

Aromatic and medicinal plants of Morocco : Richness, diversity and threats

Plantes aromatiques et médicinales du Maroc : Richesse, diversité et menaces

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Abstract. Morocco, as many countries in the world, has an old tradition and important know-how in traditional pharmacopodia. Among its natural flora, about a thousand species are currently used for this purpose in various degrees. The renewed worldwide interest for aromatic and medicinal plants (AMP), encouraged by the development of the pharmaceutical and cosmetic industry, has greatly increased the pressure on these resources. Today, some thirty native species are widely marketed in the country and abroad, and are subject to an excessive, abusive and anarchic exploitation. In general, plant harvesting practices misunderstand or ignore important taxonomic, biological and chorological considerations, thus jeopardizing species. The problem is particularly serious in the case of national endemic species plants and especially those rare or endangered. There even is, more than ever, an urgent need to develop information on aromatic and medicinal plants in Morocco and adopt a national charter, with a guide of good behaviour for their exploitation in compliance with the spirit of sustainable development.

Keywords : aromatic plants, medicinal plants, traditional pharmacopodia, Morocco.

Résumé. A l'instar de plusieurs pays au monde, le Maroc jouit d'une vieille tradition et d'un savoir faire important en matière de pharmacopée traditionnelle. Parmi son cortège floristique naturel, environ un millier d'espèces sont utilisées actuellement à des degrés divers. Le regain d'intérêt mondial pour les plantes aromatiques et médicinales (PAM), encouragé par le développement de l'industrie pharmaceutique et cosmétique, a très fortement accentué la pression sur ces ressources. Aujourd'hui, une trentaine d'espèces indigènes sont largement commercialisées à l'intérieur et à l'extérieur du pays, et font l'objet d'une exploitation démesurée, abusive et anarchique. En général, les pratiques de récolte du matériel végétal méconnaissent ou ignorent des considérations importantes d'ordres taxonomique, chorologique et biologique, mettant ainsi en péril la survie des espèces. Le problème est particulièrement grave dans le cas des plantes endémiques nationales et plus spécialement celles rares ou menacées. Plus que jamais, il y a nécessité, voire urgence, de développer les connaissances sur les PAM du Maroc et d'élaborer / adopter une charte nationale, avec un guide de bonne conduite, pour leur exploitation dans le respect de l'esprit du développement durable.

Mots-clés : plantes aromatiques, plantes médicinales, pharmacopée traditionnelle, Maroc.

INTRODUCTION

The Moroccan aromatic and medicinal flora is remarkable by its richness, diversity and socio-economic value (Ghanmi *et al.* 2009, HCEFLCD 2008). It consists of two components: one native, and the other introduced cultivated, turned sometimes to naturalized or subspontaneous. The current work concerns the first component, which, by itself, is part of the natural ecosystems of the country.

The aromatic and medicinal plants have always been used by man who, through time, has developed his experience and know-how of traditional cosmetics and pharmacopodia. For a very long time, these needs remained fair, but recently, pressure on resources continues to grow to meet the strongly increasing local and international demand (HCEFLCD 2008, Neffati & Sghaier 2014).

Today, it is clear that in Morocco, overexploitation of national resources of aromatic and medicinal plants is a real danger to national biodiversity, especially being practiced in an anarchic and abusive manner, and with lack of sufficient knowledge on biology, taxonomy and chorology of exploited species. Regarding aromatic and medicinal plants, national capacities are very important and an asset particularly for the rural socio-economic development.

The contribution of fundamental and applied scientific research is crucial in order to deeply know this wealth, valorize, exploit and preserve it in better conditions for the well-being of the present and future generations.

CONCEPT OF AROMATIC AND MEDICINAL PLANTS

Inventory difficulties

Aromatic and medicinal species grow naturally in Morocco by hundreds. Their inventory is approximate and will remain as such for three main reasons related to the very definition of an aromatic and medicinal plant, the taxonomic delimitation of the species and to the confusion of common names of plants.

How to define an aromatic and medicinal plant ?

There is no clear and precise answer to this question (Heywood 1999, World Health Organization 2000). But it should be noted that according to the comprehensive or narrow adopted meaning, the aromatic and medicinal plants list of a given area can vary within very large proportions. The approach is difficult, and it is certain that the needed definition may include a very large sense that include even food plants. Did not our ancestors say that in each plant there is a wisdom (*kooul nebta fiha hikmah*).

Problem of taxonomy

The taxonomy problem is purely scientific and concerns the taxonomists approach as they can be « lumpers » or « splitters ». The former has an « aggregative tendency » and seek to combine taxa; while the latter have a contrary

attitude leading to the multiplication of the number of taxa. Thus, for example, the family of cacti, would count, in the world, 30 to 50 genera and about 1000 species, or about 200 genera and over 2000 species. The differences are much wide, and several other families experience the same situation.



Figure 1. *Aizoon canariense* (a), *A. hispanicum* (b) and *Mesembryanthemum nodiflorum* (c), commonly named *ghassoul* or *taghassoult*. Photos (a) and (b): Msanda, (c): Douzet [website : <http://www.teline.fr/>]

Confusion and difficulties of common names

Confusion and difficulties related to plant common names are on two levels. On the one hand, there are common or vernacular names that are most often imprecise and referring under the same name to several species or even different genera.

