

Original research

Ethnobotanical study of medicinal plants in the region El Hajeb
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ABSTRACT:

As a part of enhancement of the natural heritage of the region Meknes-Tafilalet, an ethnobotanical study was conducted in the El Hajeb region. This study describes the different uses of medicinal plants by the local population and their impact on the degradation of plant biodiversity. And it also helped to create a catalogue of different species in the region. On the basis of questionnaire prepared, a survey was conducted among the local population and herbalists operating in the field of medicinal and aromatic plant intermediaries. The analysis of results from 220 question cards, using data processing technique has enabled us:-

- To identify 80 species distributed in 40 families with a significant representation of the Lamiaceae family
- To represent the frequency of use of cash by the local population surveyed at the study area
- To represent the frequency of use by age, gender, and according to the school.

Despite the richness of the studied medicinal and aromatic plants in this area, the local population does not benefit from its natural resources.

Keywords:

Morocco, El Hajeb, medicinal plants, ethnobotany, Lamiaceae

Abbreviations:

AC: Circulatory apparatus; **AD:** Digestive System; **AR :** Respiratory; **AU:** Urinary; **AG:** Genital Apparatus; **AA:** Hearing Aids; **AV:** Device Image; **SN:** Nervous System; **SQ:** Skeleton; **P:** Skin

Part used

PS: Underground Party; **T:** stem; **F:** Leaf; **TF:** Stem + Leaf; **FL:** Flower; **FR:** Fruit; **PE:** Whole plant

Method of Preparation

Inf: Infusion; **D:** Decoction; **C:** poultice; **M:** maceration; **Inh:** Inhalation; **F:** Friction; **Inj:** Injection; **P:** Powder; **N:** Nature; **D:** Miscellaneous

Abundance:

(*):** Abundant; **(**):** Means; **(*):** Rare ; **(0):** none

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INTRODUCTION

The ethnobotanical and ethnopharmacological study of Moroccan medicinal plants show the relative importance of such plants in the health system in Morocco. The first serious study of the Moroccan medicinal plants dated back in 1978 when a book was published entitled 'Traditional Medicine and Toxicology west-Saharan Africa' by Jamal Bellakhdar. This book was an undeniable contribution of Moroccan pharmacopoeia. Other studies have focused on regional medicinal flora, the most important of which were conducted by Bellakhdar *et al.* (1987) in the region of Tata (southern Morocco), Benabid and Bellakhdar (1987) in the region of Rif and Kahouadji (1995) in Morocco oriental and Hmamouchi and Agoumi (1993) have reported studies from Morocco (Central plateau). Other studies have focused on the study of biological activity of some Moroccan medicinal plants (Abdelrhafour *et al.*, 1993 a and b; Bammi *et al.*, 2000; Remmal, 1994).

In 1997, Bellakhdar published a document of crucial importance entitled, 'Traditional Moroccan Pharmacopoeia', a bibliographic research on ancient arabic texts of medical material, developed by North African. Andalusian authors have demonstrated that the Moroccan pharmacopoeia showed a remarkable continuity with the knowledge of the ancients, at least as regards the nature of the remedies, since 77.7% of what it employs are already mentioned in the texts taken as a reference (Bammi *et al.*, 2000).

Our laboratory has been trying for years conducting floristic and ethnobotanical research of medicinal plants in the region of Meknès-Tafilalet, to enhance these natural resources. In this sense, an ethnobotanical study was conducted at the area of El Hajeb, a province of the Meknes-Tafilalet region.

This study is to invent medicinal plants, for identifying the different ways of use and to understand the close relationship between plant species described in

the said region and the types of diseases that affect human beings.

MATERIALS AND METHODS

Description of the study area

The province of El Hajeb, relatively new, spreads over an area of 2,22,000 ha. It is limited:

- To the north is the province of Meknes
- To the south is the province of Ifrane
- To the east is the province of Fez and Sefrou province
- To the west is the province of Khémisset

The administrative division consists of three circles, five caïdats, twelve rural communes and four urban municipalities.

