belonging to 49 families (Table 1). The most represented families are *Lamiaceae* (15 species), *Asteraceae* (9), *Apiaceae* (6), *Poaceae* (6), *Fabaceae* (6), *Myrtaceae* (3) and *Chenopodiaceae* (3). The other plant families have only one or

two species each (Table 1). Indeed, National studies have shown that the flora used in traditional medicine is generally dominated by *Lamiaceae* and *Asteraceae* (Ennabili *et al.*, 2000, 2006; Hsein *et al.*, 2007; Mehdioui & Kahoudji, 2007; El Mansouri *et al.*, 2011; Khabbach *et al.*, 2012). Further studies carried out in the Iberian Peninsula have also shown that these two botanical families are among the most exploited in this way (Novais *et al.*, 2004; Parada *et al.*, 2009).

The medicinal flora used by the local population of Guercif Province includes spontaneous (56%) and cultivated (15%) species, while 29% of that flora consists of plant biomass imported and marketed locally. In addition, we also found the same distribution in neighboring Provinces as described by Khabbach *et al.* (2012) and El-Hilaly *et al.* (2003).

**Table 1.** Synoptic list of traditional uses of plant species, inventoried in the Province of Guercif.

Vernacular names	Taxa	Traditional uses	Parts used	Preparation modes	Type/Origin	Frequency (%)
<b>Lamiaceae</b>						<b>32.8</b>
Azir; Yazir	<i>Rosmarinus officinalis</i> L.	DA; DI; CO	AP	EO (CO); M	ST	6.40
Zaâtar; Sahtar	<i>Origanum</i> spp.	C; DA; FU; IP	L	D (HO for C); I	ST	5.47
Zaïtra	<i>Thymus</i> spp.	DA; DI	L	D	ST	3.23
Fliou	<i>Mentha pulegium</i> L.	F; FU	AP	D; I	ST	2.97
Lhalhal; Lkhzama	<i>Lavandula</i> spp.	DU; RP	L	D; I	IM	2.57
Mchichtro	<i>Mentha suaveolens</i> Ehrh.	F; FU; IS	AP	D; I	ST	2.17
Chendgora	<i>Ajuga iva</i> (L.) Schreb	C	WP	D	ST	1.65
Mardadouch	<i>Origanum majorana</i> L.	AE; F; FU; H	L	D; I	IM	1.65
Salmia	<i>Salvia officinalis</i> L.	DA; IP	AP	I	CL; ST	1.32
Marriwa	<i>Marrubium vulgare</i> L.	C; DA; DN	AP	D; I	ST	1.25
Sahtar	<i>Origanum</i> spp.	DI; IP	L	EO; I	ST	1.25
Manta	<i>Calamintha sylvatica</i> Bromf.	F; FU	AP	I	ST	1.18
Jaâda	<i>Teucrium polium</i> L.	W	R	P	ST	1.00
Naânaâ	<i>Mentha spicata</i> L.	MA	L	EO	CL	0.39
Lahbak	<i>Ocimum basilicum</i> L.	MR	WP	PT	CL	0.26
<b>Asteraceae</b>						<b>10.1</b>
Chih	<i>Artemisia herba-alba</i> Asso.	DA; F; FU	AP	I	ST	3.63
Bagraman	<i>Dittrichia viscosa</i> (L.) Greuter	DA; DI; F; HE	L	D	ST	2.17
Babounje	<i>Chamaemelum fuscatum</i> (Brot.) Vasc.	DU; HC; IP	FL	D	ST	1.71
Chiba	<i>Artemisia absinthium</i> L.	DA	L	I; D	CL	1.00
Tenghila	<i>Centaurea calcitrapa</i> L.	AN; DI	SP	P	ST	0.46
lâasfour	<i>Carlina lanata</i> L.	DI; HC	FL; SP	I; P (SP)	ST	0.39
Chwiha	<i>Achillea odorata</i> L.	IP; RH	AP; L	D; I	ST	0.33
Lhek	<i>Cynara cardunculus</i> L.	DR	FL	D	ST	0.19
Addad	<i>Atractylis gummifera</i> L.	A; CF	R	D (LD)	ST	0.19
<b>Apiaceae</b>						<b>5.33</b>
Bouchnikha	<i>Visnaga daucoides</i> Gaertn.	C; DA; DN; DU	FR	D	ST	2.31
Nafaâ; Basbas; Chmar	<i>Anethum foeniculum</i> L.	DA; IP; V	FR	D	ST	1.12
Habat Hlawa	<i>Pimpinella anisum</i> L.	AE; FN	S	D; I	IM	0.72
Lkamoune	<i>Cuminum cyminum</i> L.	DA; IS	L	D	IM	0.59
Nounkha	<i>Ammoides pusilla</i> (Brot.) Breistr.	DN; DU	AP	I	ST	0.46
Lkraffus	<i>Apium graveolens</i> subsp. <i>dulce</i> (Mill.) Schübl. & G. Martens	DU; RL	S	D; I	CL	0.13
<b>Poaceae</b>						<b>4.60</b>
Illane	<i>Cenchrus spicatus</i> (L.) Cav.	DI; FA	S	D; I; P	IM	2.24

