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Botanical identification and ethno-medicinal uses of some underground part of medicinal plants collected and traded in Marrakech region

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To establish a standardized and reliable data basis on the medicinal species used for their underground organs, many specimens were collected in the Marrakech region in collaboration with collectors and herbalists. The local ethno-medicinal uses of these medicinal underground organs were also recorded. The result showed that forty one medicinal species are exploited for their underground organs to treat a variety of human diseases. All species are wild collected and the root represents the most underground organ used. The families Asteraceae, Apiaceae and Caryophyllaceae are the more represented with respectively 10, 8 and 3 species. Comparing our data with the scientific literature showed that for each species identified, we have a complex of species and in some cases we have completely different species. On the human disease, we have identified 30 different types that have been cured using these underground organs. Rheumatism, cough and common cold, weight gain and stomach problems are the major problems treated.

Key words: Underground organs, medicinal plants, identification, ethno-medicinal uses, Marrakech region.

INTRODUCTION

During the last decade, medicinal plants and its products has attracted the world-wide interest due to the growing recognition of the drugs on natural products (Hamilton, 2004). Many populations rely on these products because of their no side effects and their easy availability at affordable price, which constitute the only source of health care available to the poor. Morocco, with its diverse ecological conditions which leads to high biodiversity, rich ethnic diversity and a strong traditional knowledge, has a very important herbal medicine activity. Regarding the flora of this country, it has been estimated around 7000 species and sub species that grown wild, of which 950 are endemic (Benabid, 2000; Fennane, 2004). Among these, many species are recognized as aromatic and medicinal plants and are used locally for the primary health care. It was estimated that about 231 species present the phytotherapeutic proprieties and are used by the local population to treat a variety of diseases (Bellakhdar et al., 1991; Hmamouchi, 1999).

Below ground organs of medicinal plants' are called locally as "*laaroug*" which means "roots", play a central role in the Moroccan pharmacopoeia. One third of plant materials used in Moroccan traditional medicine are as underground organs (bulb, root, tubercle and rhizome) and constitutes the most herbal medicinal drugs required by the local population. However, most of these plant materials are sold in stalls in the dry products state which makes their identification very difficult. The same situation arises if we want to know exactly the medicinal species that have been exploited for these organs. Infact, it was reported that many herbalists and collectors may have limited skill in the identification of plant species

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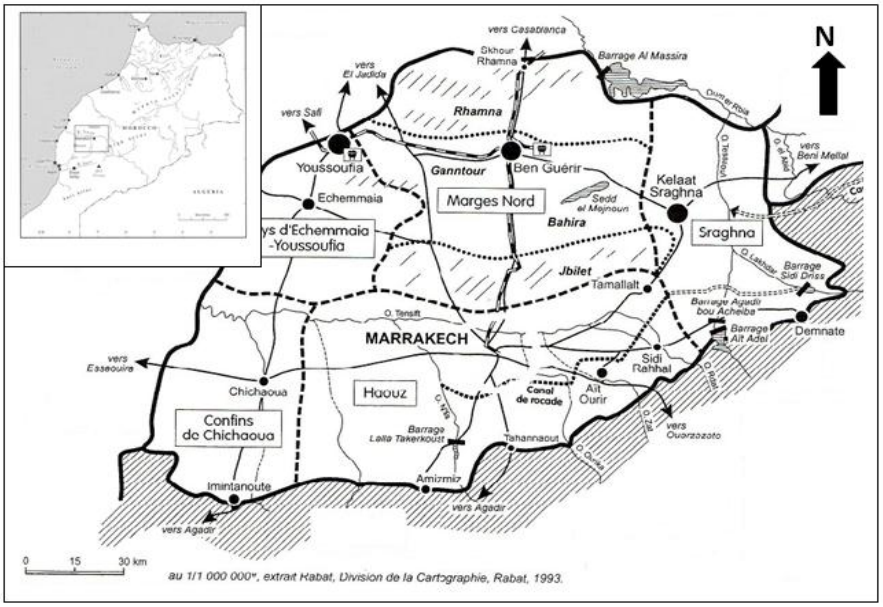

Figure 1. Location of study area.

(Barthelson et al., 2006). In addition, many medicinal drugs have a multiple trivial names to describe them. Inversely, in some cases, the same trivial name was attributed to many species (Bellakhdar et al., 1991). This situation leads to general confusion regarding the botanical identity of medicinal products used and also medicinal species collected for their underground part. It was reported that the mistakes and the unwitting use of related herbs that have different properties are the major cause of accidental poisoning (Barthelson et al., 2006; Ize-Ludlow et al., 2004). On ecological aspect, it is evident that the exploitation of underground parts is a serious threats to some species essentially those that are at high risk of extinction (Hamilton, 2004). For all these reasons and also for research purposes, it appears necessary to establish standardized and reliable databases on medicinal species that are essentially exploited for their underground organs. The present study investigated the botanical identity and ethno-medicinal uses of below ground part of medicinal plants that are essentially collected and commercialized in the Marrakech region.