On the other hand, there is a connection between these commonly used names and scientific names. Cases illustrating these difficulties are numerous, here are some examples:

- *Oum lbeina* or *hulaiba* designate different species of the genus *Euphorbia*
- *Hlenj*, *bou heddad*, *herrag* are used for at least 4 species of heather, genus *Erica*
- *Ghassoul* and *taghassoult* covers 2 genera and at least 3 species (Fig. 1): *Aizoon canariense* L., *Aizon hispanicum* L. and *Mesembryanthemum nodiflorum* L.

Overview on moroccan aromatic and medicinal plants

For the current paper we have stripped the work of Bellakhar (1997), Hmamouchi (1999) and Sijelmassi (1990) that give us a list of 446 species (Tab. 1). But, it should be reminded that maybe a tens others are not listed ; we had not had the possibility to use some unpublished words like reports and thesis. They belong to 31 different genera whose names appear in the table followed by the abbreviation « spp » meaning more species.

Quantitatively, our inventory does not stray much from that of Lamrani-Alaoui *et al.* (work under study) which provide a total of 498 species.

Richness and diversity

Currently available data, compiled in Table 1, allow to estimate that there are at least 500 species of natural

aromatic and medicinal plants in Morocco used at variant degrees and to different means, approximately 12 % of the total flora of the country (Fennane & Ibn Tattou 2011).

97 families and 295 genera are concerned, representing respectively 62 % and almost 30 % of nationwide figures.

As important families, *Asteraceae* (*Compositae*), *Lamiaceae* (*Labiatae*), *Apiaceae* (*Umbelliferae*) and *Fabaceae* (*Leguminosae*) are in the lead with respectively 36, 30, 28 and 20 species.

The Moroccan aromatic and medicinal plants show all life forms, but within variable proportions approximately 40 % of therophytes and hemicryptophytes (annual, biennial or perennial herbaceous), 25 % of phanerophytes (trees and shrubs), 20 % of chamaephytes (shrubs) and 15 % geophytes (bulb, rhizome or tuber plants).

Endemism and rarity

At least, 15 Moroccan endemic species are exploited as aromatic and/or medicinal plants: *Acacia gummifera* Willd., *Argania spinosa* (L.) Skeels, *Artemisia mesatlantica* Maire, *Cladanthus scariosus* (Ball) Oberpr. & Vogt, *Cupressus atlantica* Gaussen, *Digitalis purpurea* L., *Euphorbia resinifera* Berg. *Kleinia anteuophorbium* (L.) Haw., *Lavandula mairei* Humbert, *Origanum elongatum* (Bonnet) Emb. & Maire, *Pyrus mamorensis* Trabut, *Selaginella balansae* (A. Braun) Hieron., *Thymus broussonetii* Boiss., *Thymus riatarum* Humbert & Maire and *Verbascum sinuatum* L. This figure increases significantly when considering the lower taxonomic ranks that is subspecies, varieties and forms.

Concerning scarcity, we identified 41 species, distributed, according to Fennane & Ibn Tattou (1998) as follows: 16 very rare, 4 suspected very rare, 13 rare and 7 suspected rare (Tab. 1).

Table 1. Aromatic and medicinal plants of Morocco : Life form and distribution (after Fennane *et al.* 1999-2014) ; rarity (after Fennane & Ibn Tattou 1998). Ch: chamaephyte, G: geophyte (bulb, rhizome, tuber), G-p: geophyte parasite, Hém: hemicryptophyte, NPh: nanophanerophyte, Ph: phanerophyte, Th: therophyte, Th-b: bisannual, R: rare, RR: very rare, V: vulnerable, ● endemic.

