



Research Article

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Ethnobotanical survey and inventory of medicinal flora in the rural municipalities of Ait Ishaq, Tighassaline, El-Hammam and Ageulmam azegza – Khenifra province, Morocco-

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ABSTRACT

In order to contribute to the enhancement of plant biodiversity and traditional phytotherapy of medicinal and aromatic plants (MAP) in Morocco, an ethnobotanical study was carried out over the different stages of vegetation in rural villages of Ait Ishaq, El-Hammam, Tighassaline and Ageulmame Azegza within the province of Khenifra. By using 200 question cards, an ethnobotanical field investigation were conducted during the two months May-April 2014, which focus on probabilistic, stratified and random sampling technique. The computerization of collections in database form is a way of testing the traditional knowledge, for a better description, valorisation and preservation of local pharmacopoeia pragmatically. It also helped to identify and verify the information discrepancies and so highlight the confusion in the identity of the plants in their mode of use and in ways of practicing traditional medicine. The study of medicinal flora has identified 71 medicinal species divided into 37 families and 61 genuses, with a prevalence of lamiaceae (13), and asteraceae (9). The results of this study showed that the leaves are the most used part. Moreover, the majority of the remedies are prepared in decoction. On the diseases treated plan, the digestive affections are the most affections cured with a rate of 23,92%, followed by the metabolic affections (14,12%). The dose is still random, as 95.39% of the surveyed population use the medicinal herbs with no precise amounts. This study allowed to inventory the medicinal flora of the province of Khenifra, then to gather the maximum of informations concerning the therapeutic uses of the medicinal herbs practiced by the population.

Key words: Khenifra (Morocco), Ethnobotanical survey, Medicinal plants, Therapeutic uses, Questionnaire

INTRODUCTION

Since the ancient times, the use of plants in the field of health is still a part of actuality [1]. Medicinal plants are precious heritage for humanity and especially for the majority of poor communities in developing countries in the absence of a modern medical system [2].

Moreover, natural substances experience a growing interest in applications for the development of many consumer products. This requires a great need in the production of isolated and purified bioactive substances, in order to have a better use in many applications: cosmetics, pharmaceutical and nutritional additives like [3]. So those plants still represent a great source of inexhaustible, renewable and active ingredients. Indeed, there are about 500,000 species of plants on earth, 80,000 have medicinal properties [4].

Morocco, for the richness and diversity of its flora, is a real plant breeding tank. There are about 4,500 species and subspecies native or naturalized distributed among 920 genera and 130 families [5], allowing it to occupy a privileged place among the Mediterranean countries that have a long medical tradition and a traditional know-how of herbals [6].

However, the Moroccan medicinal flora remains unknown to this day, as on several thousand existing plant species, found medicinal species do not exceed 356 species [7] and 600 species [8] respectively 8.69% and 14.28% of the total Moroccan flora.

Nevertheless, traditional medicine has always occupied an important place in Moroccan traditions and medication [9]. Rural communes El-Hammam, Ait Ishaq, Tighssaline and Ageulmam azegza in the province of Khenifra is a concrete example.

Analysis of the Moroccan medicinal bibliography shows that the data on regional medicinal plants are very fragmented and dispersed [10]. Hence the need to seek a reliable and scientific approaches to the discovery of new species in therapeutic interest, to determine involved groups of plants and their characteristics, in order to consolidate and develop a specific knowledge in medicinal plants of Morocco.

Among these approaches, we decided, in this work, for an ethnobotanical study that will identify and quantify the biodiversity of medicinal aromatic plants, and also determine the roles and the various uses of biodiversity by people in the study area.

This work is a part of the enhancement of plant biodiversity and herbal traditions, aromatic and medicinal plants in Morocco. It aims to an environmental and social development of the rural population in order to preserve and protect their natural and traditional heritage in medicinal aromatic plants.

These objectives are achieved by following an ethnobotanical study conducted in four sites within the rural communes of the province of Khenifra: El-Hammam, Ait Ishaq, Tighssaline and Ageulmam azegza.

It comes to collect and identify the different species of plants in the so-called regions and to collect the maximum of informations about the therapeutic uses practiced by the local population.

The development of the Moroccan traditional medicine to the health system strengthens the management of natural resources and the protection of the biodiversity of the environment. Indeed, the protection of biodiversity remains indispensable in developed countries and innovation of technologies reinforces the traditional techniques of traditional medicine.

EXPERIMENTAL SECTION

Description of the study area

The Province of Khénifra is characterized by rugged terrains and increased altitude from west to east. It covers a territory with geological and geomorphologic facies that vary in which there are two physical and bioclimatic units [11].

The northwest area of the province (Circle Khénifra) is a part of the Moroccan Central Plateau, The relief is very rough, it is a succession of convex peaks and prolonged valleys[11].

The central area of the Province (Circle of El Kebab and a part of Khénifra) is shared between the Central Plateau with average mountains and the tabular Middle Atlas, In the further east there is the pleated Middle Atlas[11].

The province has 22 communes including Khenifra's 02 Urban communes, and 20 other rural communes in which we have selected four rural communes (figure 1) belonging to three levels of vegetation which they are:

- Green oak floor or mountain stage: rural municipalities Ait Ishaq and El Hammam
- Cedar forest floor or subalpine include the tops of the mountains, the town of Moroccan Ageulmam Azegza
- Colline Floor: commune Tighassaline.

