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Ancestral phytotherapeutic practices in Morocco: regards on history, current state, regulatory and safety of commonly used herbal medicine

M. Elachouri[1]*, L. Kharchoufa[1], J. Fakchich[1], Z. Lorigooini[2], P. Subhasis[3], and M. Subhash[4]

[1]*Laboratory of Bioresources, Biotechnology, Ethnopharmacology and Health, URAC-40, Department of Biology, Faculty of Sciences, Mohammed First University, Oujda, Morocco*

[2]*Medical Plants Research Center, Basic Health Sciences Institute, Shahrekord University of Medical Sciences, Shahrekord, Iran.*

[3]*Graduate Department of Botany, Darjeeling Government. College, University of North Bengal, India*

[4]*Department of Pharmaceutical Technology, Jadavpur University, Kolkata, India*

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Abstract

The apparent reversal of trend from western to herbal medicine is partly due to the fact that synthetic drugs have always shown adverse reactions and other undesirable side effects. This has led to the belief that natural products are safe because they are more harmonious with biological systems. Furthermore, medicinal plants were the original source of most medicines. Many of the miracle drugs of today are molecules or variations on compounds that were originally extracted from medicinal plant species. In fact, various chemicals and biotechnological products are being screened by major multinational pharmaceutical industries in the hope of discovering new compounds for curing various health ailments. Indeed, Morocco, endowed with an immense range of climates, cultures, human and natural resources, has rich and ancient phytotherapeutic traditions. These various historical and cultural richness coupled to contemporary evolution allowed the development of a specific culture which intrinsically embodies a myriad of visibly distinct subcultures. It concerned various forms of cultures and belief from Paganism, Judaism, and Christianity to Islam. Based on bibliographical review of relevant documents published, including articles, review and books, we attempted to give a landscape on medicinal plants used by Moroccan people, while insisting on ethnobotanical investigations as a crucial step in development and valorization of natural products related to the human health care. Also, we tried to shed light on the current state, the history, the ethnobotany as well as the safety and regulatory of the traditional use of these herbs by Moroccan society. So, in the present paper, we tried to give an overview on the richness, and diversity of indigenous knowledge on traditional use of medicinal plants by people living in this country

Keywords: Morocco, trade of medicinal plants, traditional knowledge, safety, regulation

*Corresponding author.
E-mail address: elachourimostafa@yahoo.fr

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1. Introduction

Today herbs are the main source of medical practices in developing countries, especially in remote areas. Such attitudes and treatment practices are used to alleviate suffering due to diseases. The main reasons of these behavioral is linked to various parameters such as the history, the belief or socioeconomic condition such as the lack of health facilities and poor access to basic services which are considered as distinctive features of rural life.

These natural resources, used in phytotherapy, play a crucial role in health care needs of people around the world especially in developing countries. About 80 % of the population of most developing countries still depends on the use of traditional medicine derived from plants [1]. It is well known that Medicinal and Aromatic Plants (MAPs) have been an important resource for human health care from prehistoric times to the present day. Between 40,000 and 50,000 plant species are known to be used in traditional and modern medicine systems throughout the world [2]. The people using this type of medicine are convinced that the treatment with natural products is safe, effective, and improve the general health, contrary to conventional treatments. Medicinal plants have remained useful not only as remedy for different sickness, that affect human, but also suitable substratum for the discovery of bioactive compounds which are always in demand and are a central point of research.

In Morocco, traditional uses of herbs by population to treat various ailments are widespread and have been in existence for many years. The useful information about these practices is still passed from one generation to another by oral communication. People living in this country, especially those in remote areas, depend more extensively on traditional medicine for their health care needs instead of modern systems which are out of reach. The shift to empirical medical practices is due to the vulnerability of the socio-cultural status, the historic belief and the availability of the resources derived from medicinal plants. However, this medical practice is completely forsaken by the national health system. Besides, the non-organisation of the MAPs sector leads to an over-harvesting of these herbs which are increasingly threatened. These facts posing the danger of losing these natural resources and could have a marked negative impact on folk medicine traditions from disappearance. We have become aware that the ecosystems from where the medicinal plants are extracted have been under a constant deteriorating process which has gotten worse due to climatic change, expressed in long lasting droughts and to an increase in the demand for these plant remedies, which is an aspect that needs immediate attention, if not, these resources could be lost. Besides, the sudden evolution of society towards technological patterns and the increasing use of synthetic remedies, in spite of the progress of pharmacological technology, the memory of popular medicine hardly survives, when necessary, has seen a consequent erosion of a rich cultural heritage. So, In Morocco, the current and potential value of medicinal plants,

as traditional remedies and commercial pharmaceuticals, requires the urgency to collect, document, and to save the renewable botanical resources and how know related.

To improve and develop the medicinal plants sector in Morocco, the scientific community has to know about ethnobotanical resources in this country. The aims of the present document are to know what about our national medicinal flora, which has been used for centuries and has become part of today's trading system and to make a diagnostic of the state of medicinal plants in this country.