	Scientific name	Vernacular name	Life form	Rarity	Distribution (see Fig. 2)
Pteridophyta (Fongères)	<i>Adiantum capillus-veneris</i> L.	<i>chaâr l-ghoul, qesbiat l-bir</i>	GR	R?	All divisions
	<i>Pteridium aquilinum</i> (L.) Kuhn.	<i>fershiwan</i>	GR		HA MA Man R
	<i>Dryopteris filix-mas</i> (L.) Schott		GR	R	MA Man Man R
	<i>Equisetum ramosissimum</i> Desf.	<i>oumsoukh, dalajouth</i>	GR		All divisions
	<i>Polypodium cambricum</i> L.	<i>ashtiwan</i>	GR		HA MA Mam Man Om LM R
	<i>Asplenium scolopendrium</i> L.				HA MA R
	<i>Selaginella balansae</i> (A. Braun) Hieron.			Hém	● AA HA MA Mam Man R
	<i>Sambucus nigra</i> L. (<i>Adoxaceae</i>)	<i>bourwabez, khaman, ansal</i>	NPh		HA MA Man R
Aizoaceae	<i>Aizoon canariense</i> L.	<i>ghassoul, taghassoult</i>	Th		Ms AA HA Mam Op LM R?
	<i>Aizoon hispanicum</i> L.	<i>ghassoul, taghassoult</i>	Th		Ms AA HA Mam Man Op Om LM R
	<i>Mesembryanthemum nodiflorum</i> L.	<i>ghassoul, taghassoult</i>	Th		Ms AA HA Mam Man Op Om LM R
	<i>Allium</i> spp. (<i>Alliaceae</i>)		GB		All divisions
Amaranthaceae	<i>Atriplex halimus</i> L.	<i>lgetef, ârmâs,</i>	NPh		Ms AA HA Mam Man Om Op LM R
	<i>Beta patellaris</i> Moq.	<i>selg, zlamour</i>	Th		Ms AA Mam Man LM R
	<i>Chenopodium album</i> L.	<i>baremrem, blich, blitou</i>	Th		All divisions
	<i>Chenopodium ambrosioides</i> L.	<i>mkhinza</i>	Th		Ms AA HA Mam Man Op LM R
	<i>Cornulaca monacantha</i> Delile	<i>l-had, tahara</i>	NPh		Ms
	<i>Fredolia aretioides</i> (Bunge) Ulbr.	<i>choufleur bou-hmama, akenmoud</i>	Ch		Ms As AA HA Op
	<i>Hammada articulata</i> (Moq.) Bolòs & Vigo	<i>remt, assay</i>	Ch		Ms As AA HA Mam Op
	<i>Salsola</i> spp.	<i>ghassal</i>	Ch, NPh		All divisions
	<i>Suaeda</i> spp.	<i>swida, tirebar</i>	Ch		All divisions
	<i>Traganum nudatum</i> Delile	<i>demran, tashra, el-ousrouf</i>	Ch		Ms Op
Anacardiaceae	<i>Pistacia atlantica</i> Desf.	<i>btem, atmou, kwawas, tasmalt</i>	Ph		All divisions
	<i>Pistacia lentiscus</i> L.	<i>drou, imeket, tiket, fadis</i>	Ph		As AA HA MA Mam Man Om LM R
	<i>Rhus albida</i> Schousboe	<i>zewwaya</i>	NPh		Ms AA Mam
	<i>Rhus pentaphylla</i> (Jacq.) F. A. Barkley	<i>tizgha</i>	NPh		All divisions except As
	<i>Rhus tripartita</i> (Ucria) Moffett	<i>jdari</i>	NPh		Ms As AA HA Mam
Apiaceae	<i>Ammi majus</i> L.	<i>triillan</i>	Th		AA HA MA Mam Man Op Om LM R
	<i>Ammi visnaga</i> (L.) Lam.	<i>bechnikha,</i>	Th		All divisions
	<i>Ammodaucus leucotrichus</i> Coss. & Dur.	<i>kemmoun essufi</i>	Th	R?	Ms AA?
	<i>Ammoides pusilla</i> (Brot.) Breistr.	<i>nanûkha</i>	Th		MA Mam Man Op Om LM R
	<i>Anethum graveolens</i> L.	<i>shibth, kamoun el-habchi</i>	Th	R?	As AA Mam Man Op LM
	<i>Apium graveolens</i> L.	<i>krafess</i>	Th-b		Ms Mam Man Op Om LM R
	<i>Athaminta sicula</i> L.	<i>shkouta del-hjar, tafrifrane</i>	Hém		All divisions except As
	<i>Bupleurum fruticosum</i> L.		NPh		MA LM R
	<i>Cachrys libanotis</i> L.	<i>koullikha</i>	Hém		HA MA Mam Man Om LM R
	<i>Conium maculatum</i> L.	<i>barbush, hliliba, shikran</i>	Th-b		HA MA Mam Man Op Om LM R
	<i>Daucus carota</i> L.	<i>jâida</i>	Th-b		All divisions
	<i>Daucus crinitus</i> Desf.	<i>bouzeffour</i>	G		AA HA MA Mam Man Op Om LM R
	<i>Deverra denudata</i> (viv.) Pfisterer & Podl.	<i>gezzakh, zaâzaâ</i>	NPh		Ms AA Op