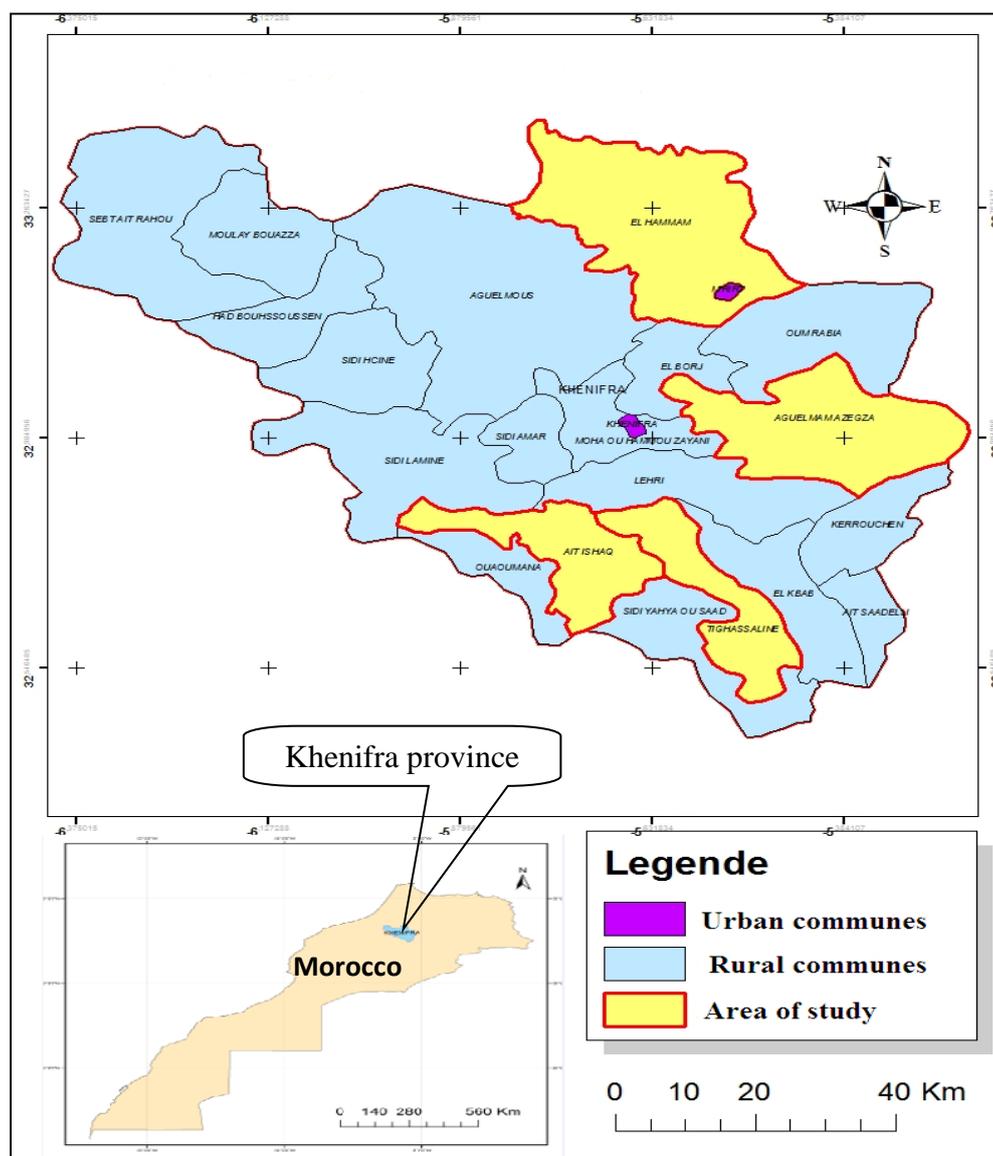


Figure 1: location cart of the study zone

The demographics of the province of Khenifra is characterized by a relatively high density (53.34 hab / km²). The population of this province is rural in a proportion of 46.16%, it composes 358 151 of inhabitants, and it is divided into 50.9 % female and 49.1% male [11].

The climate of the Province of Khenifra is mountainous Mediterranean continental. It is characterized by a rainy and cold winter, with snow periods in the high mountains, and a hot dry summer with stormy periods [11].

The precipitation regime is a seasonal basis with a maximum of rain and snow in winter. Annual rainfall varies according to the region between 400 and 700 mm depending on the altitude and exposure [11].

The recorded average of temperatures range from a low of 4 ° C (January) to a maximum of 35 ° C (July-August).The winter period is characterized by a sharp cold, while the region knows a very high summer temperatures [11].

The forest covers a total area of 264 374 HAS, and plays a very important role in developing the socio-economic fabric of the province [11].

The heterogeneity of the physical environment data has conditioned the distribution and the existence in space of a large number of plant and animal species divided according to the altitude and depending on the bioclimatic floors [11].

Methodologies

During the two months of April and May, we tried to collect informations from different respondents. Herbalists and "foqha" gave us general informations about the use of medicinal plants of this region (local names, formulations, route of administration ...) also we proceeded in taking pictures and harvest samples of different species, to check their local names and their uses with other surveys and also in order to identify their taxonomies.

Developing a survey record

To meet the study objectives, a listing questionnaire was developed. It is based on closed and semi-closed questions because they are more effective for data collection (appendix I).

The survey sheet contains two main parts: the first corresponding the investigated profile, while the second is devoted to inventoried plants (treated pathologies, part used, method of administration ...) taking into account the vernacular name.

To get a general idea about the use of medicinal plants which inventoried during this ethnobotanical phase, interviews were conducted with Aboriginal people and / or people who have lived a long time in the study area, following the procedure of "stratified probability sampling" [12] which gives a more representative sampling [13]. The sample is divided into four strata with which we targeted different levels of vegetation of the province, it is the rural town of El Hammam ,rural town of Ait ishaq, rural town of Tighassaline and rural town of Ageulmam azegza.

Within each stratum, we realized a simple random sampling without replacement with 50 samples (50 people) to each of the four areas and they are put together to form the aggregate sample of 200 respondents (table 1).

Table 1: Distribution of survey strata

No. Of the common	Area Name	Number of interviewees
common 1	Ageulmam azegza	50
common 2	El-Hammam	50
common 3	Tighassaline	50
common 4	Ait ishaq	50
The total sample	4	200

Taxonomic identification of the species

Taxonomic identification of the collected samples was made at the scientific institute within the University Mohammed V-Agdal in Rabat via a comparison with the samples of the Herbarium and Moroccan's flora.

Treatment of data

Data on raw data sheets have been transferred into a database and processed by statistical software SPSS version.

RESULTS AND DISCUSSION

Users of aromatic and medicinal plants

The ethnobotanical survey that we carried out in rural communities of El-Hammam, Ait ishaq, Tighassaline and Ageulmam azegza in the province of khenifra shows that most of the local population are cured through traditional medicine using medicinal plants instead of having access to modern medicine (figure 2).

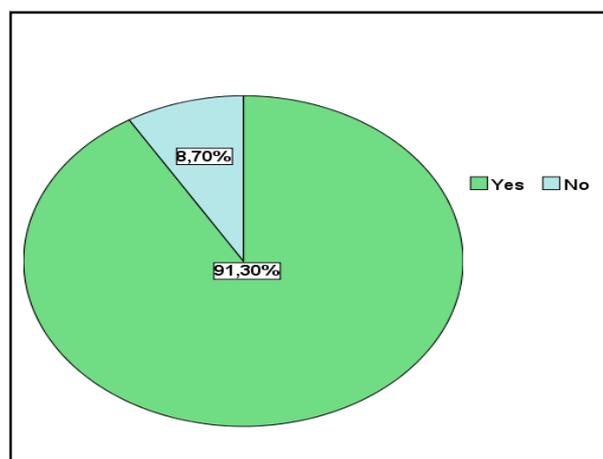


Figure 2 : users of aromatic and medicinal plants

This result is explained by the inaccessibility of the most of population to modern medicinal services due to the stiff price, quality or lack of health services on the one hand and the purchasing power of populations on the other hand. The constraints to reach health services are often important: remoteness of the health services, roads's deteriorated infrastructure and rarity or lack of transport means, transport's cost, expenditures related to the lodging and the accompanying feeding, and also specific costs associated with medical care (laboratory tests, medications, ...).

For all these reasons, traditional medicine remains the main resort as it is the case in other regions of Morocco and some countries where medicinal plants are easily available to the public without prescription and at a low cost.

Frequency of use of medicinal plants according to the profile of the investigated

According to the age

Age have a very important role in traditional medicine. The processing of the surveyed results allowed us to obtain the graph in the figure 3. This later illustrates the distribution of age percentages in the study areas.

Persons with ages older than 60 years have a frequent use of medicinal plants, over 28.99%, then the age ranges of [50-60]; [40-50]; [30-40] and [20-30] come after, respectively with percentages of uses in the order of: 20.29%; 17.39%; 14.49% and 15.94%. We have noted that people with age lower than 20 years, have a very weak frequency of use 2.90%.