The total population was estimated in 2004 as 2,40,436 with 64% rural and 36% urban inhabitants. The number of households was estimated as 30,326 and the number of farmers has been estimated as 18,800.

The area is characterized by semi-arid to sub-humid climate with a average annual rainfall of 520 mm. The minimum temperature reached was 2.8° C, while the maximum temperature reached was 38.2° C.

Farming is the main source of population in as given below

- Total area: 2,22,000 ha
- SAU: 1,46,000 ha
- Bour: 1,25,500 ha
- Irrigated: 44,700 ha
- Forests: 31,300 ha

UAA consists mainly of cereal crops (78,000 ha), market gardening and arboriculture 44.00 ha (22,000 ha) primarily.

The choice of the region

The choice of the study has been focused on the region El Hajeb for the following reasons:

- The geographical position of the mass if that forms the transition between the Rif Mountains and the Atlas chain means.

- The abundance and diversity of plants in the spontaneous state in this region.
- The existence of traditional know-how on aromatic and medicinal plants.
- Knowledge of the area as we live in El Hajeb since childhood.

Collection of plants

Collection of medicinal species was made on land by a random sampling method. Taxonomic identification was performed on comparison with the herbarium specimens of the vegetation in the area and verified by Mohamed, El Hajeb scientific institute in Rabat Agdal.

The choice of investigators

For the choice of the survey population, we considered the following criteria:

Age: Age between 19 and 70 years

Gender: Heterogeneity of respondents (women / men)

Level of activity performed: Local population, farmers, herbalists, intermediate and healers.

Ethnobotanical surveys

To meet the goals of the ethnobotanical study, surveys were conducted and exploratory outings were done to familiarize themselves with the terrain, the local vocabulary and recognition of species of WFP in the region, their spatial distribution, and abundance. This work lasted eight months.

On the basis of a questionnaire, a series of surveys was carried out with the local population, herbalists and intermediaries; 220 records on questionnaires were collected, of which 110 listings were from the local population, 80 from the souks: City El Hajeb, Ait Boubidmane (14 km), Agourai (30km), Ain Lhnach (20 km) and 30 from intermediaries, herbalists, farmers and traders.

Statistical analysis

Data collected on raw data sheets were processed by MS excel; this helped to establish a herbal monograph

of El Hajeb and describe their methods of valuation by the local population.

RESULTS AND DISCUSSION

The ethnobotanical information was included on raw data sheets and transferred to a database after collection, processed and analysed to obtain standardized data for the following areas:

Frequency of use of medicinal and aromatic plants by the local population surveyed at the study area: El Hajeb

a) Frequency of use of PAM by gender:

The WFP operation in this region affects both men and women, although women have more knowledge about the species in relation to men (56% against 44%). The data processing and the graph were shown on Figure 1. The results presented in the graph confirms the results of other ethnobotanical work at the national level, which says that more women are holders of traditional herbal knowledge (Bellakhdar, 1997).

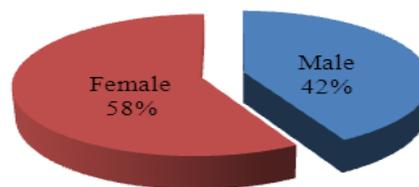


Figure 1: Distribution of the medicinal plants by gender usage frequency in the region of Elhajeb

b) Frequency of use by age:

The ethnobotanical study revealed differences in the age of the study population regarding the use of PAM as shown in the graph in Figure 2.

A wide range of El Hajeb people over 50 years of age, have a greater frequency of use of medicinal plants (50%) compared to other age groups: [40-50], [30-40], [20-30], [<20], with frequencies of use 20%, 16%,

10%, 4%, respectively; This shows that knowledge of users of WFP is usually acquired following a long experience and passed from one generation to another, but now the transmission is in danger, because it is not always assured.