	<i>Deverra scoparia</i> Coss. & Durieu	gezzaky, âttash	Ch	Ms As AA HA MA Mam Op LM R
	<i>Eryngium campestre</i> L.	Chouk lebiad	Hém	HA MA Mam Man Op Om LM R.
	<i>Eryngium ilicifolium</i> Lam.	zerriga, sekkour, kaf sbaâ	Th	All divisions
	<i>Eryngium tricuspdatum</i> L.	kharzizwa, hessika, keff d-dib	Hém	Ms AA HA MA Mam Man Om LM R
	<i>Eryngium triquetrum</i> Vahl.	shuka zerqa, qersaâna	Hém	HA MA Mam Man Op Om LM R
	<i>Ferula communis</i> L.	El-kelkh	G	All divisions
	<i>Foeniculum vulgare</i> Miller	besbas, amsa, nafaâ	Ch	All divisions
	<i>Helosciadium nodiflorum</i> (L.) Koch	ziyyata	G	All divisions except As
	<i>Kundmannia sicula</i> (L.) DC.	ziyyata	G	AA HA MA Mam Man Om LM R.
	<i>Magydaris panacifolia</i> (Vahl) Lange	frifra	G	HA MA Man R
	<i>Magydaris pastinacea</i> (Lam.) Paol.	Frifra	G	MA Man Om-1 LM R
	<i>Petroselinum crispum</i> (Miller) Hill	maâdnus, maqdunes, imzi	Th	HA MA Om LM R
	<i>Pimpinella tragium</i> Vill.		Hém	As HA MA R
	<i>Ridolfia segetum</i> Moris	aslili, tebch, slili, besbes	Th	HA MA Mam Man Op Om LM R
	<i>Sanicula europaea</i> L.		Hém	MA LM R
	<i>Smyrniolum olusatrum</i> L.	zekaya, krafess berri, rwaba, hayar, abaghor	G	HA MA Mam Man Op Om LM R
	<i>Thapsia transtagana</i> Brot.	deryas, rwaba, abagur	G	Ms? HA MA Mam Man Op Om LM R
	<i>Thapsia villosa</i> L.	deryas, rwaba, rapat chkaoui	G	AA HA MA Mam Man Om LM R
	<i>Nerium oleander</i> L. (<i>Apocynaceae</i>)	defla, âlili	Nph	All divisions
	<i>Ilex aquifolium</i> L. (<i>Aquifoliaceae</i>)	âbd-l-iser, tasaft-n-yizem	NPh	HA MA R
Araceae	<i>Arisarum simorrhinum</i> Durieu	yerni, ayerna, bgûgâ	GT	AA HA MA Mam Man Om LM R
	<i>Arisarum vulgare</i> Targ.-Tozz.	yerni, ayerna, bgûgâ	GT	All divisions
	<i>Arum hygrophylum</i> Boiss.	yerni, ayerna, bgûgâ	GT	RR MA Mam Man Op
	<i>Arum italicum</i> Mill.	yerni, ayerna, bgûgâ	GT	HA MA Mam Man Op Om LM R
	<i>Hedera helix</i> L. (<i>Araliaceae</i>)	louwaya, tanesfalt	Ph-I	AA HA MA Man Om LM R
	<i>Chamaerops humilis</i> L. (<i>Arecaeae</i>)	doum, âzef, ghaz, tigeztemt	NPh	AA HA MA Mam Man Om LM R
	<i>Aristolochia baetica</i> L. (<i>Aristolochiaceae</i>)	barreztem, ajrarkh	Ph-I	Ms AA HA Mam Man Om LM R
	<i>Aristolochia paucinervis</i> Pomel (")	berreztem	G	AA HA MA Mam Man Om LM R
Asclepiadaceae	<i>Calotropis procera</i> (Aiton) Aiton fil.	tourza	NPh	Ms AA Mam
	<i>Leptadenia pyrotechnica</i> (Forssk.) Dne.	âshabay, titarek	NPh	RR? Ms
	<i>Pergularia tomentosa</i> L.	um-jlud, el-âlqa, tazzert	Ch	Ms As? Op?
	<i>Periploca angustifolia</i> Labill.	hellab	NPh	Ms As AA HA Mam Op Om LM R
Asparagaceae	<i>Agave americana</i> L.	sebra, sebbar	Hém	AA HA MA Mam Man Om LM R
	<i>Agave sisalana</i> Perrine		Hém	Mam Man R
	<i>Asparagus acutifolius</i> L.	sekkum, azzu, azzwi, tazzut	NPh	All divisions except Ms
	<i>Asparagus albus</i> L.	sekkoum, azou, azoui, chbarbak	NPh	AA HA MA Mam Man Op Om LM R
	<i>Asparagus</i> spp.			All divisions
	<i>Drimia maritima</i> (L.) Stearn	âansal, bsal ed-dib, ikfil	GB	All divisions except As
	<i>Drimia noctiflora</i> (Batt. & Trab.) Stearn	âansal, têtîlûm	GB	Ms AA HA
	<i>Ruscus aculeatus</i> L.	khizrane beldi, ass berri	NPh	All divisions except Ms
Asphodelaceae	<i>Asphodelus fistulosus</i> L.	berwag, ingri, tighri, bliluz	Th, Hém	Ms AA HA MA Mam Op Om LM R
	<i>Asphodelus ramosus</i> L.	berwag, ingri, tighri, bliluz	GR	All divisions
	<i>Asphodelus</i> spp.	berwag, ingri, tighri, bliluz		All divisions
	<i>Asphodelus tenuifolius</i> Cav.	berwag, ingri, tighri, bliluz	Th	All divisions