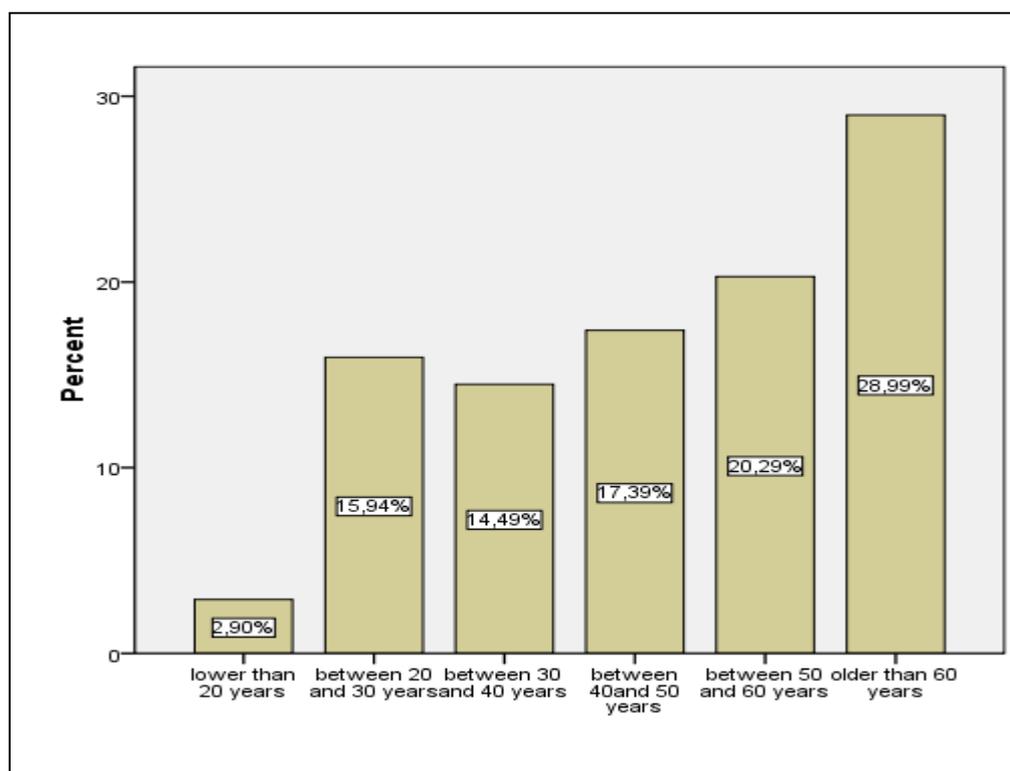


Figure 3: Distribution of the frequency of medicinal plants use by age group

The results indicate that older people, indeed, have more knowledge about medicinal plants compared to other age categories, whose have generally long experience accumulated with age. Likewise, the low interest to the therapeutic effects of the plants marked in persons with age inferior to 20 years, due to the mistrust. Particularly young people who tend to do not really believe in this traditional medicine [9] contrariwise they prefer to be treat by modern medicine.

According to the sex

The use of medicinal plants varies according to gender. Female use more herbs than male (Figure 4). In fact, 68.12% of women use the medicinal aromatic plants against 31.88% of men population. In the study area, we note that women have a higher knowledge compared to men, This is due to the fact that women benefit more of medicinal properties to relieve pain of their children and to maintain the health of their families.

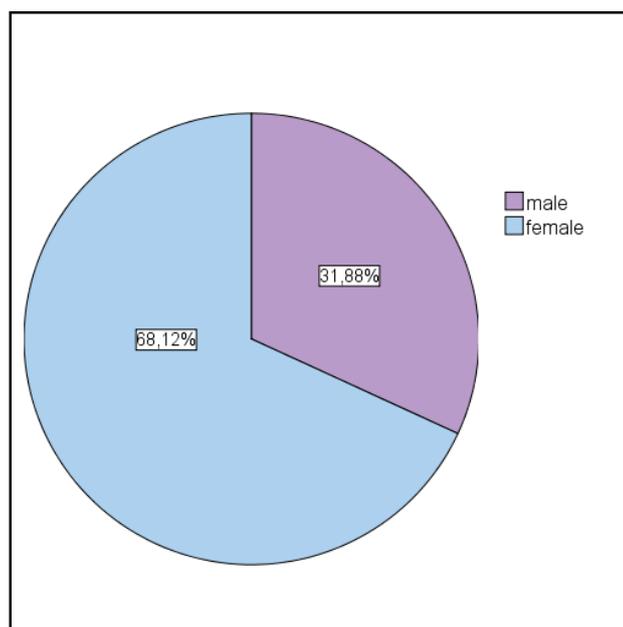


Figure 4: Distribution of the medicinal plants use frequency by sex

These results confirm the data obtained by other ethnobotanical works that have done nationally Mehioui *et al.*, [9] and Benkhniqie *et al.*, [14] in the Amsittène forest (Province of Essaouira) and the region of Mechraâ Bel Ksiri (Region Gharb Morocco) respectively. We find that women are the bearers of traditional phytotherapeutic knowledge.

According to the educational level

The vast majority of users of medicinal plants are illiterate, with a percentage of 46.38%. Relatively, this high percentage is correlate directly with education's level of the local population.

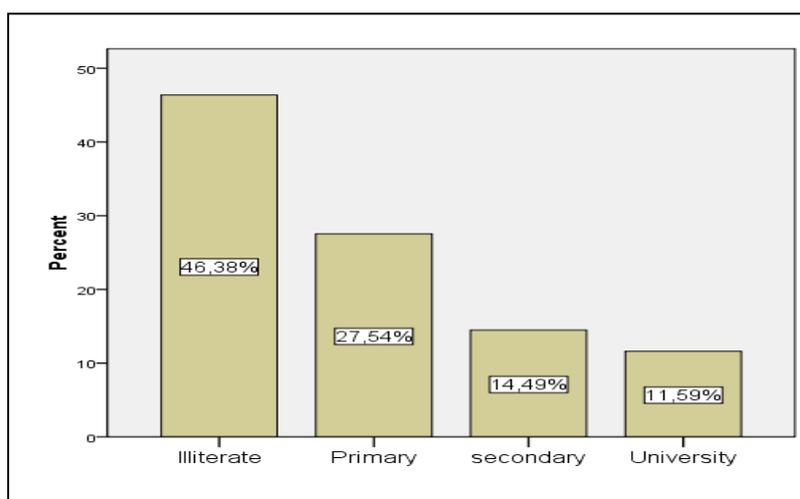


Figure 5: Distribution of the frequency use of medicinal plants according to the educational level

Persons with primary level of study have a significant percentage of use (27.54%) of medicinal plants, whereas those with a secondary and university studies, make very little use of medicinal

plants (14.49% and 11.59% respectively) (Figure 5). This is related to illiteracy rate which is generally high in the region, particularly in rural areas, certainly linked also to family poverty, geographic isolation and the weakness of transport's means and bad infrastructure.

Medicinal species inventoried in the province of khenifra

Floristic analysis

The floristic analysis of medicinal plants inventoried during our study, has identified 71 species species belong to 37 families 61 genuses. 67 species that belong to the branch of the angiosperm which was divided between the monocotyledonous and dicotyledonous and four species belongs to the branch of gymnosperm represented by three species from the Cupressaceae's and one other species from Pinaceae's family (Appendix II).