There is also some loss of information on the WFP because of the reduction of plant resources of the region and the distrust of some people, particularly young people who tend to know little about the virtues of plants and be reluctant to their use in traditional

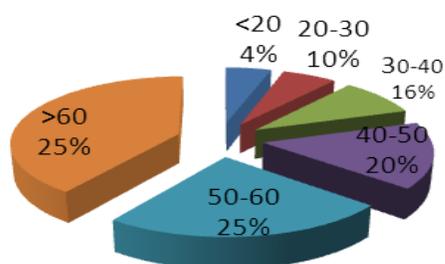


Figure 2: Frequency of use of medicinal plants by classes

medicine.

2. Frequency of use of PAM by level of schooling

El Hajeb is a region which has a lower level of schooling. Illiteracy reached a high level, especially in women with a higher percentage compared to men (HCP, 2014).

It should be noted that at this region most users of PAM are illiterate (68% of the population). However,

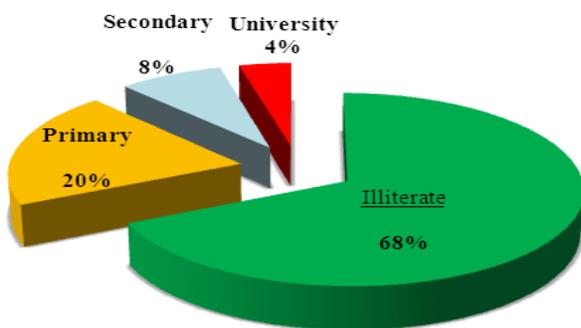


Figure3: Distribution of medicinal plant use by the level of education

people with primary level schooling - a percentage of use of significant WFP is 20%, while those with the level of secondary and university studies are found to be very little users of PAM (Figure 3).

3. Frequency of medicinal plants according to their origin

Most species of WFP in El Hajeb are characteristics of the region and are spontaneous from the forests and Douars with a frequency of 83.75%. Also crops such as caraway, anise, spearmint, fenugreek, lemongrass and garlic, do not have a low frequency of

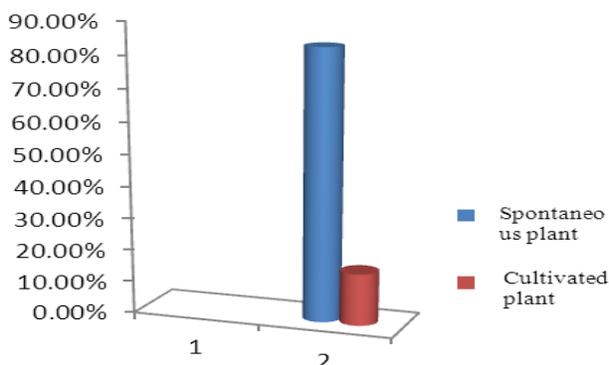


Figure 4: WFP frequency by source

availability - 16.25% (Figure 4).

4. Distribution of different plant parts used

From the survey, the local population uses different parts of the plant in the treatment of diseases; it can be the leaves, stems, flowers, fruit, bark of roots, tubers and rhizomes.

The graph given in Figure 5 shows the most commonly used plant parts in the area of El Hajeb. Stems

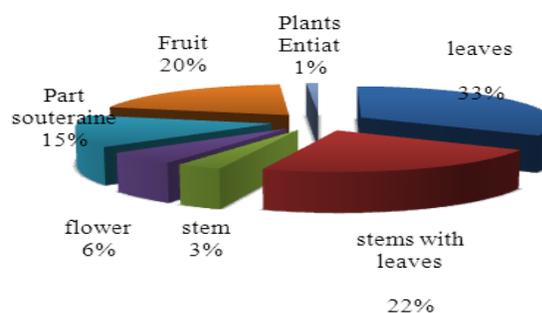


Figure 5 : Distribution of the different parts used in the region

were used by 33% of people followed by the stems with leaves (22%), fruit (20%) and underground parts (15%).