MATERIALS AND METHODS

Study area

The study area is located in the south-west of Morocco between 31st and 32 nd degree of north latitude and covers about 31000 km² (Troin et al., 2002) (Figure 1). It is characterized by a rich endemic flora due essentially to its geographical contrast offering a variety of bio-climate and a high heterogeneity of ecological habitat. Besides this natural context, the population has an ancestral knowledge on medicinal plants, which has been preserved over the centuries: the medication by plants, their use for flavoring and preserving food, as well as for extraction principles for the aromatic fragrance family or market. The seasonal harvest of wild plants provided an important source of income for families in rural areas especially through the sale of wild-harvested material. Men and women in rural areas play an important role in the conservation and management of these resources.

Field surveys were undertaken during 2007–2008 to gather data on the medicinal species collected for their underground organs and their traditional uses across various localities. 80 herbalists and 46 collectors were interviewed. To have an overview on the identity of each considered species collected for their underground organs, more than five specimens were collected in different localities in collaboration by many collectors. Identification of plants was done by Prof Mohamed Ben Tatou and Prof Mohamed Fennane from the National Center of Scientific Research and by comparing specimens collected from the field with those in the National herbarium in Rabat. The voucher specimens were deposited in the Natural History Museum of Marrakech. The botanical identity of the species were compared with what has been reported in the literature. Information on the traditional uses, local name of these below ground part of medicinal plant was obtained through informed consent semi-structured interviews in collaboration by herbalists and collectors. The current relative abundance of the species collected for their underground organs was also estimated according to the collectors interviewed. According to the information reported, the species were grouped into three main groups namely, rare, common and abundant.

RESULTS AND DISCUSSION

The result indicated that forty one medicinal species are exploited for their underground part organs to treat a variety of human diseases (Table 1). It appears that all these species were collected from the wild and the root represent the most underground organ used by the local population (87.8%). Collecting medicinal plant from the wild was a common feature reported by several authors

Table 1. List of medicinal plants exploited for their underground organs and their ethno-medicinal uses in Marrakech region.