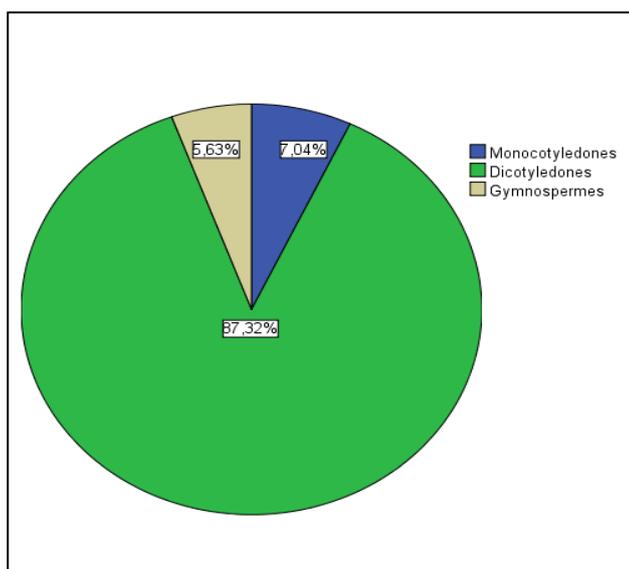


Figure 6: Classification of species according to their branches

Dicotyledons dominate with 62 species, or 87.32%. Whereas, Monocotyledons are represented only by 5 species or 7.04 % , and Gymnosperms by 4 species, or 5.63 %.

Distribution of species according to families

We identified 71 medicinal species belonging to 37 families. These, the most represented in traditional medicinal plants in the study areas are the Lamiaceae (18.31%); Asteraceae (12.68%); the Caryophyllaceae and Rosaceae (5.63%), and finally the Cistaceae and Cupressaceae (4.23%), Figure 7.

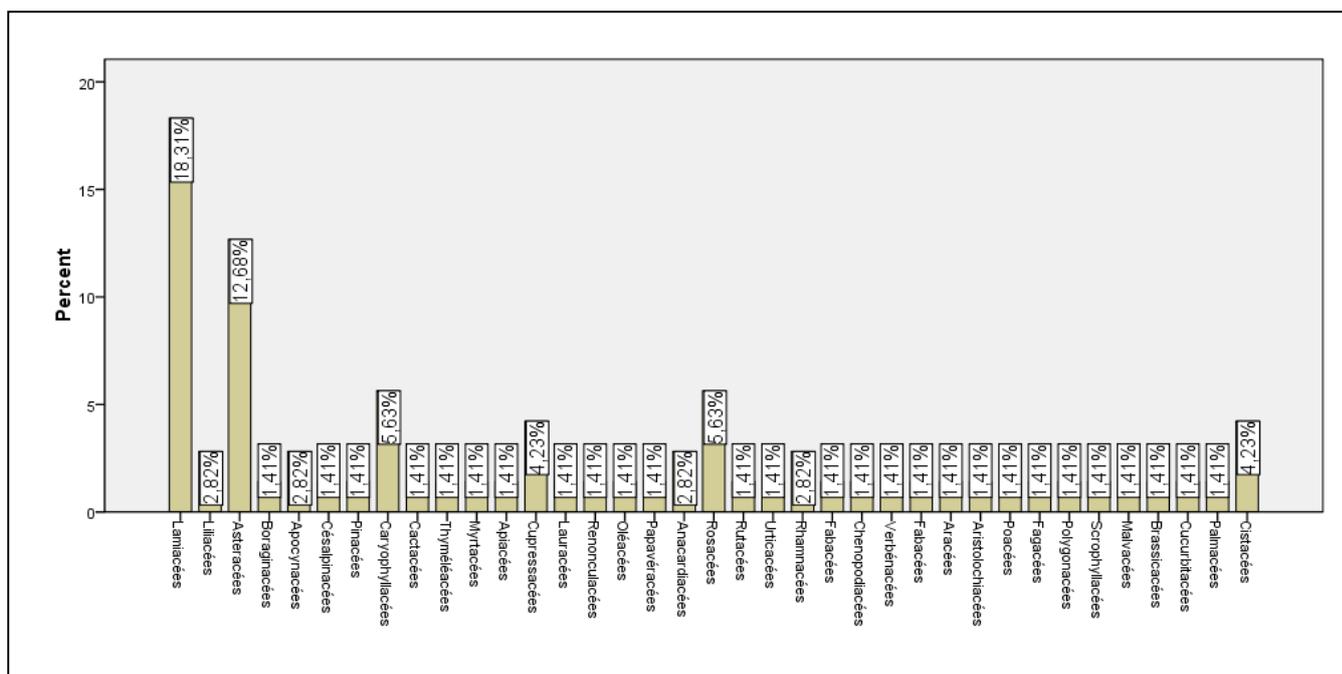


Figure 7: distribution of plants according inventoried families

The Lamiaceae and Asteraceae are the two most represented families and are in first and second place in the study areas.

Medicinal plants with very frequent use

Following the results obtained in our survey (Figure 8) ten medicinal plants are the most used in rural studied communities, they are ranked in descending order of importance for use: *Thymus spp*, *Tetraclinis articulata*, *Origanum spp*, *Caralluma europaea*, *Mentha suaveolens*, *Mentha pulegium*, *Pistacia atlantica*, *Salvia officinalis*, *Rosmarinus officinalis* and *Lavandula spp*.

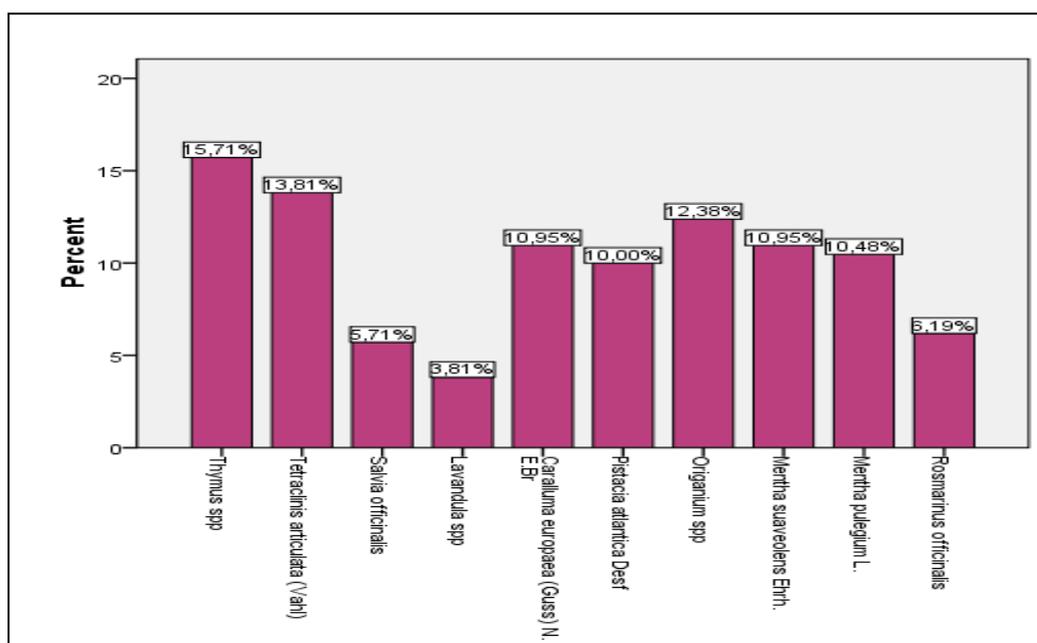


Figure 8: medicinal plants with frequent use

We find that, *Thymus* spp, is the species most used by the survey population. By comparing this study with one conducted by Mehdioui *et al.*, [9] in the municipality of Imin'Tlit (Province of Essaouira), they have chosen the ten most used species, including: *Titraclinis articulata*, *Thymus subsp zygis gracilis (boiss)* R.Morales and *lavandula* spp that is a common species in our study.