5. WFP and their methods of preparation

The method of preparation of the crude drug from a designated body of the plant is very diverse (infusion, maceration, decoction, bouillon powder etc). The results shown in graph in Figure 6 are as follows:

Decoction is the most common method of preparation with a percentage of 45%, followed by the

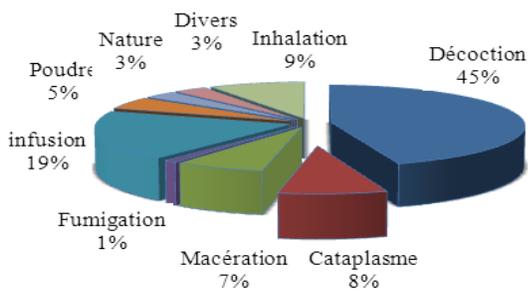


Figure 6: Distribution of different medicinal plants preparation methods in a region Elhajib .

infusion preparation (19%), and other modes are less than 9%.

6. PAM very common in the region

Computer analysis revealed the most common PAM in the study area tel que *thyme* (*Thymus ciliatus*), round-leaved

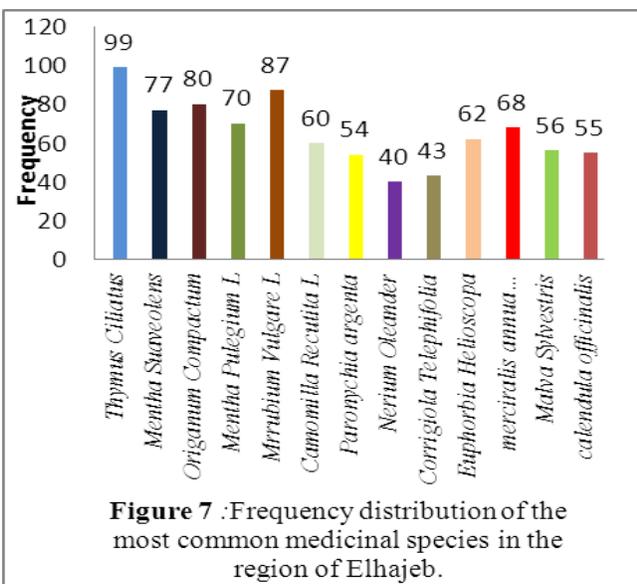


Figure 7 :Frequency distribution of the most common medicinal species in the region of Elhajib.

mint (*Mentha suaveolens*), oregano (*Origanum compactum*), pennyroyal (*Mentha pulegium L.*), white horehound (*Marrubium vulgare L.*) with a frequency of operation between 70% and 90%. Other species such as German chamomile (*Camomilla recutita L.*), *Paronychia argenta*, oleander (*Nerium oleander*), *Corrigiola telephifolia*, *Euphorbia helioscopia*, *Mercurialis annua*, *Malva sylvestris* and *Calendula officinalis* represent frequencies between 40% and 60%

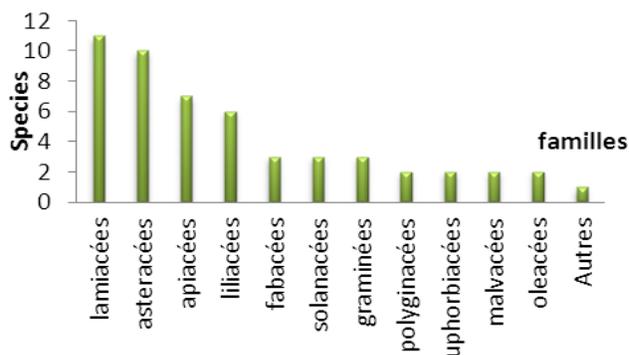


Figure 8: Frequency distribution of the most represented families in the study area

(Figure 7).