Asteraceae	<i>Aaronsohnia pubescens</i> (Desf.) Bremer & Humphries	<i>ghzim sghir, Iguertouf, lerbyan</i>	Th		Ms As AA HA MA Mam Op
	<i>Achillea leptophylla</i> M. Bieb.	<i>shwihya, qort</i>	Th		HA MA Op Om
	<i>Achillea santolinoides</i> Lag.	<i>shwihya, qort, kaysoum</i>	Ch		AA HA MA Mam Man Op Om LM R
	<i>Anacyclus pyrethrum</i> (L.) Link	<i>tagendest, tigentast, hallala</i>	Hém		As AA HA MA Man Op Om R
	<i>Anacyclus radiatus</i> Loisel.	<i>bellala, qraâ-djaja</i>	Th		Ms HA MA Mam Man Op Om LM R
	<i>Anvillea radiata</i> Cosson & Durieu	<i>nogd, menquwus, ajri, ajig</i>	Ch		Ms As AA Mam Op
	<i>Arctium atlanticum</i> (Pomel) H. Lindb.		Hém		HA MA Man R
	<i>Artemisia absinthium</i> L.	<i>shiba, chihh er-roumi</i>	Ch	RR	MA Op
	<i>Artemisia herba-alba</i> (s.l.)	<i>chihh, izri, ifsi, ifssi</i>	Ch		Ms AA HA MA Op Om LM R
	<i>Artemisia mesatlantica</i> Maire	<i>ifsi</i>	Ch		• AA HA MA
	<i>Asteriscus graveolens</i> (Forssk.) Less.	<i>karbaba</i>	Ch		Ms As AA HA Mam
	<i>Atractylis cancellata</i> L.	<i>najma, asnman wado</i>	Th		All divisions
	<i>Bellis annua</i> L.	<i>hallala</i>	Th		HA MA Mam Man Op Om LM R
	<i>Bellis sylvestris</i> Cyr.	<i>hellala, ribruba</i>	Hém		AA HA MA Mam Man Op Om LM R
	<i>Brocchia cinerea</i> (Delile) Vis.	<i>qertufa, ribruba, tiklilt</i>	Th	R?	Ms
	<i>Calendula stellata</i> Cav.		Th	R?	AA HA MA Mam Man Op Om LM R
	<i>Carlina gummifera</i> (L.) Less.	<i>addad, aghfyoun</i>	Hém		HA MA Mam Man Om LM R
	<i>Carthamus lanatus</i> L.	<i>guerguer</i>	Th		All divisions except Ms
	<i>Carthamus pinnatus</i> Desf.	<i>guern-jdi, timet</i>	Hém		AA HA MA Man Om LM R
	<i>Centaurea pungens</i> Pomel	<i>neggir</i>	Th Hém		All divisions
	<i>Chamaemelum nobile</i> (L.) All.	<i>babunj, babnuj, ghegwan</i>	Th-b		MA Man LM R
	<i>Chrysanthoglossum trifurcatum</i> (Desf.) B. H. Wilcox & al.	<i>tayrrigt</i>	Ch	RR	Ms Op
	<i>Cichorium intybus</i> L.	<i>bu aggad, adgurru, timerzuga</i>	Hém		HA MA Man Op Om LM R
	<i>Cladanthus mixtus</i> (L.) Chevall.	<i>hellala</i>	Th		HA MA Mam Man Op Om LM R
	<i>Cladanthus scariosus</i> (Ball) Oberpr. & Vogt	<i>irzghi</i>	Ch		• AA HA MA
	<i>Cotula anthemoides</i> L.	<i>l-wazwaza</i>	Th	RR	Ms
	<i>Cynara humilis</i> L.	<i>kouk lakhla, tagemmut, afzan</i>	G		HA MA Mam Man LM R
	<i>Dittrichia viscosa</i> (L.) Greuter	<i>Tirrhilane</i>	Ch		AA HA MA Mam Man Op Om LM R
	<i>Echinops spinosissimus</i> Turra	<i>tasekra, asekra, timat</i>	Hém		All divisions
	<i>Glebionis coronaria</i> (L.) Spach	<i>khellala, gehwan, l-gentus, jeghwar, kraâ djaja</i>	Th		All divisions except As
	<i>Ifloga spicata</i> (Forssk.) Schultz Bip.	<i>d-dsayma</i>	Th		Ms As AA HA Mam Op
	<i>Kleinia anteuphorbium</i> (L.) Haw.	<i>shbartou</i>	NPh		• Ms AA HA Mam
<i>Lactuca serriola</i> L.	<i>assafar, n'sem</i>	Th-b		AA HA MA Man R	
<i>Lactuca virosa</i> L.	<i>l-beina, tiffaf-idan</i>	Th-b		AA HA MA Man R	
<i>Launaea arborescens</i> (Batt.) Maire	<i>mmu l-lbina, iferskil, intrim</i>	NPh		All divisions	
<i>Matricaria chamomilla</i> L.	<i>babounj</i>	Th	RR	Man LM R	
<i>Podospermum laciniatum</i> (L.) DC.	<i>guiz-guiz, aguifa</i>	Th-b		All divisions except Ms	
<i>Pulicaria arabica</i> (L.) Cass.	<i>al-ghara, tiijirin</i>	Th		Ms AA HA MA Mam Man LM R	
<i>Pulicaria inuloides</i> (Poiret) DC.	<i>al-âtassa</i>	Hém		All divisions	
<i>Pulicaria odora</i> (L.) Reichenb.	<i>henniwa, hannioua</i>	Hém		HA MA Mam Man Om LM R	
<i>Pulicaria undulata</i> (L.) C. A. Meyer	<i>âmeyo, al-âtassa</i>	Ch	R?	Ms	
<i>Santolina africana</i> Jord. & Fourr.	<i>ayrar, tayrart, idzghi</i>	Ch		As HA MA Op	
<i>Santolina pectinata</i> Cav.	<i>ayrar, tayrart, idzghi</i>	Ch		As HA HA MA R	