Voucher	Local names	Family	Scientific names determined	Scientific names cited in the literature	Organ type	Medicinal uses	Statute collectors
808A	Abû	Apiaceae	*Kundmania sicula* (L.) DC.	*Thapsia garganica* L., *Thapsia villosa* L.	Root	Aphrodisiac, sterility, colds, rheumatism	Common
790A	Âderyâs	Apiaceae	*Thapsia villosa* L.	*Thapsia garganica* L., *Thapsia villosa* L.	Root	Aphrodisiac, weight gain, colds, incense	Abundant
843A	Besbâs	Apiaceae	Foeniculum vulgare P. Mill	Foeniculum vulgare P. Mill, Foeniculum dulce DC.	Root	Stomach problems, sterility	Common
92A	Bûkbûka	Apiaceae	*Bunium bulbocastanum* L.	*Colchicum autumnale* L.	Tubercle	Weight gain	Rare
474K	Bû-Zfûr	Apiaceae	*Ammoides pusilla* (Brot.) Beistr.	*Daucus crinitus* Desf.	Root	Incense	Rare
840A	L-Kelḫ	Apiaceae	*Ferula communis* L.	*Ferula communis* L.	Root	Sterility, weight gain	Common
793A	Mġïzla	Apiaceae	*Eryngium tricuspidatum* L.	*Eryngium ilicifolium* Lamk., E. *Triquetrum* Vahl., *E. Tricuspidatum* L., *E. campestre* Dod.,	Root	Weight gain, tonic, rheumatism	Common
794A	Ud Mserser	Apiaceae	*Ammoides pusilla* (Brot.) Beistr.	*Polygonum aviculare* L., *P. Equisetiforme* S.M., *Daucus crinitus* Desf.	Root	Incense	Rare
797A	Berezṯom	Aristolochiaceae	*Aristolochia paucinervis* Pomel	*Aristolochia longa L., A. Baetica* L.	Root	Aorta palpitation	Common
844A	Ssekûm	Asparagaceae	*Asparagus stipularis* Forsk.	*Asparagus acutifolius* L., *Asparagus albus* L., *Asparagus pastorianus* Webb. and Berth., *Asparagus stipularis* Forsk., *Asparagus altissimus* Munb.	Root	Aphrodisiac	Common
475K	Blïlûz	Asphodelaceae	*Asphodelus cf. microcarpus Parl.*	*Asphodelus microcarpus Salzm. and Viv., A. Ramosus L.*	Tubercle	Weight gain, skin disease, rheumatism, colds	Abundant
835A	Addad	Asteraceae	*Atractylis gummifera L., Carlina gummifera (L.) Less.*	*Atractylis gummifera L.*	Root	Acne, pruritus, fumigation	rare
805A	Tamzuġt	Asteraceae	*Catannanche caerulea L.*	*Not cited*	Root	Rheumatism	Common
806A	Wden L-Allûf	Asteraceae	*Pulicaria odora (L.) Reichenb.*	*Ranunculus bullatus L., R. macrophyllus Desf., R.ficaria L., R. arvensis L.*	Root	Weight gain, sterility.	Common
791A	Gazġaz	Asteraceae	*Carlina brachylepis (Batt.) Meusel and Kästner*	*Not cited*	Root	Coughing, chest pain	Common
791A	Gazġaz	Asteraceae	*Carlina brachylepis (Batt.) Meusel and Kästner*	*Not cited*	Root	Coughing, chest pain	Common
832A	Igentas Tigendist	Asteraceae	*Anacyclus pyrethrum (L.) Link subsp pyrethrum*	*Anacyclus pyrethrum (L.) Link*	Root	Stomach problems, chest pain, rheumatism	Rare
470K	Khoršef L-Beldï	Asteraceae	*Cynara cardunculus L.*	*Cynara cardunculus L.*	Root	Abdominal pain	Common
842A	Tafġa	Asteraceae	*Rhaponticum acaule L.*	*Rhaponticum acaule L. (=Centaurea chamaerhaponticum Ball)*	Root	Stomach problems	Common
478K	Taskra	Asteraceae	*Echinops spinosissimus subsp. fontqueri (Pau) Greuter*	*Echinops spinosissimus Turra. subsp. fontqueri (Pau) Greuter*	Root	Rheumatism, colds, uterus pains, uterus tumor	Common
468K	Temt	Asteraceae	*Carthamus pinnatus* Desf. (= *Carduncellus pinnatus* (Desf.) DC.)	Not cited	Root	Fumigation	Common
833A	Tasserġint	Caryophyllaceae	*Petrorhagia illyrica* (Ard.) P.W. Ball and Heywood, *Corrigiola telephiifolia* Pourret	*Corrigiola telephiifolia* Pourret	Root	Weight gain, Appetizer, Incense, Headache, Migraine	Common
800A	Tiġïġešt	Caryophyllaceae	*Silene vulgaris* (Moench) Garcke	*Saponaria vaccaria* L., S. *Glutinosa Bieb., Silene inflata* Sm.,	Root	Clean wool, intestinal pains, Incense, Itching	Common
869A	Boughlam Sahraoui	Caryophyllaceae	*Spergularia marginata* (DC.) Kittel	*Spergularia marginata* (DC.) Kittel	Root	Cold, Weight gain	Rare

Table 1. Cont'd.