2. Succinct outlook on Moroccan country

2.1 Position, orography, climate and demography

The kingdom of Morocco is an Arab-Berber society living in the north of Africa. Morocco recovered its independence from France in 1956. Rabat is the capital city. The country is a member of the Arab. Maghreb Union, of the Arab League, of the Organization of African Unit and of the Organization of the Islamic Conference. Morocco's territory Located in the North Western fringes of Africa. It is limited in the north, by the Mediterranean Sea, in the west by the Atlantic Ocean, in the east by Algeria, and in the south and south-east by Mauritania. Morocco lies directly the European continent across the Strait of Gibraltar by about 13km "8 mil". The country covers a geographical area of about The Morocco stretches over an area of 710,850 km^2. It consists of lowlands rising to extensive four high elevation mountain ranges, with high apex, including Rif (2000 m), Middle Atlas (2000 m), High Atlas (4,165m) and anti-Atlas (2000m) which interspersed with plateaus and valleys, divided the country in three parts the North, the center and the south. It is the only African country with direct access to both the Atlantic Ocean and the Mediterranean Sea, with an expansive coastline, (3 466 km of coastline) **(Figure 1)**. According to the Sixth General Census conducted by High Commissioner for Planning in September 2014, the legal population of the Moroccan's Kingdom has reached 33,762,036 citizens and 86,206 foreigners. The dominated religion in this society is the Islam and the official language is Arabic [3].

Besides, Morocco's climate is largely influenced by two forces: the Atlantic oceanic winds that blow from the west and the arid conditions of the Sahara Desert to the southeast. The Rif and Atlas Mountains in the northern and central regions of the country act as a barrier between these two climatic pressures. A subtropical, Mediterranean climate, characterized by mild, rainy winters and hot, arid summers, dominates the western and northern regions of the country. In the south and east, the rain shadow effect created by the mountainous interior limits precipitation and produces the hot, semi-arid conditions characteristic of the pre-Sahara. The Morocco's geographic location and the importance of the variable physical features provide the country with various bioclimates extended from Saharan in the south to humid in center crossing arid, semi-arid and subhumid bioclimates **(Figure 2)**. Furthermore,

precipitations in the Atlantic coastal region are moderate, and climatic conditions in different regions provide the country with the richest biological diversity in both flora and fauna. Morocco is the second, after Turkey, most biologically diverse country in the Mediterranean basin, especially in Medicinal and Aromatic Plants.

Figure 1: Map of Morocco

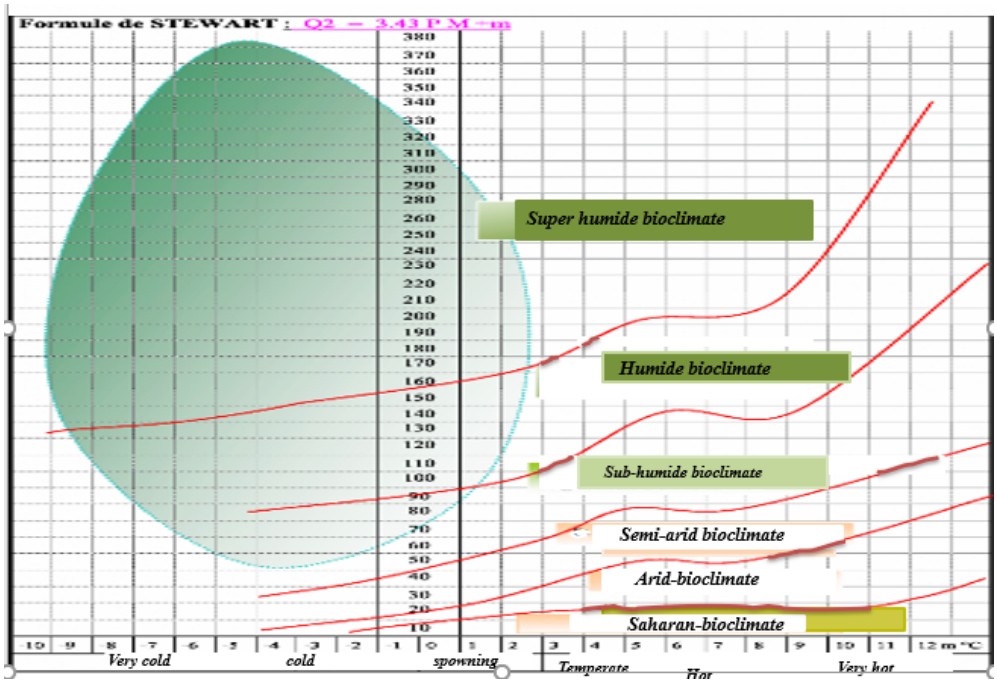

Figure 2: Diagram of Emberger (adapted from Jacques FRANCHIMONT. 2001)

2.2 Moroccan's biodiversity

Due to its position between the Atlantic and Mediterranean coasts as well as its topography and with its heterogeneous climatic conditions, Morocco offers an excellent area of plant's diversity. This country is one of the important biodiversity centers in the Mediterranean basin. It is the richest country in this circum, in terms of fauna, including 550 vertebrates, with 101 mammalian species and 22 endemic species of reptiles and amphibians as well as the flora with an estimated 3913 species of vascular flora [4]. Aware of Morocco's natural potential resources, Moroccan authorities have established a national strategy leading to the protection and the sustainable management of this natural heriage.