7. Botanical families represented in the study area

According to the survey and graph in Figure 8, we find that families Lamiaceae and Asteraceae are the most represented with 11 and 10 species, respectively, followed by the Apiaceae family (7),

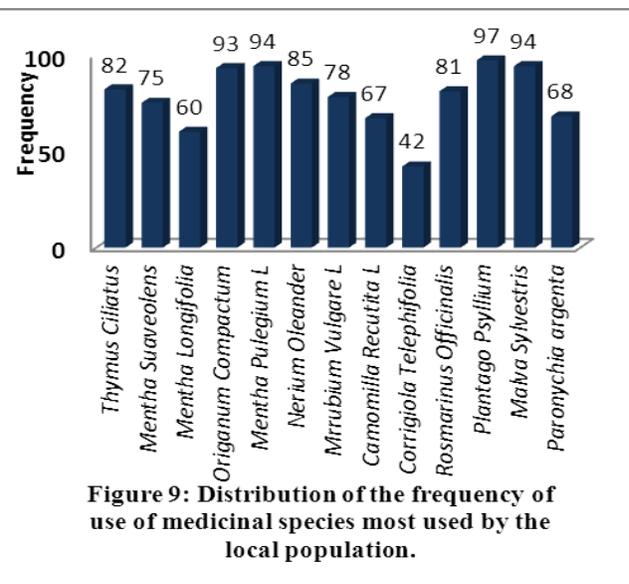


Figure 9: Distribution of the frequency of use of medicinal species most used by the local population.

liliaceae (6), Fabaceae, and Solanaceae grasses respectively (3), other families are less than two. The lamiaceae are flavouring plants. WFP belonging to this family are most commonly used for self-medication in the region. These results confirm those of other ethnobotanical studies throughout the Moroccan territory (Bellakhdar , 1997).

8. The frequency of medicinal plants mostly used by the local population

From the ethnobotanical study conducted it is possible to highlight 13 most used medicinal plants by the local population (Figure 9).

Plantago psyllium plant is most commonly used; when it is not among the most common plants in the region, it is due to its effectiveness in treating wounds, followed by plants that are common as *Thymus ciliatus*, *Origanum compactum*, *Mentha pulegium*, *Paronychia*

argenta, *Camomilla recutilla L.*, *Marrubium vulgare.L* and *Mentha suaveolens*.

9. Distribution of WFP as pathologies

According to the statistical analysis, we are successful in revealing various pathologies most frequently encountered in the El Hajeb region (Figure 10).

Dermatoses occur by a percentage of 27% followed by the digestive tract (22%), nervous system (14%), urogenital tract (14%), hormonal and circulatory system (9%), and other disorders less than 5%.

10. The number of species listed according to the most common diseases

The number of species found in the study area that treats a given disease were given in Figure 11. The most common diseases in the study area are skin diseases. 18 species treat these diseases, most of them are

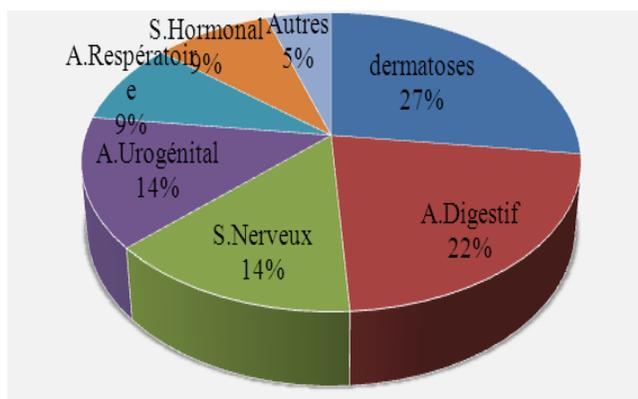


Figure 10: Distribution of the pathologies encountered in the area of El hajeb

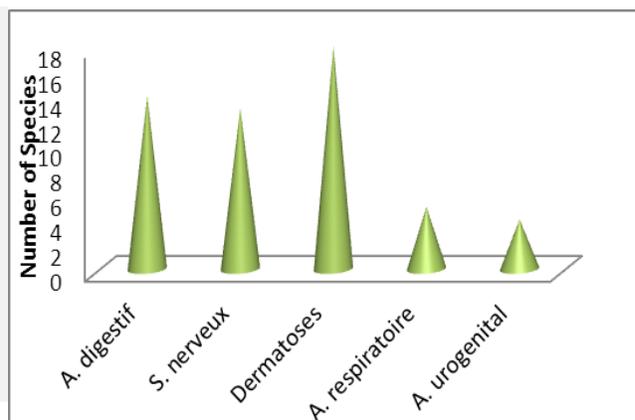


Figure 11: The number of species in relation to diseases encountered in the study area

