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Ethnobotanical study of medicinal plants in Ifran's National Park (Morocco)

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Abstract
An ethnobotanic study of medicinal plants had been realized in Ifrane's National Park in Morocco. This Park, which presents a forester massif offering great amplitude in the field of the forest ambiance, undergoes strong pressures of overexploitation of space and resources. It is consequently the seat of important dynamic degradations. The demographic evolution, the analphabetism, the poverty, the irrational exploitation, the overgrazing are still the main factors of the degradation of these natural ecosystems. This study had permitted also to constitute a catalog of medicinal plants which are exploited in this zone and to describe their medicinal uses at the local scale and based on the local Known-how. The survey led with the local population (individual, households, collectors, herbalists/chemists) had permitted to identify 46 medicinal plants used in traditional pharmacopeia, of which 89% are spontaneous species. It shows also that among the 23 plant families encountered, only 9 are the most spread, comprising 32 species among a total of 46, a rate of 69.6%. The diseases object of the care in the basis of plants species identified, concerning in particular the digestive systems (33%), respiratory (16%) and circulatory (14%), the skin (17%) and rheumatism (14%). This study also had allowed to notice that leaves constitute the most used parts and that the mode of the most frequent preparation in the therapeutic treatment is the decoction. It also comes out from it that the conservation and the sustainable management of the medicinal species identified should be ensured through a management plan.

*Keywords***:** National Park of Ifrane, Ethnobotanic, Medicinal plants, Traditional pharmacopoeia, Floristic diversity, Ecosystems.

Introduction

The particular geographical position of Morocco confers to it a great bioclimatic variety and especially a remarkable floristic diversity. Indeed, nearly 4200 species and subspecies of vascular plants, subdivided in 130 families and 940 genders are listed. Among the totality of identified plants, 800 species are endemic, offering an endemism rate of 20%[1-3]. On the other hand, the Moroccan medicinal flora is little known and does not exceed 600 species, let be approximately a rate of 13.3 % of the total flora [4].

So as to conserve and manage sustainably the biodiversity, Ifrane's National Park (INP) which is situated on the occidental portion of the Central Middle Atlas, was created in 2004 on an surface of 53 000 ha, and then extended to 125.000 ha in 2008. The final objective was to preserve the quasi-whole lot of the Atlas cedar forest, symbol type species of the Mediterranean region which represents an ecosystems of world importance. This one constitutes the greatest Moroccan forest amplitude (1/4 of the world Atlas cedar space and 1/3 of that of Morocco).

The INP offers a rich and diversified vegetal and animal biodiversity [5]. The inventory of biodiversity shows that the rates of the INP contribution to the national biodiversity are important (**Figure 1**).

The area of INP knew an overexploitation of firewood and overgrazing pressure of its natural resources causing, therefore, important degradations in terms of biodiversity, pastoral resources and forest space. Four main principal action lines have been defined in the management plan of this Park : the biodiversity conservation and the ecosystem conservatory management, environmental education program, the natural and cultural patrimonies valorization and the natural resources sustainable management [5].

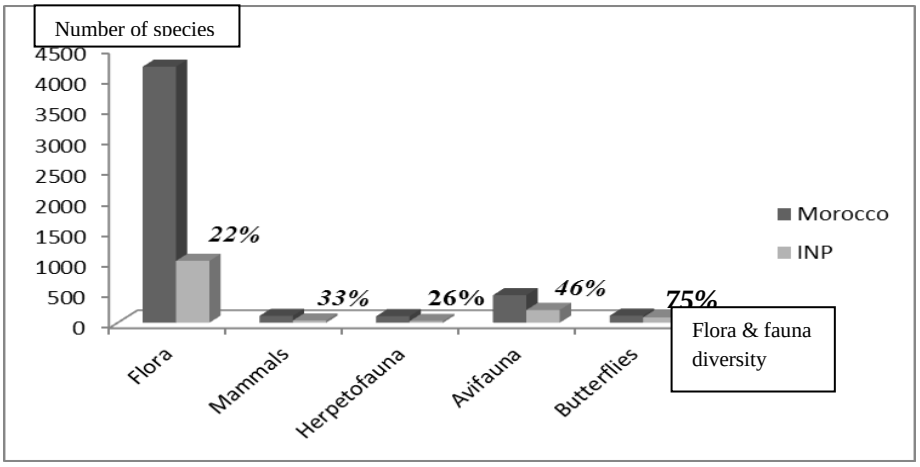

Figure 1: Graph showing the vegetal and animal diversity of INP and its contribution at the Moroccan's national scale

The bibliographic study shows that several floristic and ethnobotanic studies were led in different Moroccan regions, among them :
- Contribution to an ethnobotanical study of medicinal plants in Oriental Morocco [6];
- The traditional Moroccan pharmacopoeia, ancient Arabic medicine and popular knowledge [7];
- Ethnobotanical study, phytochemical and pharmacological of aromatic and medicinal plants of Tafilalt [8];
- Ethnobotanical study of medicinal flora in Rabat's region (Western Morocco) [9];
- Ethnobotanical study of medicinal plants in Tafilalet's region, Moroccan southeast [10].

The present work which has for objective to complete the previous works by an ethnobotanic study of the medicinal plants of Ifrane's National Park, consists of an inventory of the botanical species picked in the zone of study, their botanical identification as well as the description of their uses in traditional medicine by the local population. It also fixes as a goal to show the ecological impact of the overexploitation of these species on the environment.