In this respect, Morocco has established a variety of protected areas, over 160 sites of biological and ecological interest site (Beis), 11 national parks, and 19 important plant areas (IPA) [5]. In this respect, 8 national parks and 150 other Site of Biological and Ecological Interest (Stockpile or SBEI) covering about 3% of Morocco's land area; have been created [6].

These Sites cover an area exceeding 1 000 000 ha. This Site encompasses main ecosystems, Rif, Middle-Atlas, High Atlas, Saharan Atlas and the littoral Atlantic Sahara. The most important protected area is cited bellow:

2.2.1 National parks

- **Toubkal National Park**. This park, with an area of 38,000 ha and a buffer zone of 58,000 ha, is located in the Central High Atlas with altitude varying from 1,500 to 4,167 m.
- **Al Hoceima National Park**. This park is located in the province of Al Hoceima, on the northwestern Mediterranean coast, and comprises coastal and marine ecosystems. With an area of 31,000 ha. Buffer zone of 46,000 ha, and an altitude ranging from sea level to 747 m.
- **The Eastern High Atlas National Park**. With an area of 52,000 ha and an altitude from 1,650 m to 3,077m
- **Tazekka National park**, located in middle Atlas, with an area of 11 000 ha
- **Souss Massa Park**: situated in the south of Morocco with an area of 14 000 ha
- **Haut Atlas Oriental Park**: with an area about 40 000 ha
- **Talassemtane Natural Park**: situated in the Northwest of Morocco (Rif**):** with an area 60 000 ha
- **Ifrane Natural Park**: located in Middle Atlas with an area neighbouring 60 000 ha
- **DakhlaNatural Park** situated in Moroccan Sahara: an important area, in touch with Atlantic ocean 1 900 000 ha.

2.2.2 Stockpile or SBEI (Site of Biological and Ecological Interest)

Among these Sites we can note: Jebel Moussa (near Al-Hoceima) includes many endemic species and is a key resting place for small migrating birds, Aghbar and Tamga (near Toubkal) have rare pine and cypress forests, a wide variety of mammals and birds and a high degree of endemism, and Khniffis (on the Atlantic coast) is a Ramsar site with varied aquatic and terrestrial ecosystems, mammals, birds and invertebrates.

We can add other important Sites such as Aguelman Afennourir au Moyen Atlas centr, Baie de dakhla, Bani Snassen du maroc oriental, Bou Iblan du Moyen Atlas, El harcha, plateau central å Qulmés, Embouchure de la Mouluiya Illes d'Essaouira Jbel Bouhachem , Rif occidental, Jbel Grouz , figuig, M'sabih talaa, Haouz, Merja zerga, Moulay bouselhams and Sidi Bougaba , Kenitra.

2.3 Floral diversity

2.3.1 Vascular flora

Because of its geographic position in North Africa, at the intersection between the Atlantic ocean and Mediterranean see in the north, the Moroccan Sahara (desert) in the south and east, and the Atlas mountains inland, Morocco provides an exceptional and original floral diversity. The vascular flora of Morocco, compiled in three volumes, counts 3913 species and 872 additional subspecies belonging to 155 families and 981 genera [7-11]. The importance of this flora is related to the presence of 14 national endemic genera and 920 taxa (640 species and 280 subspecies). This Morocco's plant diversity represents a wealthy heritage, especially with a high endemism estimated to 25% of the vascular flora; the main foci of endemism are located in high mountain peaks. So, we can say that the originality of Moroccan flora, within the Mediterranean Basin and North Africa, is very impressive. It is noteworthy that that the endemic flora exist nowhere else except in Morocco [5].