Njem	<i>Cynodon dactylon</i> L.	DA	R	D	ST	0.66
Bachna	<i>Phalaris canariensis</i> L.	IP	S	AL; D	IM	0.59
Zouan	<i>Phalaris paradoxa</i> L.	AS	S	P	IM	0.46
Dra	<i>Zea mays</i> L.	DU; IP	Fi (SY)	D	CL	0.39
El khortale	<i>Avena sativa</i> L.	CH; DA; H	S	I; P	CL	0.26
<b>Fabaceae</b>						<b>3.73</b>
Lhalba	<i>Trigonella foenum-graecum</i> L.	C; DA; LA	S	M	IM	2.04
Slaighwa; Lkharoube	<i>Ceratonia siliqua</i> L.	AN; SA	FR	P (HO)	ST	1.05
Arq sous	<i>Glycyrrhiza glabra</i> L.	AE; IP	R	D; I; P	IM	0.33
Assoja	<i>Glycine max</i> (L.) Merr.	B	S	D; P	IM	0.19
Kerssana	<i>Vicia ervilia</i> (L.) willd.	DA	S	M	CL	0.06
Termas	<i>Lupinus albus</i> L.	DA	S	M	IM	0.06
<b>Myrtaceae</b>						<b>3.50</b>
Raihan	<i>Myrtus communis</i> L.	DA; DU; G	L	D; I	IM	1.78
Qoronfoul	<i>Syzygium aromaticum</i> (L.) Merr. & L.M.Perry	DA; DN; H	S	I; P	IM	1.00
Kalitous	<i>Eucalyptus</i> spp.	DA; MI	L	D (DA); IN (MI)	ST	0.72
<b>Chenopodiaceae</b>						<b>3.15</b>
Mkhinza	<i>Chenopodium ambrosioides</i> L.	DA; F	FL	I	ST	1.51
Remt	<i>Hammada scoparia</i> (Pomel) Iljin	C; DA; IT	AP	I	ST	1.51
Chejra Li maydiha Rih	<i>Fredolia aretioides</i> Coss. & Dur.	AT; DA; DU	AP	I	IM	0.13
<b>Thymelaeaceae</b>						<b>2.97</b>
Lazaze	<i>Daphne gnidium</i> L.	IT	L	D; I	ST	1.65
Lmatnane	<i>Thymelaea hirsuta</i> (L.) Endl.	DA; IT	L	I; P	ST	1.32
<b>Ranunculaceae</b>						<b>2.96</b>
Sanouj; Lhaba Sawda	<i>Nigella sativa</i> L.	AE; C; CU; DA	S	M; P	IM	2.77
Oudan Lhalouf	<i>Ranunculus bullatus</i> L.	FU; MD	R	D	ST	0.19
<b>Aristolochiaceae</b>						<b>2.31</b>
Hantal; Berztem	<i>Aristolochia fontanesii</i> Boiss. & Reut.	C	R	P (HO)	ST	2.31
<b>Zygophyllaceae</b>						<b>2.23</b>
Harmal	<i>Peganum harmala</i> L.	C; DA	S	I; P	ST	1.84
Aggaya	<i>Tetraena alba</i> (L. f.) Beier & Thulin	DA; IT	SM	I	IM	0.39
<b>Apocynaceae</b>						<b>2.04</b>
Defla	<i>Nerium oleander</i> L.	C; DA	L	D; I; M	ST	2.04
<b>Oleaceae</b>						<b>1.85</b>
Zitoune	<i>Olea europaea</i> L. subsp. <i>europaea</i>	DA; H; CH (hypo-)	L	I	CL	1.00
Zebouj; Zitoun Lbari	<i>Olea europaea</i> L. subsp. <i>europaea</i> var. <i>silvestris</i> (Mill.) Lehr	DA	L	D	ST	0.85
<b>Linaceae</b>						<b>1.45</b>