2. Description of the study area

2.1. Ifrane's National Park

The zone of study is located inside the limits of the National Park of Ifrane which occupies the altitudinal fringe between 1300 m (Forest of Jaaba) and 2440 m (Peak of Jbel Ij). It extends over a surface about 125 000 ha, among which 83 % of the total surface of the INP is occupied by forests (**Figure 2**) [5].

This entire area forms the Central Middle-Atlas which is distinguished by the presence of a structural context variety. It constitutes a Moroccan water castle. It is also a forest area by excellence and an extensive grazing area. In this area, the rainfall regime is seasonal of winter type, spring, autumn, summer. A good part of the precipitations falls as snow and drought period is about three months. All stations receive seasonal rainfall far from being neglected.

From the bioclimatic point of view, the Park offers two types of zones, subhumid and humid whose variants are fresh at the average heights, cold on the largest part of the plateau and very cold on the summits of the oriental reliefs.

The Park vegetation is followed according to three steps which vary from the bottom to the top : the mesomediterranean between 1200-1600 m, the supramediterranean zone between 1600-2000 m and the montanomediterranean zone between 2000-2440 m. Regarding its soils, we find four groups : soils on volcanic brown rocks fersiallitics andic, soils on volcanic brown rocks andic, soils on red fersiallitics calcareous rocks and soils on dolomitics pararendzines rocks [11].

2.2. The social and economic aspects

The Park covers almost-entirely the Ifrane province. This province contains eight rural communes which we can divide from a pastoral point of view in one north area (Tizguite, Dayet Aoua, Tigrigra and Ben Smim) and one south area (Timahdite, Sidi El Makhfi, Ain Leuh and Oued Ifrane).

The demographic evolution follows an increasing curve in the province of Ifrane in which the number of inhabitants had been multiplied by 1.8 within the space of 35 years. According to the general census of populations and housing of 2004, the rates of illiteracy of the urban and rural districts of this province are clearly different. They are respectively 36.7% and 54.5% for the men against 58% and 78% for the women [12].

The breeding activity in the zone of the Park takes on a considerable importance as its socioeconomic role as source of main income. The rain fed agriculture constitutes the second activity of the population of this area. Cultivated surface is subdivided between cereals (60%), the fruit cultivation (5%) and the truck farming (2%) [13].

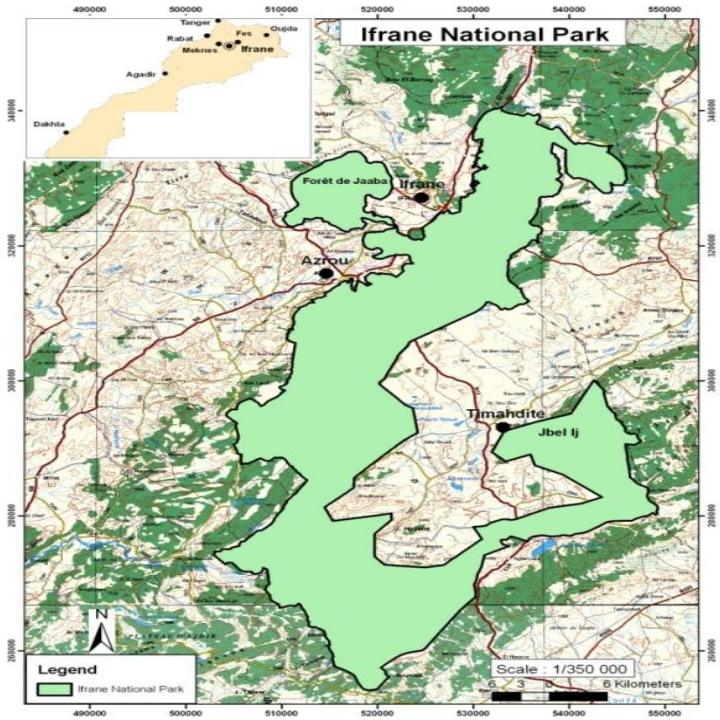

Figure 2: Geographical situation of Ifrane's National Park (The Moroccan map is in the insert)

3. Materials and methods

The ethnobotanic study of medicinal plants within the INP has for objectives, in particular the identification of species which make the object of a harvest by the local population and the knowledge of their traditional medicinal uses, inherited and experimented by numerous generations.

In order to collect the data regarding the medicinal use of these plants, an survey was conducted with the local population working in the aromatic and medicinal plants field (AMP), in the different municipalities of the Park according to random sampling (**Figure 3**).