2.3.2 Medicinal flora in Morocco

A. Background

Medicinal and aromatic plants (MAP) have been an important resource for human health care from prehistoric times to the present day. Between 40,000 and 50,000 plant species are known to be used in traditional and modern medicine systems throughout the world [12]. These natural resources play a crucial role in health care needs of people around the world especially in developing countries. About 80 % of the population of most developing countries still depends on the use of traditional medicine derived from plants [1]. In developing countries herbal drugs play an important role in health care. People are increasingly seeking for herbal remedies for maintaining their overall health condition and well-being. Since the very beginning of human civilization, plants continue to show a dominant role in

the healthcare system. Medicinal plants are the “backbone” of traditional medicine. Even today, medicinal plants are not only indispensable in health care, but form the best hope of source for safe future medicines. In fact, this past decade has obviously witnessed a tremendous public interest in phototherapies both in developed and developing countries, these herbal remedies which is being available not only in street vendors (such herbalists), drug stores, but now also in food stores and supermarkets. In spite of the fact that now we have at our command a number of modern drugs, it is still genuinely urgent to discover and develop new therapeutic agents. It has been estimated that the acceptable therapy is available only for one third of the known human ailments. Therefore, the fight against diseases must be carried on relentlessly. Traditional plant medicines still enjoy significant position in the modern-day drug industries due to the minor side effects as well as the synergistic action of the combination of compounds. In Morocco, the most important features of Aromatic and Medicinal Plants sector are its diversity and its richness. It is well known that medicinal plants have remained useful not only as remedy for different sickness, that affect human, but also suitable substratum for the discovery of bioactive compounds which are a central point of research.

B. Brief historical accounts on the contribution of Arab scholars to traditional use of medicinal plants

It is impossible to embark upon the subject of medical tradition in Morocco without first briefly recalling the main Arab medical thought, and "know-how" of Muslim communities regarding traditional medicine [13].

Belonging to the Arab world, Moroccan people have long habit on the use of traditional medicinal and aromatic plants for medical purposes. Since time immemorial, Moroccan people have gathered plant and animal resources for their needs. Historically, Moroccan society had a wealthy pharmacopeia which dates back to 711 AD (92nd year of the Hegira). In fact, Islamic influence began in Morocco in the seventh century A.D. Arab conquerors converted the indigenous Berber population to Islam which was marked by the expansion of Moslem influence during the golden age of Arab Science “750-1258 C.E” [5]. The Moroccan pharmacopeia was further developed and enriched by other knowledge brought in by various ethnic groups that migrated to Morocco from many areas, including the Arabs from the Middle-East, the Andalousians, Jews from Europe, and the Blacks from Sudan, Senegal and Niger. According to several distinguish authors such as Ibn El-Baithar (1877-1883) [13], who synthesized all medicinal drugs used by the Arab up to the 13th century. Besides, different literatures confirm the progression of the knowledge of the Arab civilisation through North Africa and the South of Spain [13, 15].

3. Current state of ethnobotany in Morocco

3.1 Phototherapeutic uses of medicinal plant

The observations mentioned above indicated that empirical health care system was deeply rooted and integrated into classical Arab medicine. The richness of these ancestral phytotherapeutic practices are the result of an amalgam and brazing of different societies and cultures. In this country, the traditional medicine practices are widespread.This original cumulative culture, which form the basis of the traditional medical system, has maintained till now [13, 16]. Even today, the majority of Moroccan people continued to use this ancestral medical approach to meet their primary health care needs. In fact, the majority of the Moroccan people, especially in remote area, continued to use this ancestral medical approach to meet its primary health care and subsistence needs as income.

In Morocco, phytotherapy can be considered as an integral part of primary health care especially for the poorest people. Indeed, traditional medicine, in this society, has always occupied an important place in the traditions of medication. This strong attachment to popular medicine is due to the low level of socio-economic status of most people, the lack of health infrastructure, especially in remote area. Unfortunately, this cultural and natural heritage enjoyed by the local population is threatened with extinction for two reasons: Primarily, indigenous knowledge about the use of wild plant resources is rapidly disappearing from traditional communities, leading to the decrease of these phytotherapeutic practices, secondly, the degradation of phytogenetic resources due to several factors, mainly urbanization, climatic hazards as well as the anthropogenic actions could have negative impact. In addition, the lack of documentary databases related to traditional medical practices and the scarcity of ethnobotanical information archives aggravate the loss of this natural and cultural heritage. Sustainable practice of traditional medicine and supply of plant materials for drug development are hinged heavily on deliberate and concerted efforts to conserve these indigenous plants. Thus, there is an urgency to collect, document, and try to save the renewable botanical resources. It is therefore necessary to evaluate this natural potential and how know related, while insuring the safety and clinical effectiveness of the herbs used. In this respect an effort to revive and expand collaboration on plant conservation has gained global attention and momentum with the adoption of a Global Strategy for Plant Conservation by the Parties to the Convention on Biological Diversity (CBD) in April 2002. In the context of conservation and sustainable and equitable use of plant resources and traditional medical practices related, ethnobotanical investigation can contribute to the scientific base for such management decisions. This discipline named « ethnobotany », coined by [17], newly emerging fields of inquiry which is getting more attention from scientific community [18]. It offers more opportunities to analyse human interactions with plant species. Such ethnobotanical approached strives to bridge the gap between