Lktan	<i>Linum usitatissimum</i> L.	AE; DA; CH	S	I; P (Ho)	IM	1.45
<b>Brassicaceae</b>						<b>1.38</b>
Hab Rchad	<i>Lepidium sativum</i> L.	CU; DA; IP; PN	S	D	IM	1.25
Laft Lmahfour	<i>Brassica rapa</i> L.	F	S	D	CL	0.13
<b>Caryophyllaceae</b>						<b>1.37</b>
Taghicht	<i>Silene vulgaris</i> (Moench) Garcke	DI	R	P	ST	0.85
Serghina; Tasrghint	<i>Corrigiola telephiifolia</i> Pourr.	C	R	I; D	ST	0.52
<b>Urticaceae</b>						<b>1.32</b>
Harriga Lharcha	<i>Urtica dioica</i> L.	DA; H; RH	L	I; P	ST	0.66
Harriga Malssa	<i>Urtica urens</i> L.	DA; H; RH	L	I	ST	0.66
<b>Zingiberaceae</b>						<b>1.25</b>
Zanjabil	<i>Zingiber officinale</i> Roscoe	DA; DI; H	R	P	IM	1.25
<b>Burseraceae</b>						<b>1.19</b>
Loubane Dacare	<i>Boswellia sacra</i> Flueck.	DA	S	I	IM	1.00
Salabane	<i>Boswellia</i> spp.	DA	S	D	IM; ST	0.19
<b>Cistaceae</b>						<b>1.18</b>
Touzalt	<i>Cistus ladanifer</i> L.	LL	L; S	I	ST	1.18
<b>Alliaceae</b>						<b>1.18</b>
Touma	<i>Allium sativum</i> L.	AT; DA; FU; H	PU	D; EO	CL; IM	0.72
Lbassla	<i>Allium cepa</i> L.	G	PU	D	CL	0.46
<b>Euphorbiaceae</b>						<b>1.00</b>
Daghmous	<i>Euphorbia resinifera</i> O.Berg	C; CY; DA;	AP	P	ST	1.00
<b>Rutaceae</b>						<b>1.00</b>
Fidjl; Aouremi	<i>Ruta montana</i> (L.) L.	DA; H; RH	AP; S	D; I; P (S)	ST	1.00
<b>Punicaceae</b>						<b>0.92</b>
Roman	<i>Punica granatum</i> L.	C; SA	BA (FR)	D	CL	0.92
<b>Rosaceae</b>						<b>0.79</b>
Louz	<i>Prunus dulcis</i> (Mill.) D.A.Webb.	SR	FR	AL	CL	0.79
<b>Anacardiaceae</b>						<b>0.79</b>
Dro; Tro	<i>Pistacia lentiscus</i> L.	C	L; SM	D	ST	0.79
<b>Illecebraceae</b>						<b>0.73</b>
Harras Lhajar; Lkhyata	<i>Herniaria hirsuta</i> L.	DU; RP	L	D	ST	0.73
<b>Cupressaceae</b>						<b>0.72</b>
Lârâar	<i>Tetraclinis articulata</i> (Vahl) Mast.	C; DA; IS; MI	L	D; I; IN	ST	0.72
<b>Cactaceae</b>						<b>0.72</b>
Lhandia	<i>Opuntia maxima</i> Miller	CY; RH	FR; L	AL; EO	ST	0.72
<b>Papaveraceae</b>						<b>0.59</b>
Bellaâmane	<i>Papaver rhoeas</i> L.	RH; IP	CP	I	ST	0.59