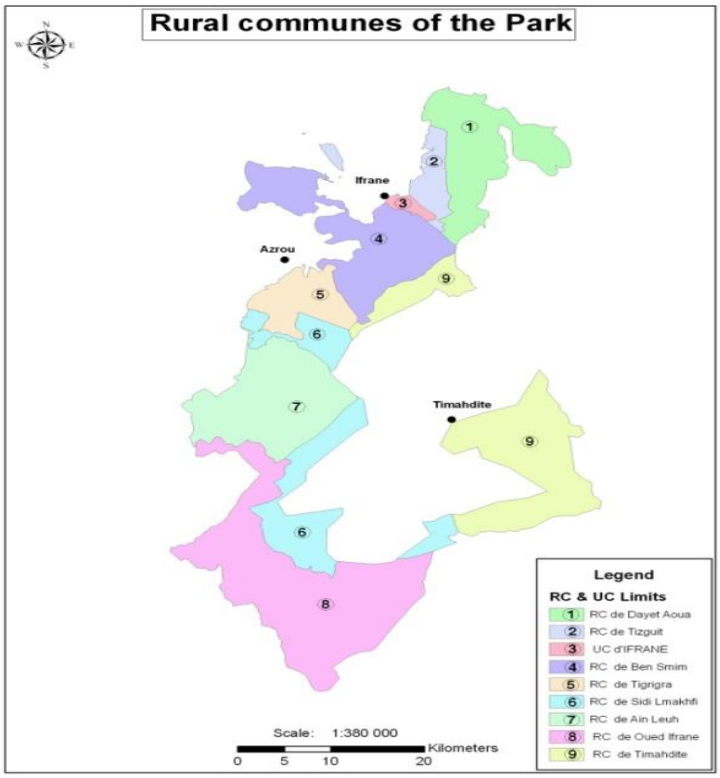

Figure 3: Rural communes of Ifrane's National Park

This survey consisted to fill in index forms containing a pre-established questionnaire (**Annex I**). It permitted to realize 216 interviews with elderly between approximately 20 and 60 years. The collected data contain detailed information on the investigated (age, study level, family situation and income) and on the exploited plant (vernacular name, usage part, sale prices, medicinal usages and preparation mode).
On the other hand, the botanical identification of listed plants in the Park was realized under a botanist control, Dr Aafi Abderrahman from the Forestry Research Center / High Commission for Water, Forest and Fight against Desertification (Morocco).

4. Results and discussion

The ethnobotanic investigation with the population of eight municipalities of the INP was led during June and July 2012. It was completed in 2013 by the floral analysis of the listed medicinal plants (constitution of a herbarium and its botanical identification). This study has permitted to obtain information on the investigated profile working in the field of AMP (age, sex, educational level, family situation) and on exploited medicinal plants in the zone of study (floral analysis, origins, therapeutic treatments, used parts, preparation mode, marketing). A synthesis of the results of this study is presented at the end of this article as an index.

4.1. Use of medicinal plants according to the profile of the investigated

4.1.1. According to the age

The results of the survey (**Figure 4**) show that the use of medicinal plants concern all age groups. However, we notice that this use increases with age of the investigated. This result is similar to those obtained by ethnobotanical studies realized in other Moroccan regions [14-15].
This trend can be explained by the fact that traditional know-how accumulated in the course of generations. The overexploitation of the vegetal resources noticed, which had led to the loss of information on medicinal plants, as well as the increase in the modern medicinal confidence for the new generations can be the main reasons that may also explain this evolution.

4.1.2. According to the sex

This study shows that the interest in medicinal plants in the Park region is almost fairly equal shared between men and women, with however a slight increase for men (**Figure 5**).

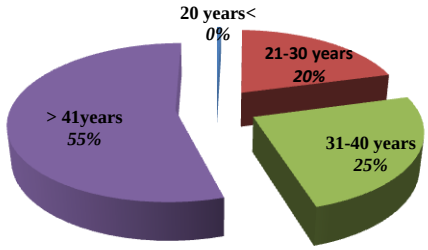

Figure 4: Distribution of the frequency of medicinal plants use by age group

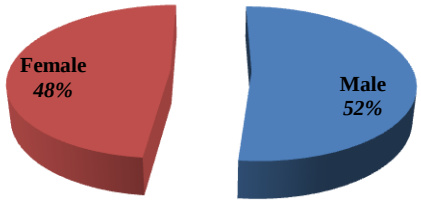

Figure 5: Distribution of the medicinal plants use frequency by sex

4.1.3. According to the educational level

The use of medicinal plants in the area of study concerns all educational levels, from the illiterate to the academic scholar (**Figure 6**). This use drastically decreases with the level of study; illiterate grabbing the largest part. This result is compatible with the last general census of the populations and the housing in Morocco (2004) which showed that the rate of illiteracy was 36.7% for men and 58% for women in the urban zones, while it is respectively 54.5% and of 78% in rural areas [12]. This situation influences the local development of the AMP sector by putting in danger the vegetal resources of the region through an excessive exploitation and the use of traditional practices which do not respect the sustainable management.

4.1.4. According to the family situation

The frequency of the usage of these vegetal resources depends on the family situation of the population (**Figure 7**). However, the majority of the investigated (69%) are constituted by married people. This situation could be connected with the low life level of people and with the imposed charges by the families living conditions.

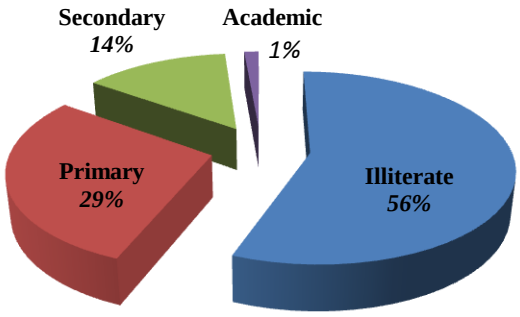

Figure 6: Distribution of the frequency use of medicinal plants according to the educational level

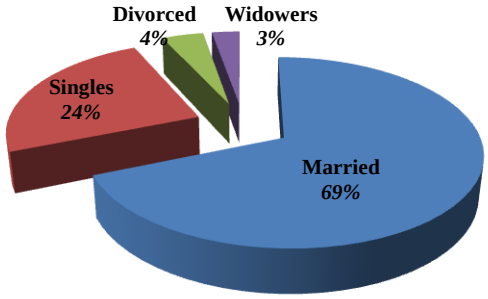

Figure 7: Distribution of the frequency use of plants according to the family situation

4.2. Medicinal plants used in the region of Ifrane's National Park

4.2.1. Floristic analysis

The floristic analysis of the medicinal plants, used by the population in the region of Ifrane's National Park which is identified during the investigation, had permitted to identify 46 species belonging to 23 botanical families (**Table 1**). Only 9 botanical families comprising 32 species are widespread in the area of the Park : Lamiaceae (9), Asteraceae (5), Apiaceae (5) Liliaceae (3), Cupressaceae (2) Rosacea (2) Parmeliaceae (2) Fagaceae (2) and Caryophyllaceae (2).