traditional knowledge and scientific knowledge and to understand the relationship between local practices and knowledge systems. This scientific method, aims to describe and analyse qualitatively and quantitatively the information on plants used traditionally by users. After reviewing the literature, related to ethnobotany and ethnopharmacology conducted in morocco during the last decades, we found more than 100 studies conducted in different regions of Morocco **(Figure 3)**. Conscious that, mostly, these studies were carried out separately in space and time, reflecting only a fragment of the territory which are very dispersed and are non-representative of the whole potential use of medicinal and aromatic plants used countrywide by Moroccan society, our team has published recently a synthetic work, based on careful literature review, giving a summary of information on the whole set of medicinal plants and there uses by people at whole Morocco [16]. In this report, we indicated that Moroccan society lay in an impressive traditional medical knowledge related to a diverse medicinal flora with a total number of 905 plant species, used in phytotherapy, belonging to 116 families and 726 genera. The most represented families are the Asteraceae (111), Fabaceae (77), Lamiaceae (75), and Apiaceae (46) **(Figure 4)**. These results witnessed the richness and the diversity of medicinal plants at whole Morocco of medicinal flora used traditionally by Moroccan society to treat various sicknesses. Our results showed that the predominant ailment treated traditionally by medicinal plants is the digestive with 494 plant species (representing 54.79%), followed by dermatological diseases accounting for 407 species (45.77%), diabetes (diabetes I and II) with 315 plant species (36.17%) and urinary diseases with 277 plants species (30.32%) [16].

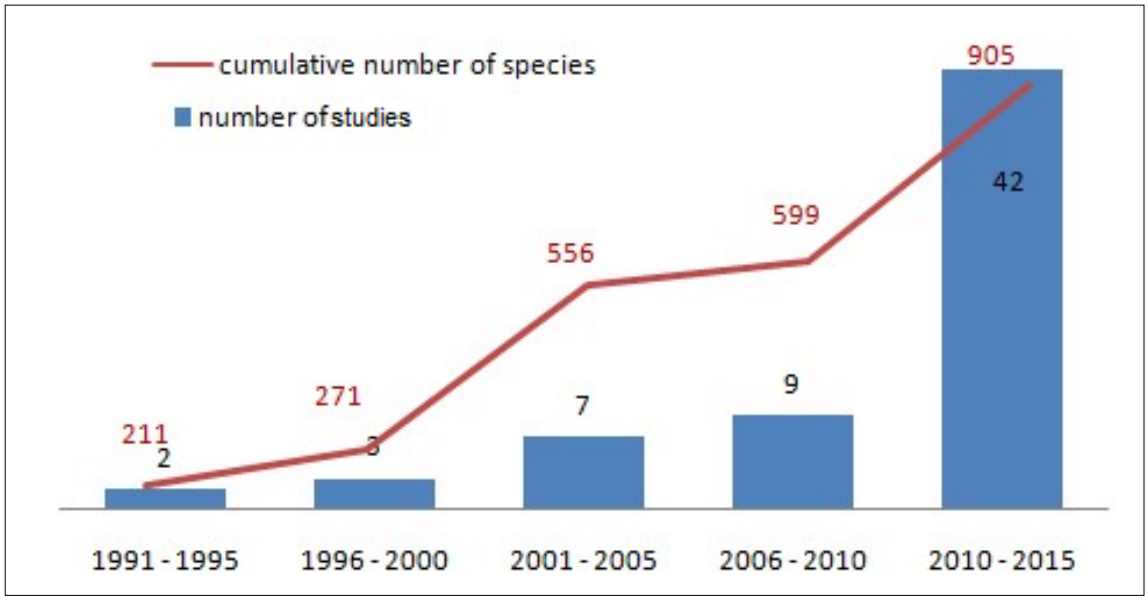

Figure 3: Increased publication of ethnobotanical and pharmacological researches during the period 1991-2015. (From Fakchich and Elachouri. 2020)