Another study by Benlamdini *et al.*, [15] in the eastern High Atlas (High Moulouya) which selected the most used 11 species and those which are identified as common species are: *Rosmarinus officinalis*, *Mentha pulegium*, *Origanum* spp, *Mentha suaveolens*, *Lavandula* spp

The use of medicinal plants in care diseases

Medicinal plants and therapeutic treatments

The analysis of the condition treated traditionally leads to the knowledge of traditional treatments performed, (figure 9) shows the percentage of the distribution of treated pathologies. The results show that most of the plants involved in the treatment of digestive disorders (23.92%), followed by metabolic disorders (14.12%), respiratory diseases (13.83%), dermatological conditions (12.97%), genitourinary diseases (9.51%) and musculoskeletal diseases (8.65%), neurological disorders (7.20%), cardiovascular diseases (0.58%). As for other diseases (renal, viral, hepatitis, cancer,) noted in the graph, represent 9.22%.

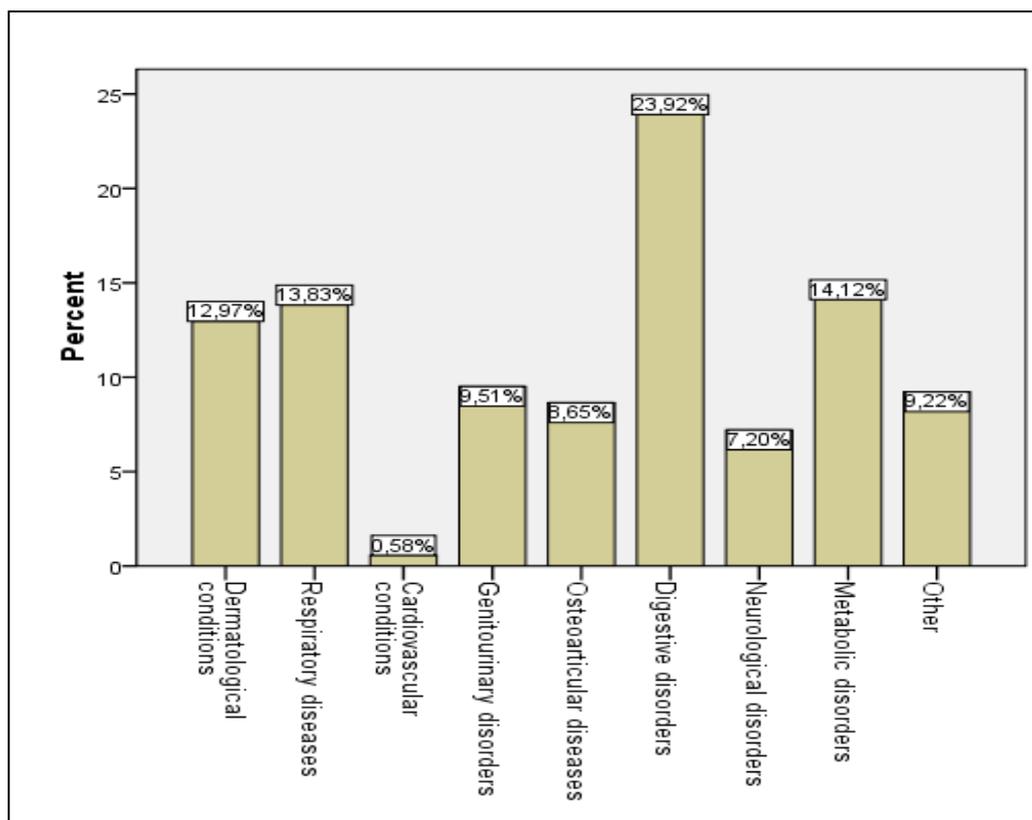


Figure 9: Distribution of the different uses of medicinal plants in the treatment of diseases

Our results show that digestive diseases occupy the first place in the use of medicinal plants, there are similar to those obtained by Lahsissène *et al.*, [16] in the area of Zaer and Hseini *et al.*, [17] in the area of Rabat.

In fact, some species are used to cure many diseases, for example *Thymus subsp zygis gracilis* that is used against diseases of the digestive, metabolic and skin, according to the surveyed population *Tetraclinis artciulata* (Vahl) is used against all diseases, and these results justify the particular pressure on these plants.

Used parts of medicinal plants

The analyzes of our survey in the four study areas, concluded that the leaves are the most used part with a percentage of 52.74% (Figure 10); followed by the entire plant (19.31%), flowers (16.43%), fruits (6.63%), Roots (2.59%), bark (1.44%), seeds (0.58%) and the stem with a small percentage (0.29%).

These results are consistent with those obtained by Tahiri *et al.*, [18] in the region province of Settat, who report that the leaves made the most used part. The high frequency of use of leaves can be explained by the ease and speed of harvesting [19] but also by the fact that they are the site of photosynthesis and sometimes storage of secondary metabolites responsible for properties biological plant [20]. But we noticed on the ground that users tend to pull the whole plant instead of focusing solely on the part they wish to operate (mainly leaves). Knowing that there is a clear relationship between the used part of the operated plant and the negative effects of this operation on its existence [21]. This method of picking compromises the sustainability of medicinal species in the region which may lead to the degradation of our natural heritage.

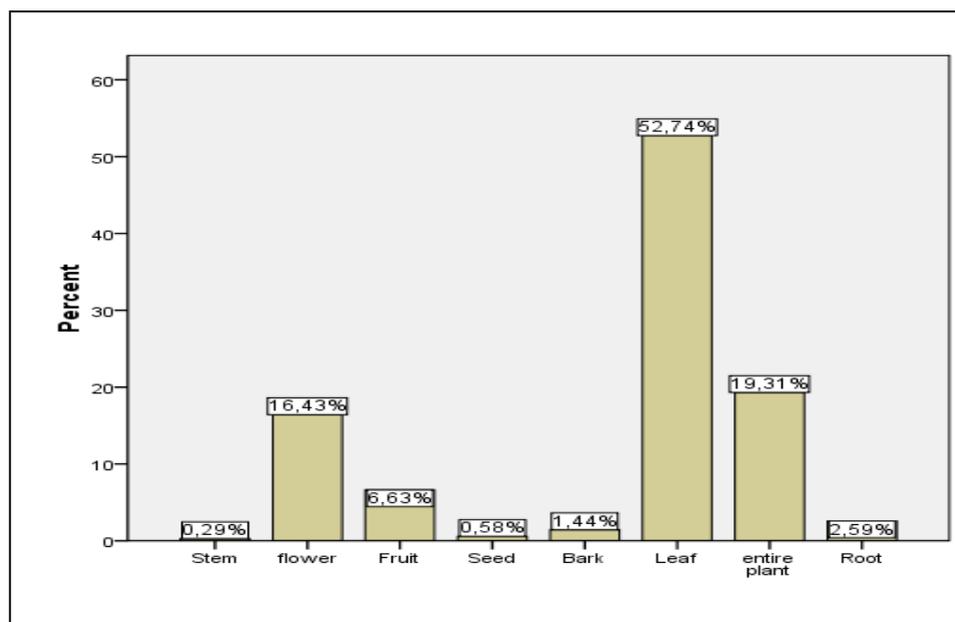


Figure 10: Distribution of the various parts medicinal plants used

Method of Preparation

The administration of medicines is done either by internally way (infusion, decoction, extract, hydrosol, etc.) or externally way (cataplasm, liniment, plaster, etc.), it really depends on the chemical nature of active substances and the degree of their toxicity. It assume that a plant may have internal and external use.