	<i>Scolymus hispanicus</i> L.	<i>guernina, taghdut, zarnij</i>	Hém		All divisions except As
	<i>Scolymus maculatus</i> L.	<i>guernina, taghdut, zarnij</i>	Th		HA MA Mam Man Op Om LM R
	<i>Scorzonera undulata</i> Vahl.	<i>igiz, talma</i>	Hém		All divisions
	<i>Senecio leucanthemifolius</i> Poiret	<i>lâchba salma, shiba salma</i>	Th		Ms HA MA Mam Man Op Om LM R
	<i>Senecio vulgaris</i> L.	<i>lâchba salma, taanana, hiyara</i>	Th		AA HA MA Mam Man Op Om LM R
	<i>Silybum marianum</i> (L.) Gaertn.	<i>tawra, bu zerwal, chouk lahmir</i>	Th		Ms HA MA Mam Man Op Om LM R
	<i>Sonchus oleraceus</i> L.	<i>tfaf, wagerin, tadgamit</i>	Th		All divisions
	<i>Sonchus</i> spp.		Th, Hém		All divisions
	<i>Warionia saharae</i> Benth. & Cosson	<i>afezdad, afessas, tirnet</i>	NPh		Ms As AA HA Mam
	<i>Berberis hispanica</i> Boiss. & Reuter (<i>Berberidaceae</i>)	<i>bousman, izzirki, ighris</i>	NPh		As HA MA R
<i>Boraginaceae</i>	<i>Borago officinalis</i> L.	<i>horraycha, bou-assal, uzgar</i>	Th		AA HA MA Mam Man Op Om LM R
	<i>Cynoglossum</i> spp.	<i>ouden-taâleb, lsan-elkelb, bou-hamdouna</i>	Th-b		All divisions
	<i>Echium horridum</i> Batt.	<i>lharsha, lsan-lbgar, tanasat</i>	Th		Ms AA HA Mam Man Op LM R
	<i>Echium plantagineum</i> L.		Th		AA HA MA Mam Man Op Om LM R
	<i>Heliotropium crispum</i> Desf.	<i>hebbaliya, tidallin, khuniza</i>	Ch		Ms AA Mam
	<i>Heliotropium erosum</i> Lehm.	<i>hebbaliya, takhena, khuniza</i>	Ch		Ms AA Mam
	<i>Heliotropium europaeum</i> L.	<i>hebbaliya, akerir, khuniza</i>	Th		AA HA MA Mam Man Op Om LM R
	<i>Heliotropium supinum</i> L.	<i>hebbaliya, tidallin, khuniza</i>	Th		AA Mam Man Op Om LM R
<i>Moltkiopsis ciliata</i> (Forssk.) I. M. Johnston	<i>ânshaâ, lkhenna, halma</i>	Ch	R?	Ms	
<i>Brassicaceae</i>	<i>Anastatica hierochuntica</i> L.	<i>kmicha, tamkelt</i>	Th		Ms As AA Mam? Op?
	<i>Brassica nigra</i> (L.) Koch	<i>âshnab, khardal, kerkaz</i>	Th		Ms? Man? R?
	<i>Capsella bursa-pastoris</i> (L.) Medicus	<i>kiss er-raïi</i>	Th		All divisions
	<i>Diplotaxis</i> spp.	<i>l-kerkaz, l-harra, asheryad, bou-hammou</i>			Ms As AA HA MA Mam Man Op Om LM R
	<i>Eremophyton chevallieri</i> (Barratte) Béguinot	<i>l-gelglan, awenig</i>	Th		Ms AA
	<i>Eruca vesicaria</i> (L.) Cav.	<i>l-harra, l-erjir, buhammou</i>	Th		All divisions
	<i>Farsetia aegyptia</i> Turra	<i>ûd-labiad, zaâzaâ, tissit</i>	Ch		Ms As AA Op
	<i>Lobularia maritima</i> (L.) Desv.	<i>âgerma</i>	Th Ch		All divisions except As
	<i>Morettia canescens</i> Boiss.	<i>tuzbaget, hebbaliya</i>	Th		Ms As AA
	<i>Moricandia arvensis</i> (L.) DC.	<i>Krumb-jmel, jerjir</i>	Th		All divisions
<i>Sinapis alba</i> L.	<i>Ashnab, khardal, kerkaz</i>	Th		AA HA MA Mam Man Op Om LM R	
<i>Buxus balearica</i> Lam. (<i>Buxaceae</i>)	<i>baqs</i>	NPh		As? AA HA MA Op Om LM R	
<i>Buxus sempervirens</i> L. (")	<i>baqs</i>	NPh	V	HA	
<i>Opuntia ficus-barbarica</i> A. Berger (<i>Cactaceae</i>)	<i>hendia, zaâboul</i>	NPh-s		AA HA MA Mam Man Om LM R	
<i>Capparaceae</i>	<i>Capparis decidua</i> (Forssk.) Edgew.	<i>eignin</i>	Ph	R	Ms
	<i>Capparis spinosa</i> (s. l.)	<i>Kebbar, taylulut</i>	Ch		All divisions
	<i>Maerua crassifolia</i> Forssk.	<i>atil</i>	Ph		Ms
<i>Lonicera periclymenum</i> L. (<i>Caprifoliaceae</i>)	<i>irifi, buzrurud, qab nigayzen</i>	NPh-l		MA Man LM R	
<i>Caryophyllaceae</i>	<i>Herniaria hirsuta</i> L.	<i>harras lehjar</i>	Th	R	All divisions
	<i>Saponaria glutinosa</i> MB.	<i>tighighicht</i>	Th-b		As HA MA Om LM R
	<i>Spergularia media</i> (L.) Presl.	<i>boughlam</i>	Hém		Ms As AA MA Mam Man Op LM R.
	<i>Vaccaria hispanica</i> (Miller) Rauschert	<i>tighighest, hamrat er-ras</i>	Th		All divisions