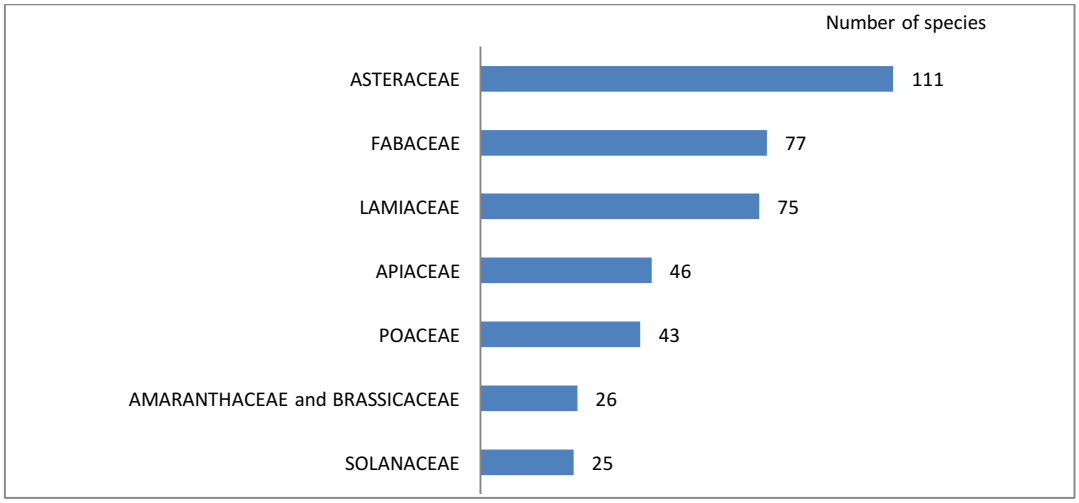

Figure 4: Classification of medicinal plant families according to the number of species (From Fakchich and Elachouri. 2021)

In another work published recently by our team, we listed the plant species used by Moroccan society to cope with a deadly disease such as cancer [19]. In fine, we can say that, till now, medicinal plants are considered as important elements of indigenous medical system, and these resources are usually regarded as a part of traditional knowledge related to medical practices of Moroccan society

3.2 Concerns with Regard to the toxicity of Herbal Medicines in Morocco

There is a general belief amongst consumers around the world that medical herbs are inherently safe, because they are "natural". However, just because the product is natural, that does not assure their safety. Empirical use of medicinal plants involves potential hazardous risks attributed to both inherent toxic effect of herbal medicine, misused of plants as well as its misidentification, overdose and toxicity induced by adulterant/contaminants of plants. We can note, the best example, related to the misidentification of *Aristolochea baetica*, which was identified in North Eastern of Morocco [21]. In fact, toxicity related to traditional use of medicinal plants is becoming more widely recognized as these remedies become popular in the Mediterranean region as well as worldwide. The concerns regarding the safety of herbal medicines have been raised because the use of these plants continues to expand rapidly across the world, particularly in developing countries where folk medicine is popular. This is particularly the case with medicinal plants, which are widely used in Morocco. Although the widespread uses of medicinal plants in this country, most of the plants have not been investigated for toxicity, furthermore, there is an ongoing problem with unexpected toxicity of herbal products. However, in this country a few scientific articles have been dedicated to the safety, quality and toxicity issues of the plant used to cure diseases. So, it is important to examine the literature on the safety of these herbs to raise a warning flag whenever potential hazardous risks are possible. In this respect, our team has published, recently, an

outstanding work regrouping 89 toxic plants used as medicine by people living in Northeastern Morocco [20]. This number of toxic plant represents an important part, whether 31% of the total plants used as medicine by local people. In this report we indicated that the hazardous impact of folk remedies employed in folk medicine, on the entire spectrum of organ system including liver, kidney although reports of other toxic effects including kidney, nervous system, blood, cardiovascular and dermatologic effects, mutagenicity and carcinogenicity **(Figure 5)**.

The safety of herbal medicines has become an issue for the regulatory authorities, as serious effects have been reported. It is important to note that the empirical use of herbal medicine involves risk and can pose a public health problem; this is particularly the case of nephrotoxic effects due the use of *Aristollochia baetica* in North Eastern Morocco [21]. Unfortunately, in this country there are no governmental regulations on the manufacture, purity, concentration, or labeling claims of herbal remedies and dietary supplements. That's why, the safety of herbal medicine has become an issue for the regulatory and standardization of medicinal plant's sector.