4.2.2. Use of medicinal plants according to their origin

The ethnobotanical study revealed that medicinal plants used by the local population are in majority spontaneous, a rate of 89%, while the cultivated species represent only 11% of the total (**Figure 8**). These data are consistent with those found in 2006 by an American Agency study for the International Development on AMP at the national scale [16].This result may explain the observed overexploitation of these plants by the local population who used them not only for healing but especially as source of income by marketing them.

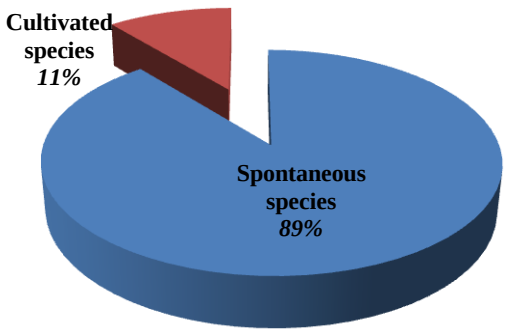

Figure 8 : Distribution of the use frequency of medicinal plants according to their origin

Table 1: Families and species of used plants in traditional medicine by the population of Ifrane's National Park (*the families of the most widespread plants are mentioned with an asterisk* *)

Family	Scientific name of the species	French name	Vernacular name
Anacardiaceae	*Pistacia atlantica* Desf.	Pistachier de l'Atlas	Lebtem
Apiaceae*	*Coriandrum sativum* L.	Coriandre	Qezbor
	Pimpinella anisum L.	Anis vert	Habbet hlawa
	Ammi visnaga L.	Khella	Bechnikha
	Petroselinum sativum Hoffm.	Persil	Ma'adnûs
	Ferula communis L.	Férule	L-klekh
Aquifoliaceae	*Ilex aquifolium* L.	Houx commun	Âbdlisser
Araliaceae	*Hedera helix* L.	Lierre grimpant	Louwaya
Asparagaceae	*Muscari comosum* (L.) Mill.	Muscari à toupet	Bsyla
Asteraceae*	*Anacyclus pyrethrum* L.	Pyrèthre d'Afrique	Tigendast
	Calendula officinalis L.	Souci	Jemra
	Taraxacum obovatum DC.	Pissenlit	Ûdjem
	Cynara humilis L.	Artichaut nain	Timta
	Anthemis nobilis L.	Camomille romaine	Babunj
Caryophyllaceae*	*Corrigiola telephiifolia* L.	Corrigiole à feuilles de téléphium	Sarghîna
	Silene vulgaris (Moench) Garcke	Silène vulgaire	Tighîghecht
Chenopodiaceae	*Chenopodium ambrosoides* L.	Ansérine vermifuge	Mkhinza
Cupressaceae*	*Juniperus oxycedrus* L.	Genévrier oxycèdre	Tâqqa
	Juniperus thurifera L. var. africana	Genévrier thurifère	Tawalt
Fagaceae*	*Quercus faginea* Lamk	Chêne zen	Tacht
	Quercus rotundifolia Lamk.	Chêne-vert	Tassaft
Lamiaceae*	Lavandula pedonculata (Mill).	Lavande pédonculée	Lhalhale
	Mentha suaveolens Ehr.	Menthe à feuilles rondes	Marseta
	Satureja alpina L.	Calament des Alpes	Fliyyo diâl berr
	Thymus algeriensis Boiss. & Rent.	Thym	Z'îtra
	Marrubium vulgare L.	Marrube blanc	Meriwte
	Mentha pulegium L.	Menthe pouliot	Fliyyo dîal mâ
	Mentha gatefossei Maire	Menthe de Gatefossé	Fliyyo dîal jbel
	Origanum compactum Benth.	Origan	Za'tar
	Ocimum basilicum L.	Basilic	Lehbeq
Lauraceae	*Laurus nobilis* L.	Laurier noble	Asa sidna Moussa
Liliaceae*	*Ruscus aculeatus* L.	Petit houx	Bû-chûka
	Asphodelus ramosus L.	Asphodèle rameux	Berwâg
	Allium cepa L.	Oignon	L-besla
Malvaceae	*Malva parviflora* L.	Mauve	Bqûla
Paeoniaceae	*Paeonia corallina L. ssp. maroccana*	Pivoine mâle	Habersis
Parmeliaceae*	*Evernia furfuracea* Mann.	Mousse de cèdre	Tamert numghar
	Evernia prunastri Ach.	Mousse de chêne	Tamert numghar
Papaveraceae	*Papaver rhoeas* L.	Coquelicot	Bela'mân
Pinaceae	*Cedrus atlantica* Manetti.	Cèdre d'Atlas	Îddil
Plantaginaceae	*Plantago coronopus* L.	Plantain corne de cerf	Tamzourte ntikhsi
Rosaceae*	*Rosa canina* L.	l'églantier commun	Tabgha
	Crataegus laciniata Ucr.	Aubépine	Âdmâm
Rutaceae	*Ruta chalepensis* L.	Rue d'Alep	Iwrmi
Thymelaeaceae	*Daphne gnidium* L.	Garou	Âlezzâze
Verbenaceae	*Lippia citriodora* H.B et K.	Verveine odorante	Lwîsa