<i>Cistaceae</i>	<i>Cistus albidus</i> L.	<i>bechnikh, tanaghoust</i>	NPh		AA Mam Man Om LM R
	<i>Cistus crispus</i> L.	<i>shettaba</i>	Ch		MA Man LM Om R
	<i>Cistus ladanifer</i> L.	<i>ftakh, targla, bouzegzaw, touzzal</i>	NPh		MA Man Om LM R
	<i>Cistus laurifolius</i> L.	<i>amziwet</i>	Ch		HA MA Om LM? R
	<i>Cistus monspeliensis</i> L.	<i>shettaba</i>	NPh		AA HA MA Mam Man Om LM R
	<i>Cistus populifolius</i> L.	<i>irgel, hinikko, agullid</i>	NPh		HA R
	<i>Cistus salviifolius</i> L.	<i>chettaba, irgel, tuzzalt</i>	Ch		AA HA MA Mam Man Om LM R
	<i>Androcymbium gramineum</i> (Cav.) Mc Bride (<i>Colchicaceae</i>)	<i>sgaât lerneb, keykut, germi</i>	GB		Ms Mam Man Man R
	<i>Colchicum lusitanum</i> Brot. (")	<i>boukbouba, el bessela</i>	G		HA MA Mam Man Om LM? R
<i>Convolvulaceae</i>	<i>Convolvulus althaeoides</i> L.	<i>louwaya, tamnayt, mesran eddib, tanesfalt</i>	Hém		Ms As AA HA MA Mam Man Op Om LM R
	<i>Convolvulus arvensis</i> L.	<i>louwaya, tamnayt, mesran eddib, tanesfalt, onsofan</i>	G		Ms As AA HA MA Mam Man Op Om LM R
	<i>Cressa cretica</i> L.	<i>l-ghbwira, wammas, mellikha, dsima</i>	Hém		Ms AA Mam Man Op LM R
	<i>Cuscuta</i> spp.	<i>hrir-eddib, akshut, sla-lkelba, boujlala</i>	Th		AA HA MA Mam Man Op Om LM R
<i>Cucurbitaceae</i>	<i>Bryonia dioica</i> Jacq.	<i>âneb-eddib, adil n-wuchen</i>	G		Ms As AA HA MA Mam Man Op Om LM R
	<i>Citrullus colocynthis</i> (L.) Schrader	<i>hdej, ilif, taferzizt, hantal</i>	G		Ms As AA HA MA Mam Man Op Om LM R
	<i>Ecballium elaterium</i> (L.) A. Richard	<i>feggous-lehmir</i>	G		Ms Mam Man Op LM R
<i>Cupressaceae</i>	<i>Cupressus atlantica</i> Gaussen	<i>sarw, azel</i>	Ph	V	• HA
	<i>Juniperus hemisphaerica</i> C. Presl.	<i>ifsar-n-taqqa, taoult</i>	NPh	RR	HA MA R
	<i>Juniperus oxycedrus</i> L.	<i>taqqa, tiqqi</i>	Ph		As AA HA MA Man Om LM R
	<i>Juniperus phoenicea</i> L.	<i>ârâar-el-horr, ayfs</i>	Ph		As AA HA MA Mam Man Op Om LM R
	<i>Juniperus thurifera</i> L.	<i>âwal, tawalt, adroumane</i>	Ph	V	AA HA MA
	<i>Tetraclinis articulata</i> (Vahl) Masters	<i>ârâar, azuka, amelzi</i>	Ph		AA HA MA Mam Man Op Om LM R
	<i>Cynomorium coccineum</i> L. (<i>Cynomoriaceae</i>)	<i>tertut, l-guennuya, âfdâd</i>	G-p		Ms As AA HA MA? Mam Man Op LM R
	<i>Cyperus longus</i> L. (<i>Cyperaceae</i>)	<i>ârouk essaâd, sokait, tara</i>	GR		Ms As AA HA MA Mam Man Op Om LM? R
	<i>Cyperus rotundus</i> L. (")	<i>tamouchayt, sawâd, essaâd</i>	GR		Ms HA Mam Man LM R
	<i>Ephedra alata</i> Decaisne (<i>Ephedraceae</i>)	<i>el-âlanda</i>	NPh		Ms
<i>Ericaceae</i>	<i>Arbutus unedo</i> L.	<i>bakhannou, sasnou</i>	Ph		AA HA MA Mam Man Om LM R
	<i>Calluna vulgaris</i> (L.) Hull	<i>hlenj</i>	Ch	R	Man R
	<i>Erica arborea</i> L.	<i>hlenj, bou heddad, herrag</i>	NPh		MA Man Op Om LM R
	<i>Erica australis</i> L.	<i>hlenj, bou heddad, herrag</i>	NPh	RR?	R
	<i>Erica multiflora</i> L.	<i>hlenj, bou heddad, herrag</i>	NPh		Man Om LM R
	<i>Erica scoparia</i> L.	<i>hlenj, bou heddad, herrag</i>	NPh		Man Om LM R
<i>Euphorbiaceae</i>	<i>Chrozophora tinctoria</i> (L.) A. Juss.	<i>meraâs, âfarak</i>	Th		HA? MA Mam Man LM R
	<i>Euphorbia balsamifera</i> Aiton	<i>afdir, afernan</i>	NPh	V	Ms AA
	<i>Euphorbia calyptrata</i> Cosson & Durieu	<i>r-remmada</i>	Th		Ms As AA
	<i>Euphorbia characias</i> L.		Ch		Om LM R
	<i>Euphorbia falcata</i> L.	<i>halliba</i>	Th		As AA HA MA Mam Man Op Om LM R
	<i>Euphorbia granulata</i> Forssk.	<i>kbidat-ed-dobb</i>	Th		Ms AA Op LM R?
	<i>Euphorbia helioscopia</i> L.	<i>halliba, oum-lbina, tanougha</i>	Th		Ms As AA HA MA Mam Man Op Om LM R