In this study decoctions and infusions are the most common method of preparation with rates 68.59% and 12.68% respectively, followed by fumigation (4.03%), cataplasm (0.86%). The other modes namely: powder, maceration, cooked, raw, distempering and essence are represented by a cumulative rate of 13.83% (Figure 11).

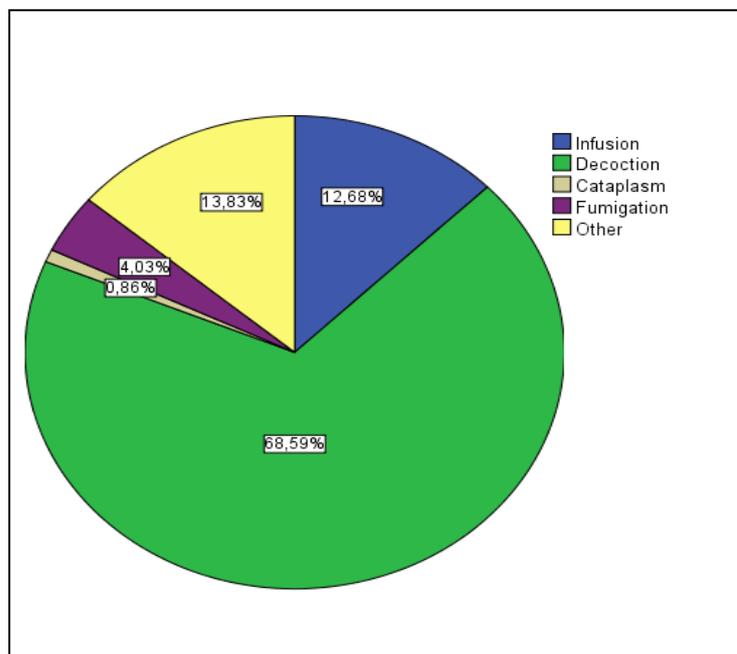


Figure 11: Distribution of different preparation methods of treatment plants

Indeed, the decoction is recovered the more active principles and reduces or cancels the toxic effect of certain revenues. This result is consistent with the result of ethnobotanical study of medicinal plants produced in the city of Kenitra by Salhi *et al.*, [22].

Administration modes

The main mode of administration is oral with a percentage of 80.98% followed by massage with a percentage of 9.80% and rinse (9.22%) (Figure 12).

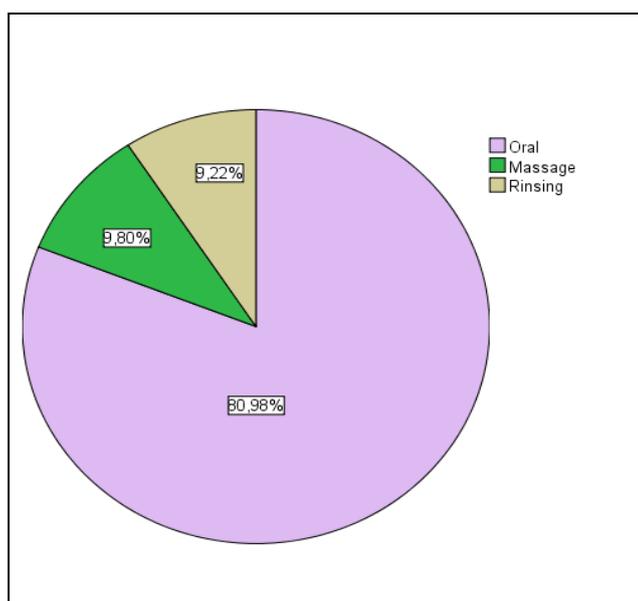


Figure 12: Distribution of different administration methods of treatment plants

Dose used

95.39% of users of medicinal plants in these four areas use them with no precise dose. Only 4.61% of the population use medicinal plants with specific dose (Figure13).

In fact, the dose is still random, which is manifested by harmful health effects. It said "no substance is poison itself, it is the dose that makes the poison"[14].

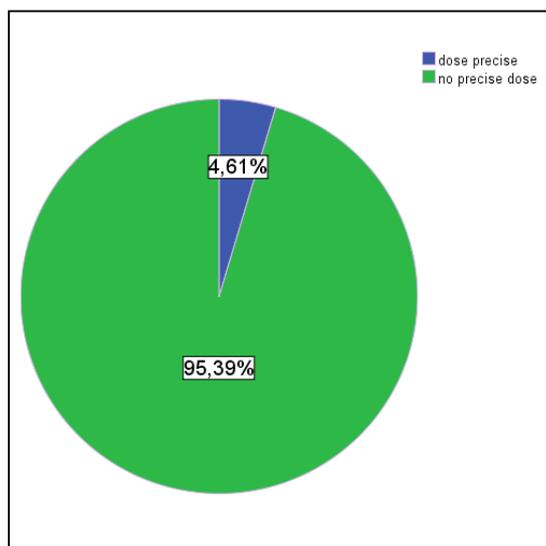


Figure 13: dose used

Prescription use of medicinal plants

48.41% of the population use the aromatic and medicinal plants based on the experiences of others, or the relative transmission of traditional practices from one generation to the other followed by 27.67 % of the population seeking information from herbalists, then 14.41 % turn to themselves, also 8.93 % consult of the people visual emissions and 0.58% of the population rely on books and specialized training in the field (Figure14).

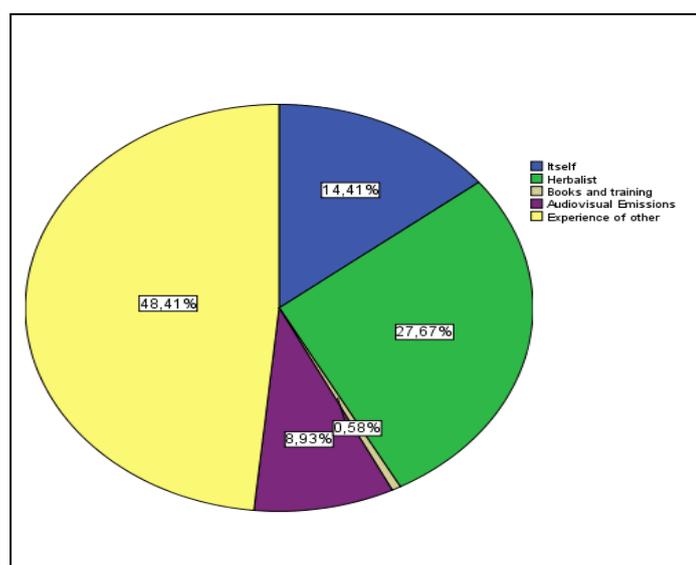


Figure 14: The source of the information

Care outcomes

76.67% of the populations believe that medicinal plants provide improved health 13.33% of the surveyed populations believe that medicinal plants help healing from the treated diseases. While 10.00% of the local population do not trust the medicinal aromatic plants, and believe that the medicinal aromatic plants are ineffective and can cause serious toxicity to the consumer states (Figure 15).