845A	Tarra Sûdâniya	Cyperaceae	*Cyperus rotundus* L.	*Cyperus articulates* L., *Cyperus maculates* Boeck	Rhizome	Hair problems	Common
796A	Bogouz	Dioscoraceae	*Tamus communis* L.	Not cited	Root	Skin diseases	Common
486K	Dbaġ	Fagaceae	*Quercus ilex* L. subsp. *rotundifolia* (Lam.) T. Morais	*Quercus ilex* L. subsp. *rotundifolia* (Lam.) T. Morais	Root	Stomach problems, Hair problems, Skin inflammation	Common
469K	Asswak	Juglandaceae	*Juglan regia* L.	*Juglan regia* L.	Root bark	Tooth care, Gingivitis	Abundant
839A	Ssmâr, Âzmây	Juncaceae	*Juncus maritimus* Lamk.	*Juncus maritimus* Lamk., *Juncus bufonius* L.	Root	Cold, Fumigation	Common
471K	Azalim U-Wuššen	Hyacinthaceae	*Ornithogalum narbonense* L.	*Urginea maritima* (L.) *baker et U. Noctiflora* Batt. and Trab.	Bulb	Hepatitis, Black magic, Rheumatism, Colds	Abundant
846A	Telh	Mimosaseae	*Acacia gummifera* Willd.	*Acacia gummifera* Willd., *Acacia raddiana* Savi	Root	Fumigation	Common
841A	Dûm	Palmaceae	*Chamaerops humilis* L.	*Chamaerops humilis* L.	Root	Aphrodisiac	Abundant
802A	Wadmï	Plumbaginaceae	*Armeria* cf. *alliacea* (Cav.) Hoffmanns. and Link, Meum *athamanticum* Jacq.	*Polygonum aviculare* L., *P. Equisetiforme* S.M., *Armeria mauritanica* Wallr., *A. Alliacea* (Cav.) Hoffm.	Root	Rheumatism	Rare
836A	L-Gseb	Poaceae	*Phragmites communis Trin.*	*Phragmites communis* Trin.	Root	Hair problems	Common
838A	Nnjem	Poacese	*Cynodon dactylon* (L.) Pers.	*Cynodon dactylon* (L.) Pers., *Agropyrum repens* P. Beauv.	Root	Cold, Diuretic, bladder infection	Common
489K	Ssder	Rhamnaceae	*Ziziphus lotus* (L.) Lam.	*Ziziphus lotus* (L.) Lam., *Z. Spinachristi* (L.) Willd.	Root	Stomach problems, Bladder problems	Common
795A	Fuwwa	Rubiaceae	*Rubia peregrina* L.	*Rubia peregrina* L., *R. Tinctoria* L.	Root	Hepatitis, Liver problems, Tonic, Weight gain	Common
789A	Âwermï	Rutaceae	*Ruta montana* (L.)	*Ruta montana* L., *R. Chalepensis* L., *Haplophyllum vermiculare Hand. and Maz.*	Root	Aphrodisiac, Rheumatism, Colds	Common
870A	Saleh Ndar	Scrofulariaceae	*Verbascum sinuatum* L.	*Verbacum sinuatum* L., *V. granatense* Boiss	Root	Ophthalmopathy	Common
830A	Tizorin	Valerianaceae	*Valeriana tuberosa* L.	Not cited	Root	Colic	Common
837A	L-Harmel	Zygophyllaceae	*Peganum harmala L.*	*Peganum harmala* L.	Root	Rheumatism	Common

in many regions (Hamilton, 2004; Ibe and Nwufo, 2005; Aguilar-Støen and Moe, 2007) and have raised many questions about their sustainable use (Hamilton, 2004). This situation is more dramatic for these wild medicinal plants collected for their underground organs.

In fact, many collectors recognized that several of these medicinal plants became very scarce in the Marrakech region and that affected greatly their financial income. It is the case essentially of some species such as *Atractylis gummifera*, *Bunium bulbucastanum*, *Ammoides pusilla*, *Anacyclus pyrethrum* subsp *pyrethrum*, *Spergularia marginata* and *Armeria alliacea* which became according to collectors rare in the region. The highest number of medicinal plants collected for their underground organs belong to the family Asteraceae (10 species) followed by Apiaceae (8 species), and Caryophyllaceae (3 species) (Table 1). Indeed these families with the family Lamiaceae, which is not represented in this category of plants, are the most diverse in Morocco in terms solely of medicinal flora (Bellakhadr, 1991; Hmamouchi, 1999).

The result showed that for each species identified, we have found a complex of species cited in scientific literature (Table 1). In some cases, we have completely different species between our result and what has been cited in the literature, for example, *B. bulbocatanum* which was confused with *Colchicum autumnalis* who was known as a highly toxic species (Bellakhadar et al., 1991; Charnot, 1945). The same situation was observed between *Pulicaria odora* and *Ranunculus* sp., *Kundmania sicula* and *Thapsia* sp., *A. pusilla* and *Polygonum* sp. The result indicated also that

many species collected and used by the local population were not mentioned in the literature such as *Carlina brachylepis*, *Tamus communis*,*Catannanche caerulea*, *Valeriana tuberose* and *Carthamus pinnatus* (Table 1).

On human disease, we have identified about 30 different types that have been cured using the underground organs of medicinal plants. Most of these below ground organs inventories are used against cough and common cold (11 species), rheumatism (10 species), for gain weight (8 species) and against stomach problems (5 species) (Table 1). The medicinal uses of underground organ were also reported by many authors in many regions in Morocco (Bellakhdar et al., 1991; Sijelmassi, 1993; Merzouki et al., 2000).

Conclusion

In this study, it appears that there is a lack of information on medicinal plants used for their underground organ and available in the trade, so many of them were not reported in the scientific literature. The study confirms that most of these medicinal plants have ambiguous identification and there arises an urgent and ultimate need for standardization, starting from correct identification of plant material.

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