<b>Polygonaceae</b>						<b>0.59</b>
Homaida	<i>Rumex palustris</i> Sm.	DA	L	D	ST	0.59
<b>Asparagaceae</b>						<b>0.52</b>
Sekum	<i>Asparagus</i> spp.	DA	R	I	ST	0.52
<b>Capparaceae</b>						<b>0.52</b>
Lkbar	<i>Capparis spinosa</i> L.	DA; RH; SA	FR	D; P	ST	0.52
<b>Plantaginaceae</b>						<b>0.33</b>
Messaça	<i>Plantago major</i> L.	HE; SI	L	EX	ST	0.33
<b>Rubiaceae</b>						<b>0.33</b>
El fouda	<i>Rubia tinctorum</i> L.	AN	R	D	ST	0.33
<b>Arecaceae</b>						<b>0.33</b>
Tamer	<i>Phoenix dactylifera</i> L.	DR	FR	J (ML)	IM	0.33
<b>Aloaceae</b>						<b>0.33</b>
Sibr	<i>Aloe ferox</i> Mill.	DA	S	P	IM	0.33
<b>Cucurbitaceae</b>						<b>0.33</b>
Handal; Hdejja	<i>Citrullus colocynthis</i> L.	DA; C	FR	I; P (Ho)	ST	0.33
<b>Agavaceae</b>						<b>0.19</b>
Sabra; Sabare	<i>Agave sisalana</i> Perrine	RI	L	LE	ST	0.19
<b>Moraceae</b>						<b>0.19</b>
Lkarmous; Chriha	<i>Ficus carica</i> L.	SA	FR	AL	CL	0.19
<b>Rhamnaceae</b>						<b>0.19</b>
Sadra	<i>Ziziphus lotus</i> (L.) Lam.	DA; IP	R	M	ST	0.19
<b>Solanaceae</b>						<b>0.19</b>
Khodanjaj; Bodanjaj	<i>Solanum melongena</i> L.	FU; IS	R	I	IM	0.19
<b>Globulariaceae</b>						<b>0.19</b>
Ain Larnab	<i>Globularia alypum</i> L.	DA	L	D	ST	0.19
<b>Hyacinthaceae</b>						<b>0.13</b>
Gargaât Tib (Dib)	<i>Drimys maritima</i> (L.) Stearn	CA; FU	FR	P	ST	0.13
<b>Juglandaceae</b>						<b>0.13</b>
Lgargaâ	<i>Juglans regia</i> L.	SR	FR	AL	IM	0.13
<b>Fagaceae</b>						<b>0.06</b>
Lbalout	<i>Quercus ilex</i> L.	DA	BA (FR)	D	ST	0.06
<b>Gentianaceae</b>						<b>0.06</b>
Gassat Lhaya	<i>Centaurium erythraea</i> Rafn	DA	AP	I	IM	0.06
<b>Cannabaceae</b>						<b>0.06</b>
El kife	<i>Cannabis sativa</i> L.	C; HC	S	I	IM	0.06
<b>Ericaceae</b>						<b>0.06</b>
Sasnou	<i>Arbutus unedo</i> L.	DA; DU	L	D	IM	0.06

**Legend:** A, acne; AE, allergy; AL, alimentation; AN, anemia; AP, aerial part; AS, asthma; AT, antidote; B, bodybuilding; BA, bark; C, cancer; CA, calming; CF, childbirth facilitating; CH, cholesterol; CL, cultivated; CO, cosmetics; CP, capsule (Lkbala); CU, cough; CY, cyst; D, decoction; DA, diabetes; DI, digestive problems; DN, dental infection; DR, diarrhea; DU, diuretic; EO, Essential oils; EX, external direct application; F, fever; FA,