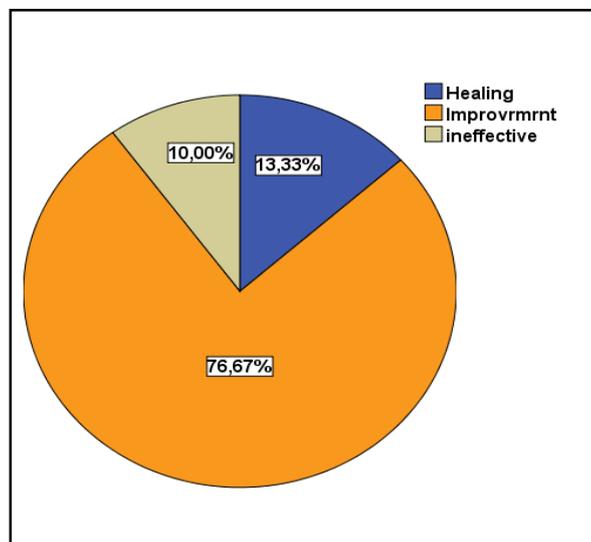


Figure 15: Care Results

CONCLUSION

This study allowed us to show that despite the revolution of modern medicine, traditional medicinal plants has a relative importance in the health system in Khenifra's area and this is confirmed by the use of medicinal plants in the therapeutic field.

The results showed that medicinal plants are related to the profile of respondents. Thus, older people generally know the names and usefulness of the majority of plant compared to youth. Women and men have the knowledge and share expertise in medicinal plants, with a slight advantage for women, all ages can be cured by medicinal plants with a predominance for people aged above 60 years, the most part used is the leaves followed by the whole plant, decoction is the essence of preparing recipes in medicinal plants traditional, the precise dose to make these recipes remains uncertain. In addition, the distribution of medicinal plant use frequency according to the group of diseases treated showed that digestive diseases are the main therapeutic indications with a percentage of 23.92%. Moreover, information about the use of medicinal plants is passed from one generation to another and the majority of the populations are based on the experiences of others. The floristic analysis of the results of this study identifies 71 medicinal species belonging to 37 families and 61 genera with a predominance of lamiaceae (13) and Asteraceae (9), 10 plants are the most used by the population.

This study allowed to enjoy and know the traditional practices used by the population of the Khenifra province, can also be a source of information contributing to knowledge of medicinal flora.

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REFERENCES

- [1] Beloued. plante médicinale d'Algérie. **2001**.
- [2] J.R.S .Tabuti; K.A. Lye; S.S. Dhillion. *Ethnopharmacology*, **2003**, 88, 19-44.
- [3] P. I. Penchev. Étude des procédés d'extraction et de purification de produits bioactifs à partir de plantes par couplage de techniques séparatives à basses et hautes pressions, doctoral thesis- University Toulouse, **2010**.
- [4] A .Quyuu. Mise au point d'une base de données sur les plantes médicinales. Exemple d'utilisation pratique de cette base, doctoral thesis. University Ibn Tofail. Kénitra, Morocco, **2003**, 110 .
- [5] M.Fennane. Proposition de zones importantes pour les plantes au Maroc (ZIP Maroc), Institut scientifique Rabat, **2004**, 25.
- [6] A.M. Scherrer; R .Motti; C.S. Weckerle. *Ethnopharmacology*, **2005**, 97, 129-143.
- [7] M. Hmamouchi ; A .Agoumi. Place des plantes médicinales dans le système de santé au Maroc, Prem. Congr. Int. Plant. Méd. phytothérapie. 1st Congr. Intercont, Tunis, **1993**.
- [8] M .Rejdali. La flore du Maroc état actuel et perspectives de conservation. diversité biologique et valorisation des plantes médicinales, Actes Edition, **1996**, 17-22.
- [9] R .Mehdioui ; A. Kahouadji, Bulletin de l'institut scientifique Rabat. section science de la vie, **2007**, 29, 11-20.
- [10] A. Daoudi ; S. Zerkani ; L. Nassiri ; M. Boukil ; J. Ibjibijen, , Science lib. Editions mersenne, **2013**, 5, Issn 2111-4706.
- [11] DPA. Monographie régionale, Direction Provinciale d'Agriculture, Khénifra, **2013**.
- [12] S. Kahouadji. contribution à une étude ethnobotanique des plantes médicinales dans le Maroc oriental, doctoral thesis 3rd cycle, University Mohamed I, OUJDA, **1995**, 220.
- [13] J. Bellakhdar. la pharmacopée marocaine traditionnelle, Médecine arabe ancienne et savoirs populaires, ibis press, Paris, **1997**, 764.
- [14] O. Benkhniq ; L. Zidane ; M. Fadli ; H. Elyacoubi ; A. Rochdi ; A. Douira, *Barcelona Acta Bot. Barc*, no.53, **2011**, 191-216, .
- [15] N. Benlamdini ; M. Elhafian ; A. Rochdi ; L. Zidane, *Journal of Applied Biosciences*, **78**, **2014**, 6771 – 6787.
- [16] H. Lahsissène ; A. Kahouadji ; M. Tijane ; S. Hseini., *Lejeunia*, 186, **2009**, 1-27 .
- [17] S. Hseini ; A. Kahouadji ; H. Lahsissène ; M. Tijane . *Lazaroa*, no.28, **2011**, 93-100.
- [18] N. Tahri ; A. Elbasti ; L. Zidane ; A .Rochdi ; A .Douira. **2012**, 192-208.
- [19] M. Bitsindou. Enquête sur la phytothérapie traditionnelle à Kindamba et Odzala (Congo) et analyse de convergence d'usage des plantes médicinales en Afrique centrale, Mem. Doc (inéd.). University. Libre of Bruxelles, **1986**, 482.
- [20] M.J. Bigendako-Polygenis ; J. Lejoly, “La pharmacopée traditionnelle au Burundi. Pesticides et médicaments en santé animale”, Pres. University. Namur. Pp., **1990**, 425-442.
- [21] A.B. Cunningham. Peoples, parc et plantes. Recommandations pour les zones à usages multiples et les alternatives de développement autour du parc national de Bwindi Impénétrable, Ouganda. Documents de travail Peoples et Plantes. no 4, UNESCO. Paris, **1996**, 66.
- [22] S. Salhi ; M. Fadli ; L. Zidane ; A. Douira, *Lazaroa*, **2010**, 31, 133-146.

Appendices

Appendix I: Questionnaire sheet on the uses of medicinal plants

Informants details

Gender: Female Male Age : <20 ; 20 et 30 ; 30 et 40 ; 40 et 50 ; 50 et 60 ; >60 .Level of education: No school Primary High school University

Location/Residence:

Are you a user of medicinal plants ?

Yes ; No ; if yes then response the next questions:

Your choice of using herbal remedy is based on:

yourself ; books and formations ; herbalist ; Books ; Based in experience of the others ; in audiovisual shows

the medicinal plants used by informants

Did you know about the existence of any toxic plants in the region ?please specify:

.....
According to the following data complete Table 1:

Type of Disease treated

1-dermatological affections; 2-respiratory affections; 3-cardiovascular affections; 4 -genitourinary disorders; 5-musculoskeletal disorders; 6-metabolic disorders ; 7-digestive system disorders ; 8-neurological affections; 9- others.