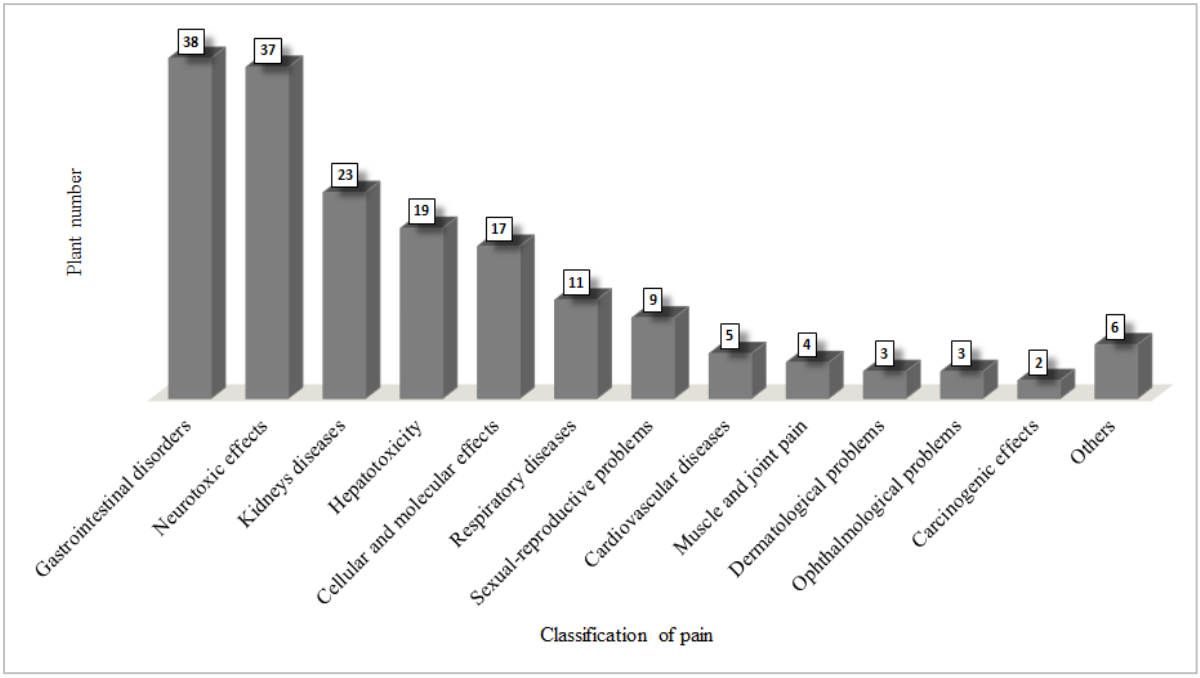

Figure 5: Different ailments caused by toxic plants (From Kharchoufa and al, 2018)

4. Socio-economic and trade considerations of MAP in Morocco

As estimated, a number of 70,000 plant species are used in folk medicine worldwide [22]. Medicinal and Aromatic Plants (MAPs) offered a wide variety of products, from crude materials to processed and packaged products like pharmaceuticals, herbal remedies, teas, spirits, cosmetics, sweets, dietary supplements, varnishes and insecticides. These plant species, which are the sources of a number of active substances for the export market with a valuable source of bioactive agents and chemical

diversity. They are in demand mainly in some areas; such as modern allopathic medicine and herbal remedies or phytomedicine. So, Medicinal and Aromatic Plants play a central role, not only as traditional medicines, used in many societies, but also as trade commodities that meet the demand of often distant markets. As a consequence, there is an enormous demand of these botanical species for domestic use and for commercial trade resulting in a huge trade on local, regional, national and international levels. The plant raw material in trade consists of mainly dried plant parts including, leaves, roots, wood, flowers, bark, seeds, or sometimes the whole plant. To have a global idea on the dimension of medicinal plants traded throughout the world, we display bellow a table regrouping some information relative to the trade of medicinal plants. The table indicated that Over half AMP world production is ensured by two categories of countries, in general, the major importers are in the developed countries (USA, Japan, France, UK etc…), while the bulk of the botanicals are exported from developing countries (Morocco, India, Chile etc….). Such situation can be explained by two parameters; first: dominating and development of technology in developing countries; second: poverty and lower cost manpower in developing countries. Morocco holds a significant place on the AMP international trade with a production marked by its wealth and diversity as indicated in **Table 1**. Already, ranked tenth in the world in MAP exports and the organic MAP was growing significantly every year. As indicated in **Table 2** this country exported annually significant quantities to the world's market. The exported average quantity amounted to 8,500 US$ valued at 13.7 million US$, the exports increased from 6,700 t in 1991 to 10,750 t in 2003.

Table 1: The leading countries of import and export of MAP material classified as pharmaceutical plants. The countries are listed according to descending order of average trade volumes (from: Dagmar et al 2006) [23].

Country of import	**Quantity [tonnes]**	**Value [US$]**	**Country of export**	**Quantity [tonnes]**	**Value [US$]**
Hong Kong	59,950	263,484,200	China	150,600	266,038,500
USA	51,200	139,379,500	Hong Kong	55,000	201,021,200
Japan	46,450	131,031,500	India	40,400	61,665,500
Germany	44,750	104,457,200	Mexico	37,600	14,257,500
Rep. Korea	33,500	49,889,200	Germany	15,100	68,243,200
France	21,800	51,975,000	USA	13,050	104,572,000
China	15,550	41,602,800	Egypt	11,800	13,476,000
Italy	11,950	43,006,600	Bulgaria	10,300	14,355,500
Pakistan	10,650	9,813,800	Chile	9,850	26,352,000
Spain	9,850	27,648,300	Morocco	8,500	13,685,400
UK	7,950	29,551,000	Albania	8,050	11,693,300
Malaysia	7,050	38,685,400	Singapore	7,950	52,620,700
Total	320,550	930,524,400	Total	368,100	847,980,800

Taking account the export, **Table 2** indicated the progress of Moroccan exports of the PAM and derivate, from 1999 to 2003. These results show that the average annual export global earnings from 1999 to 2003 average annual volume of 32,000 tonnes, estimated to DH 615 million (8.5DH= 1US$) (USAID.2008). Without taking into account the informal wild plant material trade which provide a source of sustainable income for farmers, collectors, and rural poor people. This pharmaceutical trade is enormous even if difficult to quantify. This information showed that, there is an enormous demand in Medicinal an Aromatic Plants for domestic use and for commercial trade resulting in a huge trade on local, regional, national and international level. This production of herbs comes from both wild farmed and crafted. Among these herbs almost 100 species are exported in the form of dried herbs. More than 20 species are used for the production of essential oils or other aromatic extracts intended primarily for the perfumery and cosmetic industry and for the preparation of hygienic products and the formulation of flavours.