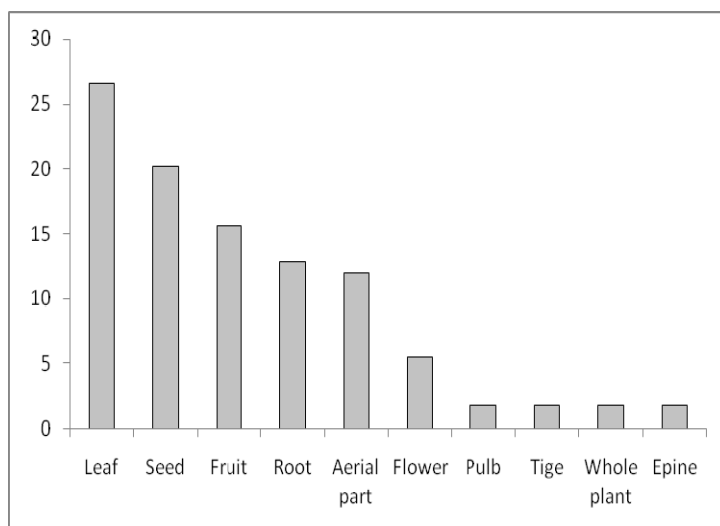
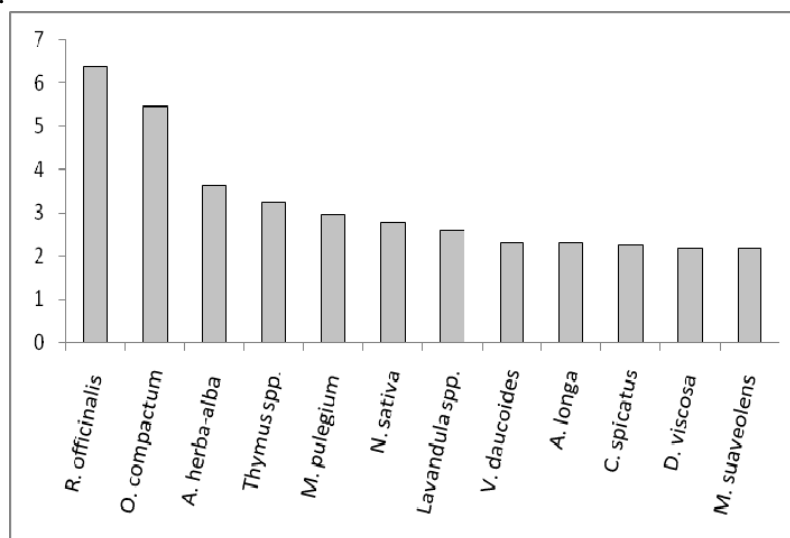
fracture; **FI**, female inflorescences; **FL**, flowers; **FN**, female infertility; **FR**, fruits; **FU**, flu; **G**, gastrointestinal; **H**, hypertension; **HC**, hair care; **HE**, healing (cicatrizing); **HO**, honey (mixed with); **I**, infusion; **IM**, imported (marketed); **IN**, inhalation; **IT**, intoxication (Toukal); **IP**, intestinal pain; **IS**, intestinal swelling (irritable bowel syndrome); **J**, Juice; **L**, leaves; **LA**, Loss of appetite; **LD**, low dose; **LE**, Liquid extract; **LL**, low libido; **M**, maceration; **MA**, massage; **MD**, menstrual cycle disorder. **MI**, migraine; **ML**, milk (mixed with); **MR**, mosquito repellent; **P**, powder; **PN**, pneumonia; **PT**, potted; **PU**, pulp; **R**, roots; **RH**, rheumatism; **RI**, ringworm; **RL**, kidney stones (renal lithiasis); **RP**, renal pain; **S**, seeds; **SA**, stomach pain; **SI**, skin infection; **SM**, stems; **SP**, spines; **SR**, sperm production; **ST**, Spontaneous; **SY**, silks (styles); **V**, vision improvement; **W**, wounds; **WP**, whole plant.

### *Plant use in traditional medicine*

*Rosmarinus officinalis*, *Origanum compactum* and *Artemisia herba-alba* are the most commonly used species in traditional medicine in the Province of Guercif (Figure 3). This could be explained by their abundance in the immediate environment. Khabbach *et al.* (2012) also underlined the use interest of these three species in traditional medicine in the Taza Province, bordering our study area.

The leaves are the most used plant parts (28%), followed by seeds (22%), fruits (15%), aerial parts (13%) and roots (12%). while the other plant parts (flowers, pulp, stem, whole plant and spines) do not exceed 4% for each (Figure 4). Other studies have shown that leaves, aerial part and/or fruits are the most exploited among plant parts (Ennabili *et al.*, 2000, 2006; Mehdioui & Kahouadji, 2007; El Mansouri *et al.*, 2011; Khabbach *et al.*, 2012).

**Figure 3.** Frequency of plants use (%) in traditional medicine, Guercif Province.



**Figure 4.** Frequency of plant parts use (%) in traditional medicine, Guercif Province.

**Table 2:** Frequency use (%) of medicinal plants according the body systems, Province of Guercif.

Body systems	Diseases	Frequency (%)
Endocrine system	Diabetes	35
	Cancer	
	Cyst	
	Lack of appetite	
Digestive apparatus	Intestinal pain	17
	Bloating	
	Gastro-intestinal	
	Intoxication "Toukal"	
	Digestive problems	
	Stomach pain	
Immune system	Flu	13
	Diarrhea	
	Fever	
	Antidote	
	Asthma	
	Cough	
Urino-genital system	Low of libido	10
	Renal lithiasis	
	Renal pain	
	Diuretic	
	Sperm production	
	Childbirth ease	
	Female infertility	
	Menstrual cycle disorder	
Circulatory System	Anemia	9
	Hypertension	
	Cholesterol	
Dermatological system	Wounds	8
	Cicatrizing	
	Cosmetic	
	Skin infection	
	Allergy	
	Hair care	
	Acne	
	Ringworm	
Articulatory-skeletal system	Rheumatism	5
	Fracture	
	Bodybuilding	