Preparation method(s): 1 -Infusion ; 2- Décoction ; 3-Cataplasm ; 4- Fumigation ; 5-others:.....

Part(s) of plant used : 1-stem; 2-Flower; 3- Fruit; 4-Seed; 5-bark; 6-leaf; 7 full-Plante; 8- Root

Dose used: - 1-specific dose; 2- dose not precise

Results: 1- healing, 2-improving, 3- ineffective

Administration form (s) : 1- Oral, 2-Massage, 3-Flushing

Others applications : 1- Therapeutics; 2- Cosmetics; Veterinary Medicine-3;

Table 2: aromatic and medicinal plants

The plants used	Type of diseases	Part(s) of plant used	Preparationmethod(s)	Dose used	Administration form (s)	Diagnostic by	Résults	Others applications

Appendix II: list of medicinal and aromatic plants inventoried

N°	Scientific name	local name	family
01	<i>Ajugaiva (L.) Schreber</i>	ThifTalba	Lamiaceae
2	<i>Ammi visnaga</i>	Bchnikha	Apiaceae
03	<i>Anacyclus pyrethrum</i>	Ignes	Asteraceae
04	<i>Anacyclus radiatus lois</i>	Barkouks izghar	Asteraceae
05	<i>Anagyris foetida L</i>	Ofni	Fabaceae
06	<i>Anchusa italica Retz</i>	Lsan tour	Boraginaceae
7	<i>Arbutus unedo L</i>	asasno	Ericaceae
08	<i>Aristolochia paucinervis Pomel</i>	Barztam	Aristolochiaceae
09	<i>Artemisia herba-alba</i>	Chih	Asteraceae
10	<i>Artimisia arborescens L</i>	Chiba	Asteraceae
11	<i>Arundo donax</i>	Aghanime	Poaceae
12	<i>Asphodelus macrocarpusParl.</i>	Inghri	Liliaceae
13	<i>Brynia dioica Jacq</i>	thamnayt	Cucurbitaceae
14	<i>Calendula arvensis L.</i>	jamra	Asteraceae
15	<i>Caralluma europaea (Guss.) N.E. Br.</i>	Daghmous	Apocynaceae
16	<i>Cedrus atlantica</i>	ithgal	Pinaceae
17	<i>Ceratonia siliqua L.</i>	Thislighwa	Cesalpiniaceae
18	<i>Chamaemelum fuscatum (Brot.) Vasc</i>	Barkokch Izgar	Asteraceae
19	<i>Chamaerops humilis L</i>	thiguzdan	Palmaceae
20	<i>Chenopodium ambrosioides</i>	Mkhinza	Chenopodiaceae
21	<i>Cistus ladanifer .L.subsp africanus</i>	thozzal	Cistaceae
22	<i>Cistus salviifolius L</i>	Thozzal	Cistaceae
23	<i>Cistus villosus L</i>	Rbibit	Cistaceae
24	<i>Corrigiola telephiiifoliaPourret</i>	Thawsarghine	Caryophyllaceae

25	<i>Crataegus monogyna</i>	Admam	Rosaceae
26	<i>Daphne gnidium L.</i>	Arzaz	Thymeleaceae
27	<i>Eucalyptus globulus</i>	klitous	Myrtaceae
28	<i>Foeniculum vulgare, syn.</i>	Lbsbas barri	Apiaceae
29	<i>Herniaria hirsuta L.</i>	Herrast lahjar	Caryophyllaceae
30	<i>Juniperus oxycedrus L.</i>	thakka	Cupressaceae(Gy)
31	<i>Juniperus thurifera</i>	Araar	Cupressaceae
32	<i>Lactuca serriola L.</i>	Assafar n'essam	Asteraceae
33	<i>Laurus nobilis</i>	Wraq sidnamousa	Lauraceae
34	<i>Lavandula multifida L.</i>	Thazoul ighial	Lamiaceae
35	<i>Lavandula stoechas L subsp. atlantica Br.-Bl. (E)</i>	Izri	Lamiaceae
36	<i>Malva sylvestris L</i>	elbakkoul	Malvaceae
37	<i>Mantisalca salmantica L</i>	thazmourth	Asteraceae
38	<i>Marrubium vulgare L</i>	Morro	Lamiaceae
39	<i>Mentha pulegium L.</i>	Fliou	Lamiaceae
40	<i>Mentha suaveolens Ehrh.</i>	Thimarssad	Lamiaceae
41	<i>Muscari comosum</i>	Basila	Liliaceae(M)
42	<i>Nastrutium officinalis R.Br</i>	gurnouch	Brassicaceae
43	<i>Nerium oleander L.</i>	Alili	Apocynaceae
44	<i>Nigella damascene L.</i>	Zanouj	Renonculaceae
45	<i>Olea europaea L. subsp. Oleaster (Hoffmanns. & Link) Negodi</i>	Azmour	Oleaceae
46	<i>Opuntia fucus india Mill</i>	Krmous,lhndia	Cactaceae
47	<i>Origanum spp</i>	Zatar	Lamiaceae
48	<i>Origanum majorana.L</i>	Marddouch	Lamiaceae
49	<i>Papaver rhoeas L.</i>	Bennaamane	Papaveraceae
50	<i>Pistacia atlanticaDesf.</i>	Ij , labtam	Anacardiaceae
51	<i>Pistacia lentiscus L.</i>	Trou	Anacardiaceae
52	<i>Quercus ilexsubsp.rotundifolia</i>	thasft	Fagaceae
53	<i>Rhamnus alaternus</i>	amlilse	Rhamnaceae
54	<i>Rosa damascena</i>	Lward	Rosaceae
55	<i>Rosa sempervirens L.</i>	Thikhfarth	Rosaceae
56	<i>Rosmarinus officinalis</i>	Assir	Lamiaceae
57	<i>Rubus ulmifolius Schott</i>	Thabgha	Rosaceae
58	<i>Rumex bucephalophorus L</i>	thismmamine	Polygonaceae
59	<i>Ruta montana (L.) L</i>	Iwarmi	Rutaceae
60	<i>Salvia officinalis</i>	salmia	Lamiaceae
61	<i>Salvia verbenaca L.</i>	Asafar l'afith	Lamiaceae
62	<i>Scolymus hispanicus L</i>	thagdiwt	Asteraceae
63	<i>Silene vulgaris (Moench) Garcke</i>	Thighighet	Caryophyllaceae
64	<i>Tetraclinis articulata (Vahl) Masters</i>	A Araar	Cupressaceae(Gy)
65	<i>Teucrium polium L.</i>	Jaada	Lamiaceae
66	<i>Thymus zygissubsp gracilis (boiss) R. Morales</i>	Adouchen	Lamiaceae
67	<i>Trigonella foenum-graecum.</i>	Lhalba	Fabaceae
68	<i>Urtica membranaceaPoiret</i>	Thissarkmaz	Urticaceae
69	<i>Verbena spp</i>	Lwiza	verbenaceae
70	<i>Veronica anagallis-aquatica</i>	Naanaari	Scrophulariaceae
71	<i>Ziziphus lotus (L.) Lam.</i>	Azguar	Rhamnaceae