4.2.3. Medicinal plants and therapeutic treatments

The study of the species of plants listed based on the diseases to be treated allowed classifying them according to the apparatus of the human body for which are intended these therapeutic treatments (**Figure 9**). We notice

that the majority of the used plants are intended for the digestive, respiratory and circulatory apparatus, for the skin and for the rheumatism. The remains of the species serves to treat the diseases of the genital, urinary, auditory apparatus and the nervous and oral system.

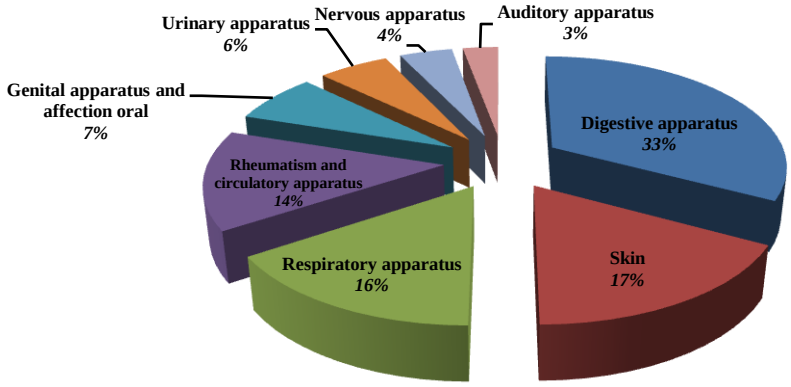

Figure 9 : Distribution of the different uses of medicinal plants in the treatment of diseases

4.2.4. Used parts of medicinal plants

The realized investigation on the medicinal plants of the area showed that the different parts of the plant (leaves, stems, roots, fruits) are used in therapeutic preparations, but with, however, some preference for the leaves (**Figure 10**). We also note that the method of picking practiced by the population is generally not rational, which threatens the survival of the species.

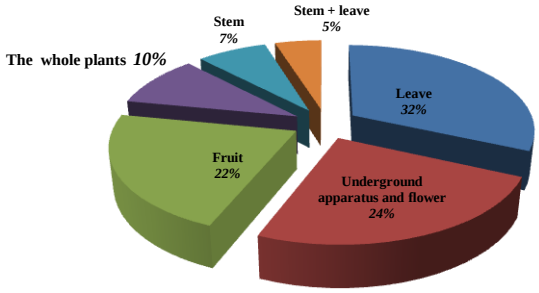

Figure 10 : Distribution of the various parts medicinal plants used

4.2.5. Preparation modes

Several procedures modes are used by the population to put into point the therapeutic preparations (**Figure 11**). However, extractions by infusion or decoction, the use in the form of powder, by poultice or natural remain the most common processes.

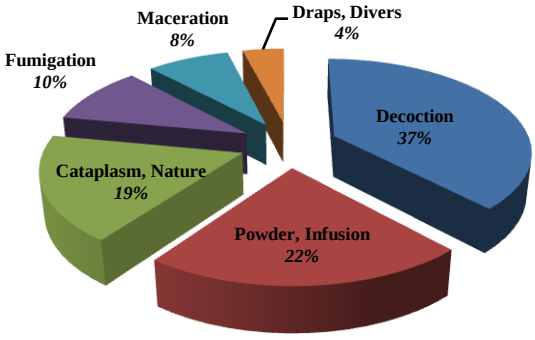

Figure 11 : Distribution of different preparation methods of treatment plants

4.2.6. Commercialization of medicinal plants

The economy of the Park area is mainly based on agriculture rainfall and on traditional breeding. The average per capita income of the inhabitants is of the order of 1500 MAD/month. This difficult economic situation incites certain slices of the population to pick up and marketing in a craft way medicinal plants of the region. The practiced prices (**Figure 12**) are mostly less than 10 MAD/Kg. Only 16% of plants used have a higher price at 31 MAD/Kg. According to this investigation, the price of plants is directly related to their frequency in nature, which is influenced by the extent and the operation mode. Consequently, this study has found that some species are in the process of disappearing, it is the case for example of *Anacyclus pyrethrum* (70 MAD/kg).

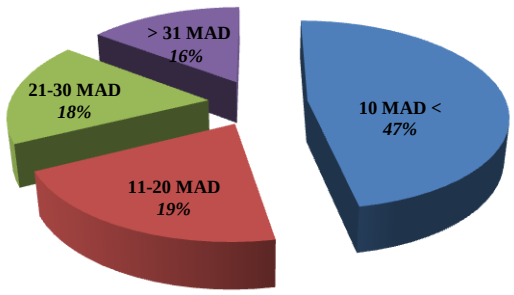

Figure 12 : Distribution of medicinal plants according to their selling price

4.2.7. Index of medicinal plants used by the local population of Ifrane's National Park

The summary of the results of this whole ethnobotanic study is presented as an index (**Annex II**). This latter encloses the inventory of all plant species, their naming list, the used part, the operatory mode, the local medicinal use as well as the medicinal uses according to the bibliography.