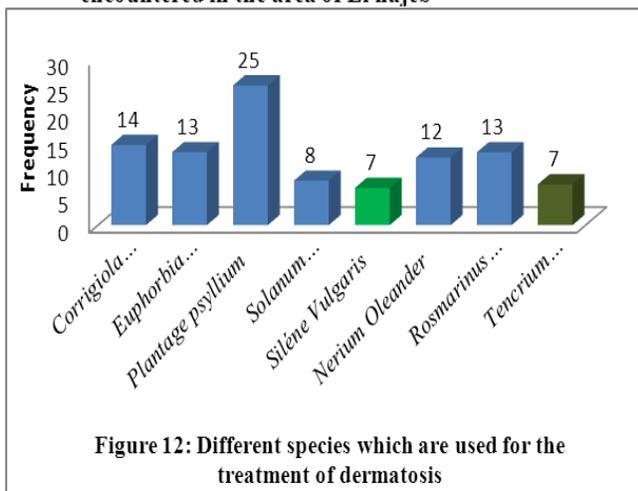
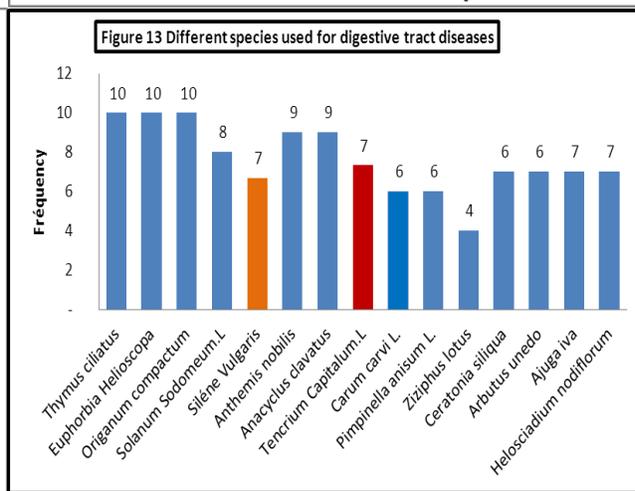


Figure 12: Different species which are used for the treatment of dermatosis



healing, the most represented are *Plantago psyllium* with a percentage of 25.17%, followed by *Corrigiola telephifolia* (14.42%), *Euphorbia helioscopia* (13.13%), *Rosmarinus officinalis* (13.10%), *Nerium oleander* (12.15%), *Solanum sodomaeum* L. (8%), *Teucrium capitatum* .L (7.33%) and *Silene vulgaris* (6.7%).

For diseases of the digestive system, 14 species are used, followed by 15 species for the nervous system, 5 species for respiratory and 4 species for the urogenital tract problem (Figure 12).

It is found that 15 species treat diseases of the gastrointestinal tract, the most represented are primarily *Thymus ciliatus*, *Euphorbia helioscopia*, *Origanum compactum*, *Solanum sodomeum* L., *Silefia vulgaris*, *Teucrium capitatum*. L, *Ceratonia siliqua*, *Arbutus unedo*, *Ajuga iva*, *Helosciadium nodiflorum* , *Carum carvi* L and *Pimpinella anisum* L and last *Ziziphus lotus*.

According to Figures 12 and 13, it was found that two plants were used for curing both dermatoses and digestive tract diseases. Both plants were chosen to study their antimicrobial effect.

CONCLUSION

This study identified the aromatic and medicinal plants that exist in the region of El Hajeb and their various uses by the local population.