Exploitation, of these wild MAP resources, is confined to only few regions, which may easily lead to overexploitation. Due to increasing commercial collection, largely unmonitored trade, and habitat loss, as well as the sudden evolution of society towards technological patterns and the increasing use of synthetic remedies, have seen a consequent erosion of a rich cultural heritage. Consequently, these natural products face an incomparably growing pressure on plant species leading to the populations in the wild, which could lead to disappearance.

Table 2: Summary of AMP global exports (1999-2003). Data related to the overall sector (essential oils, AMP, carob and related species) show that the average annual export global earnings from 1999 to 2003 amount to DH 615 million for an average annual volume of 32,000 tons, i.e. an average sales unit price of MDH19.85/kg.(8,5DH= 1US$).

	1999	**2000**	**2001**	**2002**	**2003**
Exports in quantity (Tons)	36 328	25 066	23 766	31 804	43 039
Exports in value (DH)	591 131	496 045	603 660	679 084	707 810
Average unit price (DH/Kg)	16,27	19,79	25,40	21,35	16,45

4.1 Threats and conservation aspects

Several factors are at the origin of disappearance of medicinal plants including the intensive and increasing commercial collection, the largely unmonitored trade, destructive harvesting techniques, and global habitat loss and alteration.

Despite the fact that these plants are traded in large volume, and very little is known about the biological

impact of such trade, regulation of harvest at the national level remains rare and control is difficult and ineffective. Furthermore, many of the most important species in trade are threatened by habitat destruction and unsustainable harvest. We have become aware that the ecosystems from where the medicinal plants are extracted have been under a constant deteriorating process which has gotten worse due to climatic change, expressed in long lasting droughts and to an increase in the demand for these plant remedies, which is an aspect that needs immediate attention or these resources will be lost.

Besides, the sudden evolution of society towards technological patterns and the increasing use of synthetic remedies, in spite of the progress of pharmacological technology, the memory of popular medicine hardly survives, when necessary, has seen a consequent erosion of a rich cultural heritage.

So, conservation concepts and Management of Botanical Resources are needed. In this respect, direct and coherent efforts to conserve plant species have received relatively little policy attention and research support. In the 1980s, IUCN and WWF began to redress this imbalance by creating the Joint IUCN/WWF Plants Conservation Programme, but this was disbanded early in the 1990s as these organizations. Besides, at the international level, in recent years, a number of initiatives have been launched to achieve a better framework for the sustainable use of biological diversity, particularly the Convention on Biological Diversity "CBD" [24].

To promote the participation of the local communities, increasing their responsibility in the conservation of the biological diversity, we draw the attention of the national authorities and scientific communities to

- The continuing disruption and loss of indigenous cultures, which often hold the key to finding new medicinal plant that may benefit the global country.
- The condemning of the habitat destruction and unsustainable harvesting practices.
- The application of certain restrictive and severe laws against the irrational harvesting of medicinal plants.
- The urgent need for international cooperation and coordination to establish programmes for conservation of medicinal plants to ensure that adequate quantities are available for future generation.
- The significant economic value of the medicinal plants used today and the great potential of the plant kingdom to provide new drugs.

In fine we can say that, the best way to preserve these plant species is to use them wisely and to manage them in a sustainable manner, with the participation of the communities and the social actors directly involved in the use and commercialization pro-cesses of these herbs.

5. Conclusion and future outlook

In this paper we give a global overview on the current state of ethnobotany in Morocco while giving an insight on trade, safety, toxicity, regulatory and quality issues of plant species used traditionally by Inhabitants of the region to treat a wide range of diseases. In this document we showed that Medicinal plants and used since ancient times are still commonly used by this society. Also, we indicated that these herbs have remarkable importance in national and international trade. We reported that the country has a great biodiversity with a variety of medicinal and aromatic plants and still needs more explorations, knowing that most of them are not investigated yet for their medical activities and their hidden potential. Undoubtedly, the extensive experiences in use of medicinal plants in traditional medicine coupled to scientific study and identification of active plant compounds and their effects can lead to the discovery of new therapeutic benefits and the production of nature-based products in the future. However, these natural resources are without protection and these may, in the near future, become endangered or extinct. So, it is therefore urgent to establish programs of conservation and sensitization of populations on the protection of biodiversity. In this connection, attention should be drawn to the conservations of traditional medicinal plants and associated indigenous knowledge in Morocco and make a strategy to improve the living standards of the populations in order to reduce the pressure on the natural resources.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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