Conclusion

This work is an ethnobotanical study of medicinal plants of Ifrane's National Park in Morocco. These aromatic and medicinal plants are exploited by the local population for their self-medication and commercial purposes. This study is important because of on one hand, the great role detained by this park in the biodiversity conservation in the country and on the other hand, of the richness of this traditional medicine acquired in the course of many generations.

The ethnobotanical investigations conducted with the concerned population by the medicinal plants exploitation, have provided information on the investigated profile, the exploited plants and their sale price, the therapeutic modes of preparations, as well as on the medical uses of these species.

In fact, the obtained results show that the medicinal plants exploitation of the Park is performed fairly equal by men and women (50% against 48%) and that all age groups are concerned, this exploitation increases with people's age. They had also permitted to know that all plant parts are used in the therapeutic uses, but with a clear preference for the leaves. Besides, they had put into highlight several operatory performed modes so as to extract the principal actives of medicinal species, especially the decoction. It also emerges that therapeutic uses concern mainly the digestive, respiratory, nervous, auditory apparatus as well as skin diseases.

On the other hand, the floristic analysis of medicinal plants identified have permitted to identified 46 species belonging to 23 families among which the Lamiaceae are the most represented with 9 species. Consequently, a list of these medicinal plants as well as the information and therapeutic uses are presented in the index.

The present study has also put into evidence the excessive character and unreasonable of medicinal plants exploitation in the Park by the local population. These effects begin to cause damages; in particular by putting into the process of disappearing some species, it is the case for example of the African pyrèthre (*Anacyclus pyrethrum* L.).

The radio programs and articles in the media explaining the well-done of medicinal plants to the citizens and encouraging to consume them have become a fashion these last years in Morocco. This advertising stresses in advantage the pressure on these plants by a population which practices a picking up with traditional methods and not long-lasting.

To conserve the biodiversity and ensure a sustainable management of these natural resources, it is imperative to raise the population's awareness, improve their standard of living, organizing circuits of AMP sector through legislation and economic interest groupings, design a development strategy and establish a mechanism for the monitoring of these plants by modern techniques such as the spatial remote sensing.

References

1. Aafi A., Sghir Taleb M., Fechtal M., Espèces remarquables de la flore du Maroc, Centre Nationale de la Recherche Forestière, Rabat (Maroc) (2002) 46
2. Kabouche A., Touzani R., Kabouche Z., Chemotypes investigation of essential oils of "Guertoufa" herbs W. Tadrent, *J. Mater. Environ. Sci. 5 (4) (2014) 1200-1205*
3. Funk, V. A., Susanna, A., Stuessy, T. F., Robinson, H., Classification of Compositae, International Association for Plant Taxonomy, Ed. SEBC, Vienna (Austria), Chapter 11 (2009) 171
4. Rejdali M., La flore du Maroc : Etat actuel et perspectives de conservation, diversité biologique et valorisation des plantes médicinales, Actes Edition, (1996) 17-22
5. Plan d'aménagement et de gestion du Parc National d'Ifrane (rapport diagnostic, version finale), Haut-commissariat aux Eaux et Forêts et à la lutte Contre la Désertification, Service provincial des Eaux et Forêts d'Ifrane, (2007) 27-55
6. Kahouadji M.S., Contribution à une étude ethnobotanique des plantes médicinales dans le Maroc oriental, Mem. Doc. 3ème cycl. (ined.), Fac. Sci., Univ. Mohamed I, Oujda, Maroc (1995) 206
7. Bellakhdar, J., La pharmacopée marocaine, traditionnelle. Médecine arabe ancienne et savoir populaire, Ed. Le Fennec. Casablanca, Maroc (1995) 120-522
8. El Rhaffari, L., Etude ethnobotanique, phytochimique et pharmacologique des plantes aromatiques et médicinales du Tafilalt. Ressources végétales des oasis du sud-est du Maroc. Etat des lieux, valorisation gestion et préservation, Mem. Doc. Etat. (ined.). Univ. My Ismâil, Fac. Sci. Meknès, Maroc (2002).
9. Hseini, S., Kahouadji, A., Etude ethnobotanique de la flore médicinale dans la région de Rabat (Maroc occidental), *Lazaroa*. 28 (2007) 79-93
10. Bouhhriss A., Farah B., Strani B., Lakhlifi T., Boukhriss B., Chaouch A., Etude ethnobotanique des plantes médicinales dans la région de Tafilalet (Sud-est marocain), *Magazine La Phytothérapie Européenne.* 73 (2013) 25-28
11. Benabid A., Flore et végétation du Parc National d'Ifrane (Service provincial des Eaux et Forêts d'Ifrane), (2006) 1-6
12. Haut-commissariat au plan (H.C.P), Recensement général de la population et de l'habitat, Plan d'aménagement et de gestion du Parc d'Ifrane (rapport diagnostic, version finale), (2007) 65-74
13. .Direction provinciale de l'Agriculture (DPA), Plan d'aménagement et de gestion du Parc d'Ifrane (rapport diagnostic, version finale), (2007), 109-110
14. Benkhnigue O., Zidane L., Fadli M., Elyacoubi H., Rochdi A., Douira A., Ethnobotanique des plantes médicinales dans la région de Mechraa Bel Ksiri (Région du Gharb du Maroc), *Acta Botanica Barcinonensia.* 53 (2010) 191-216
15. Mehdioui R, Kahouadji A., Etude ethnobotanique auprès de la population riveraine de la forêt d'Amsittène : cas de la Commune d'Imi N'Tlit (Province d'Essaouira), *Bulletin de l'Institut Scientifique, Section Sciences de la Vie.* 29 (2007) 11-20
16. USAID (United States Agency for International Development), Maroc, Agriculture et agrobusiness intégrés : projet filière des plantes aromatiques et médicinales, (2006) 11-16
17. Bellakhdar J., Plantes médicinales au Maghreb et soins de base, Ed. le Fennec. Casablanca, Maroc (2006) 52-320
18. Ghanmi M., Strani B., Aberchane M., Ismaili M.R., Aafi A., El Abid A., Plantes aromatiques et médicinales du Maroc : Les mille et une vertus, Edition Maroc-Nature, Centre Nationale de la Recherche Forestière, Rabat (Maroc), (2011) 46-108
19. Pouliquen H., Toxicologie clinique des ruminants, Edition du Point Vétérinaire, Maisons-Alfort, France (2004) 374
20. Lelong F., Les belles et les bêtes, Précis illustré de toxicologie botanique à usage Vétérinaire, Faculté de Médecine, Nantes (2008) 327
21. Loizzo M. R., Tundsi R., Menichini F., Pugliese A., Solimene U., Menichini F., Chelating, antioxidant and hypoglycaemic potential of *Muscari comosum* (L.) Mill. bulb extracts. *Int. J. Food Sci. Nutr.* (2010) 780-791
22. El Ouafi F., Contribution à l'étude des plantes médicinales du Maroc, Thèse pour l'obtention du Doctorat Vétérinaire de l'I.A.V Hassan II, Rabat (1997)
23. Auguste Loiseleur-Deslongchamps J., Manuel des plantes usuelles indigènes ou histoire abrégée des plantes en France (1819) 453
24. Société des naturalistes et des agriculteurs, Nouveau dictionnaire d'histoire naturelle, appliqué aux arts, principalement à l'agriculture et à l'économie rurale et domestique, Tome XVIII (1830) 57