The results of this study showed that the area holds significant potential in spontaneous WFP crop and toxic. El Hajeb region has a low level of schooling. It should be noted that at this region most of the users of PAM are illiterate.

The information acquired from questionnaires sheets and floristic surveys conducted in the field, helped us to catalog 80 plant species belonging to 40 families.

The most common medicinal and aromatic plants widely used in the study area are thyme, mint round leaves, oregano and white horehound. These species contain essential oils used mainly as a carminative,

antiseptic, stomachic and antitussive. Over-harvesting led to their extinction which leads us to adopt a management approach to the protection and preservation of natural resources.

The ethnobotanical study revealed that the most common disease prevalent in this area is dermatitis. Foliage is the most used plant organ and decoction is the most dominant mode. Also skin diseases are treated locally which allowed us to describe the different uses of medicinal plants by the local population. This study helped us to understand the close relationship between plant species and described the different types of pathologies affecting population. Thus two plants used both for skin diseases and diseases of the intestine were chosen for future studies.

It is noted, that the exploitation of wild plants is not developed neither technically nor economically. Therefore, local people do not benefit from the development of natural resources and are not said to be as top managers.

For sustainable management of aromatic and medicinal resources and better utilization of medicinal and aromatic plants at the local level, Provincial Agriculture Officer (PAO) with others proposed the following steps:

- An organization of local people together
- The integration of rural women in the exploitation of medicinal and aromatic plants
- Improved incomes of men and women
- Creating self-employment
- Improved quality of products of medicinal and aromatic plants
- Promotion markets for WFP nationally and internationally
- An organization from the sale of products derived from PAM (dried plants, floral waters and essential oils).

Appendix 1: Photo of some of the most used plants in the region El Hajeb



Thymus ciliatus (Le thym)



Nerium oleander (laurier rose)



Mentha pulegium (La menthe pouliot)



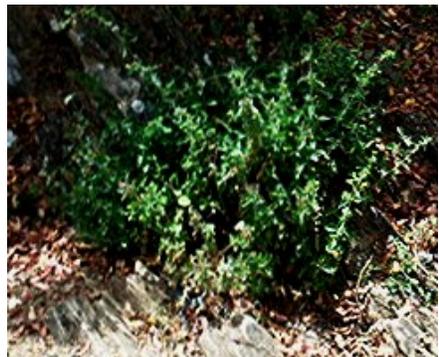
Inula viscosa (L'inule visqueuse)



Marrubium vulgare L. (Le marrube)



Laurus nobilis L. (Le laurier noble)



Origanum compactum (L'origan)



Papaver rhoeas (Le coquelicot)



Salvia officinalis L. (La sauge)



Calendula officinalis (Le souci offici-)



Camomilla recutita (L.) (Camomille)



Lippia Triphylla (La verveine)

Appendix 1: Photo of some of the most used plants in the region El Hajeb (Contd)



Urtica dioica L. (L'ortie)



Mentha longifolia L. (Menthe)



Rumex acetosa L. (L'oseille)



Lavandula dentata (Lavande sauvage)

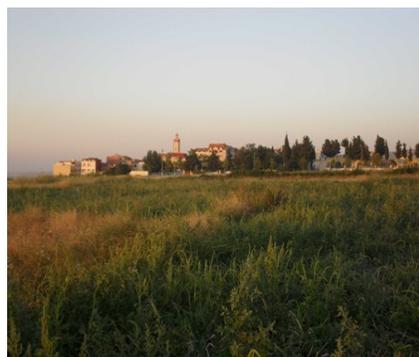


Carum carvi L. (Le carvi)

Appendix 2 : Lot picture (investigators and users)



Appendix 3: Landscape picture of the region of El Hajeb



Appendix 4 : Field pictures (users, herbalists and healers)