	Massage	
Nervous system	Migraine	1
	Calming	
Oto-rhino-laryngeal sphere	Toothache	1
Ophthalmic system	Vision improvement	0,5
Other	mosquito repellent	0,5

The frequency of plant parts use in traditional medicine depends in general on the availability of the plant (abundance and ease of picking). However, comparisons should be taken with caution by considering the diversity and precision of the parts chosen by each author: underground part (rhizome, root, bulb ...), aerial part (branch, leafed stem, flower summit ...), leaf (buds, sorted leaves ...), flower (inflorescence, flower, floral summit ...), fruit (infrutescence, fruit, seed ...), stem, wood, etc.

#### *Therapeutic indication*

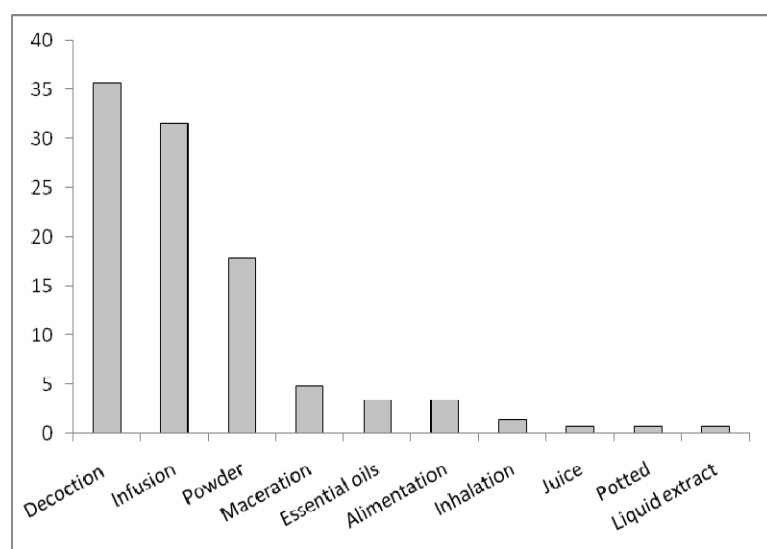
This study allowed us to list a number of chronic diseases treated by medicinal plants in the Province of Guercif). Analysis of the obtained results shows that these plants are involved for the treatment of some diseases with frequency varying from less than 5% to 35% (Table 2).

Furthermore, some species are used in the traditional treatment of several diseases, as *Rosmarinus officinalis*, *Origanum compactum* and *Artemisia herba-alba*, especially in the treatment of metabolic, digestive and respiratory infections. Previous studies have reported the local use of medicinal plants from Morocco in the treatment of various diseases (Bellakhdar, 1978, 1997; Bellakhdar *et al.*, 1982, 1991; Ennabili *et al.*, 2000, 2006; El Mansouri *et al.*, 2011; Khabbach *et al.*, 2012).

### Recipes preparation

The decoction is the frequent mode of preparation (34%), followed in particular by infusion (31%) and powder (17%) (Figure 5). Other authors have mainly reported variable frequencies of decoction as a mode of recipes: 29% in the Western Rif (Bachar *et al.*, 2016), 47% in

Essaouira Province (Mehdioui & Kahouadji, 2007), and 65.6% in the Province of Taza (Khabbach *et al.*, 2012). When compared to other modes of preparation, the predominance of decoction is justified by the "disinfection" ability of plants, and its ability for "warming" the patient's body (Bachar *et al.*, 2016).



**Figure 5.** Frequency of recipes preparation mode (%) by the local population, Province of Guercif.

### Conclusion

This work allowed us to inventory one hundred plant species used in traditional medicine in the Province of Guercif. The frequency of use of medicinal plants is closely related to the interviewee profile (age and sex). The younger people generally are less informed about the local know-how on the traditional medicine.

The medicinal plants most commonly used in the studied area are *Rosmarinus officinalis*, *Origanum compactum* and *Artemisia herba-alba*. In traditional medicine, the leaves mostly

represent the plant parts used in Guercif province.

Furthermore, medicinal plants are widely used to treat mainly metabolic diseases and digestive infections. The decoction is the galenic form most practiced by the local population.

This study allowed us to appreciate and to know the practices of traditional herbal medicine transmitted by the population of the Province of Guercif, and will constitute a basis of selection of some plants to validate their uses as a remedy.

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