ANNEX I : Ethnobotanical survey sheet

Informant

Age	☐			
Sex	Male ☐	Female ☐		
Family situation	Married ☐	Single ☐	widower ☐	Divorced ☐
Level of study	Illiterate ☐	Primary ☐	Secondary ☐	Academic ☐
Income / month (MAD)	250-1500 ☐	1500-5000 ☐	> 5000 ☐	

Vegetal material

Medicinal species	Vernacular name ☐				Scientific Name ☐		
Plant Type	Spontaneous ☐	Cultivated ☐					
Used Part	Underground apparatus ☐	Flower ☐	stem ☐	Stem plus leaf ☐	Leaf ☐	Fruit ☐	The whole plant ☐
Preparation Mode	☐						

Therapeutic Use

Type of disease	
Origin of the information	

Species marketing

Sale price (MAD/Kg)	< 10 ☐	[11-20] ☐	[21-30] ☐	[30-40] ☐	[41-50] ☐	> 50 ☐

ANNEX II : Index of the INP's medicinal plants

Family	Scientific name of the species	Local name	Parts used	Instructions of usage	Local medicinal usages	Medicinal usages as bibliographic data
Anacardiaceae	*Pistacia atlantica* Desf.	Lebtem	Leaves, fruits	Decoction powder	Aphrodisiac, rheumatism	Belly aches [7]
Apiaceae	*Coriandrum sativum* L.	Qezbor	Fruits, flowers	Powder, decoction	Stomachaches	Spastic colitis, eructation [17]
	Pimpinella anisum L.	Habbet hlawa	Fruits	Powder	Pains of the bladder	Diuretic, stomatic, diaphoretic [7]
	Ammi visnaga L.	Bechnikha	Fruits	Infusion, nature	Toothache	Dental troubles, kidneys pain and bladder [18]
	Petroselinum sativum Hoffm.	Ma'adnûs	Leaves, flowers	Maceration	Stomachache, facilitate rules	Painful Rule, asthenia, convalescence [7]
	Ferula communis L.	L-klekh	Fruit, root	Decoction	Rheumatism, aphrodisiac	Anticoagulant, rubefiant [19]
Aquifoliaceae	*Ilex aquifolium* L.	Âbdlisser	Leaves, fruits	Infusion, nature	Maldigestion	Emetic, purgative [20]
Araliaceae	*Hedera helix* L.	Louwaya	Leaves, fruits	Maceration, powder	Against fatigue, rheumatism	Anti-inflammatory, analgesic[19]
Asparagaceae	*Muscari comosum* (L.) Mill.	Bsyla	Underground part	Infusion, cataplasm	Antidiabetic, rheumatism	Antioxidant, hypoglycemic [21]
Asteraceae	*Anacyclus pyrethrum* L.	Tigendast	Root	Powder	Toothache, bad breath, aphrodisiac	Sternutatory, sialagogue, diaphoretic, Toothache [7]
	Calendula officinalis L.	Jemra	Capitulums	Cataplasm	Itching	Antispasmodic, antiseptic, anti-inflammatory [7]
	Taraxacum obovatum DC.	Ûdjem	Root	Powder	Antidiabetic, Cutaneous affections	Depurative, diuretic [17]
	Cynara humilis L.	Timta	Root, flowers	Decoction	Renal pains	Inflation of the liver [22]
	Anthemis nobilis L.	Babunj	Capitulums	Decoction	Diarrheas, pains gastric	Antispasmodic, anti-inflammatory [7]
Caryophyllaceae	*Corrigiola telephiifolia* L.	Sarghîna	Root	Decoction	Stomach pains, stomachic	Fortifying, diuretic, aphrodisiac [7]
	Silene vulgaris (Moench) Garcke	Tighîghecht	Flowers	Decoction	Stomachic	Constipation, cough, abortifacient [7]
Chénopodiaceae	*Chenopodium ambrosoides* L.	Mkhinza	Stem + leaves	Infusion, nature	Intestinal, oral affection	Gastronomic-intestinal affection [7]
Cupressaceae	- *Juniperus oxycedrus* L. - *Juniperus thurifera* L. var.africana	Tâqqa Tawalt	Essential oil of wood	Nature	Cutaneous affections	Affection scaly eczema, hair loss-prevention [7]
Fagaceae	*Quercus faginea* Lamk	Tacht	Oak gall	Powder	Diarrhea, intestinal pains	used in diarrhoeas, vaginal losses and the epistaxis [7]