User 1



User 2



Herbalist 1



Herbalist 2



Herbalist 3



Healer

Table I : Catalog of aromatic and medicinal plants of the region of El Hajeb

Family	Botanical Name	Name vernacular	Use	No species cited by Bellakhdar	Toxic Plants	Abundant Yes / no	Spontaneous or cultivated plant
	<i>Thymus ciliatus</i>	zitra	- To treat abdominal pain - As a flavor in bread			Yes	Spontaneous plant
lamiacées	<i>Mentha suaveolens</i>	mersita	-To treat fever, headache, typhoid - As a flavor in bread Flavor milk, tea and coffee			Yes	Spontaneous plant
	<i>Mentha longifolia</i>	manta	- Treating colds			Enough	Spontaneous plant
	<i>Origanum compactum</i>	zaatar	- Gastralgia - Flavor bread			Enough	Spontaneous plant
lamiacées	<i>Mentha L. pulegium</i>	Ber Fliyou	Influenza, cough, headache and chills - Flavor meals, burns			Yes	Spontaneous plant
	<i>Salvia officinalis L.</i>	salmia	- Flavor tea - Antidiabetic			Not	Spontaneous plant
	<i>Mentha viridis L.</i>	Nanaa	- Flavor tea -Headache.	+		Yes	Cultivated
	<i>Teucrium L. capitatum</i>	Lkhiyata	Furuncle, healing, gastroenteritis -gastralgie, dysmenorrhea,	+		Yes	Spontaneous plant
	<i>Rosmarinus officinalis L.</i>	Azir	skin care, cooling, headache			not	Spontaneous plant
	<i>Calendula officinalis L.</i>	jemmra	- Freezing them, acne			Yes	Spontaneous plant
Asteraceae	<i>Anthemis nobilis</i>	babnouj	Belly aches, hair care and facial			Enough	Spontaneous plant
	<i>Inula viscosa</i>	mâgrâmân	Tuberculosis, pneumonia, healing			Yes	Spontaneous plant
	<i>Atractylis gummifera L.</i>	Ddâd	Fumigation against microbes and insects, abscess		Deadly common in Morocco: Root (Bellakhdar, 1997)	not	Spontaneous plant
	<i>Scolymus hispanicus L.</i>	l-gernina	-Consumption			Yes	Spontaneous plant
Asteraceae	<i>Echinops spinosus L.</i>	Taskra or Chawkate elhmar	-Consumption			Yes	Spontaneous plant

	<i>Paronychia Argenta Anacyclus clavatus</i>	Harras el Hjar Krae Djaja	Kidney - Lithiases -gastralgie		Yes not	Spontaneous plant Spontaneous plant
Rutaceae	<i>Ruta angustifolia</i>	FIJL	Fever, typhoid, headaches -digestions		Yes	Spontaneous plant
Apiaceae	<i>Carum carvi L.</i>	karwiyâ	difficiles-antispasmodic gas -gonflements		Yes	Cultivated
Apiaceae	<i>Eryngium ilicifolium</i>	boumghizal	Gastroenteritis cooling, headache		not	Spontaneous plant
Apiaceae	<i>Daucus crinitus</i>	bouzfour			not	Spontaneous plant
Lily	<i>Pimpinella anisum L.</i>	Habat Hlawa	- Digestive problems - Flavor bread	+	Yes	Cultivated
	<i>Corrigiola telephiiifolia</i>	Serghina	-Eczéma, Hemorrhoids	+	not	Spontaneous plant
Apocynacées	<i>Nerium oleander</i>	Dafla	Abscess, cooling, headache ac- ne, burns		Very toxic (Kingsbury, 1964) enough	Spontaneous plant
Lauraceae	<i>Laurus nobilis L.</i>	Asa Musa	- Flavor sauces -Cooling		Not	Spontaneous plant
Papaveraceae	<i>Papaver rhoeas</i>	bel-naaman	-Toux -laryngite	+	Toxic to animals (Cooper and Johnson, 1984) Yes	Spontaneous plant
Verbenaceae	<i>Lippia triphylla</i>	Lwiza	- Flavor tea, fever, headache	+	Not	Cultivated

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