	Quercus rotundifolia Lamk.	Tassaft	Ecorce	Powder	Wound healing	Hemostatic, wound healing [7]
Lamiaceae	Lavandula pedonculata (Mill).	Lhalhale	The whole plant	Decoction, cataplasm	Against the fever, rheumatism	Cold, asthma, Cough [7]
	Menthe suaveolens Ehr.	Marseta	Leaves	Nature, cataplasm	Against the cold, rheumatism	Flu, Colds [17]
	Satureja alpina L. *Mentha pulegium* L. *Mentha gatefossei* Maire	Fliyyo diâl berr Fliyyo dîal mâ Fliyyo dîal jbel	Stem + leaves	Infusion, fumigation	Cold, cough, rheumatism	Gastro - intestinal, bronchitis, Colds, Throat pains, cough, stomachache affections [7]
	Thymus algeriensis Boiss. & Rent.	Z'îtra	Leaves	Decoction, fumigation, powder	Bronchitis, cough	Antiseptic, antispasmodic [17]
	Marrubium vulgare L.	Meriwte	Leaves	Decoction	Diuretic, intestinal pains	Tonic, appetizer, emmenagogue [23]
	Origanum compactum Benth.	Za'tar	Leaves	Infusion	Stomachaches, against the cold	Gastro - intestinal and broncho - pulmonary Affections [7]
	Ocimum basilicum L.	Lehbeq	Leaves, Stem	Infusion	Intestines Pains, favor the digestion	Antispasmodic, stomachic, sedative [17]
Lauraceae	*Laurus nobilis* L.	Asa sidna Moussa	Leaves, fruits	Infusion, cataplasm	Maldigestion, condiment, rheumatism	Rheumatism, inflammation Oral - pharyngeal [17]
Liliaceae	*Ruscus aculeatus* L.	Bû-chûka	Rhizome	Maceration, powder	Depurative, aphrodisiac	Veno-tonic, diuretic [17]
	Asphodelus ramosus L.	Berwâg	Underground part	Maceration, cataplasm	Humming of ear, stomatic	Cure abscess, otitis treatment [7]
	Allium cepa L.	L-besla	Bulb	Decoction	Cold, cough	Genito-urinary, respiratory and oral affections [17]

Malvaceae	*Malva parviflora* L.	Bqûla	Leaves	Decoction, cataplasm	Oral affection	Antipruritic, anti-inflammatory, antitussive [17]
Paeoniaceae	*Paeonia corallina* L. ssp. maroccana	Habersis	Root Flowers	Powder Decoction	Antipoison Against fatigue	Convulsion, anti - epileptic [24]
Parmeliaceae	*Evernia furfuracea* Mann. *Evernia prunastri* Ach.	Tamert numghar	The whole plant	Decoction Powder	Depurative Wound healing	Increase the volume of blood, help the liver to eliminate waste [7]
Papaveraceae	*Papaver rhoeas* L.	Bela'mân	Flowers	Decoction	Against fever, sleep troubles, against asthma	Antitussive, pectoral, emolliant [7]
Pinaceae	*Cedrus atlantica* Manetti.	Îddil	Essential oil of wood	Nature	Cutaneous affections	Cutaneous inflammations, wound healing [18]
Plantaginaceae	*Plantago coronopus* L.	Tamzourte ntikhsi	The whole plant, root	Decoction, nature	Gastric pains	Anti-inflammatory [17]
Rosaceae	*Rosa canina* L.	Tabgha	Fruits Flowers	Nature Infusion	Diarrheas Calculated renal	Diuretic, astringent [7]
	Crataegus laciniata Ucr.	Âdmâm	Leaves, flowers	Decoction	State of nervousness, sleep troubles	Heart erethism, irritability of menopause [7]
Rutaceae	*Ruta chalepensis* L.	Iwrmi	Flowers, stem	Infusion, drop fumigation	Earache, against the cold	Rheumatism, ears humming [7]
Thymeleaceae	*Daphne gnidium* L.	Alezzâze	Leaves, fruits	Decoction, powder	Abortive, hair loss-prevention	Toothaches abortive [7]
Verbenaceae	*Lippia citriodora* H.B et K.	Lwîsa	Leaves	Infusion	Against stress, sleep troubles	Sedative, stomachic, antispasmodic [17]

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