	<i>Euphorbia lathyris</i> L.	<i>mahudana</i>	Th-b	Mam Man
	<i>Euphorbia nicaeensis</i> All.	<i>tezzi urturya, tanagut</i>	Ch	Ms HA MA LM
	<i>Euphorbia officinarum</i> L.	<i>daghmous, tikiut, zekkoum</i>	NPh-s	Ms AA Mam
	<i>Euphorbia peplus</i> L.	<i>hezaza</i>	Th	Ms As AA HA MA Mam Man Op Om LM R
	<i>Euphorbia regis-jubae</i> Webb & Berth.	<i>el-fernan, afdir</i>	NPh	Ms AA Mam Man
	<i>Euphorbia resinifera</i> Berg.	<i>tikiut, zekkoum</i>	NPh-s	• AA HA MA Mam
	<i>Euphorbia</i> spp.	<i>oum-lbina, houlliba...</i>		All divisions
	<i>Mercurialis annua</i> L.	<i>archud, hourrigua melsa</i>	Th	All divisions
	<i>Ricinus communis</i> L.	<i>kherwaâ, awriwra</i>	Ph	All divisions
Fabaceae	<i>Acacia ehrenbergiana</i> Hayne	<i>amrad, tamat, talh</i>	Ph	Ms AA
	<i>Acacia gummifera</i> Willd.	<i>taddut, talh</i>	Ph	• Ms AA HA Mam Man
	<i>Acacia raddiana</i> Savi	<i>talh</i>	Ph	Ms AA
	<i>Acacia</i> spp.		Ph	Ms AA
	<i>Anagyris foetida</i> L.	<i>kharrub-l-klab, âûfni, anaghrouss, ibwar</i>	NPh	AA HA MA Mam Man LM R
	<i>Anthyllis vulneraria</i> L.	<i>akrus</i>	Hém, Th	AA HA MA Mam Man Op Om LM R
	<i>Astragalus akkensis</i> Cosson	<i>kechchir</i>	Hém	Ms AA HA Mam
	<i>Astragalus lusitanicus</i> Lam.	<i>fouila</i>	GR	AA HA Mam Man Om LM R
	<i>Astragalus monspessulanus</i> L.		Hém	RR R
	<i>Astragalus</i> spp.			All divisions
	<i>Bituminaria bituminosa</i> (L.) Stirton	<i>chgiriya</i>	Hém	All divisions
	<i>Calicotome infesta</i> (C. Presl) Guss.	<i>admam, joundoul</i>	NPh	MA Man Om LM R
	<i>Calicotome villosa</i> (Poiret) Link	<i>admam, joundoul</i>	NPh	MA Man R
	<i>Ceratonia siliqua</i> L.	<i>kharroub, slaghoua, tikida</i>	Ph	All divisions except Ms
	<i>Crotalaria saharae</i> Cosson	<i>l-fula, âfarfar</i>	Ch	Ms
	<i>Cullen plicatum</i> (Delile) Stirton	<i>tatrâret</i>	Hém	Ms
	<i>Faidherbia albida</i> (Delile) A. Cheval.	<i>âfrar, talh labiad</i>	Ph	RR? Ms
	<i>Genista</i> spp.		NPh	AA HA MA Mam Man Op Om LM R
	<i>Glycyrrhiza foetida</i> Desf.	<i>êrk-es-souss</i>	G	Man R
	<i>Indigofera</i> spp.	<i>nila, ânîl, l-gâra, atteihane</i>		Ms?
	<i>Lotus jolyi</i> Batt.	<i>um-hallus</i>	Hém	Ms AA
	<i>Lupinus angustifolius</i> L.	<i>semkala, fouila</i>	Th	AA HA MA Mam Man R
	<i>Lupinus cosentini</i> Guss.	<i>semkala, fouila</i>	Th	AA HA Mam Man R
	<i>Lupinus luteus</i> L.	<i>tegefa, semkala</i>	Th	Mam Man R
	<i>Lupinus micranthus</i> Guss.	<i>semkala, fouila</i>	Th	AA MA Mam Man R
	<i>Melilotus officinalis</i> (L.) Lam.	<i>azrud, chnane, tazumart</i>	Th	Ms
	<i>Melilotus sulcatus</i> Desf.	<i>nefla, nilza</i>	Th	All divisions
	<i>Ononis natrix</i> L.	<i>âfezzaz, saboun laâzara</i>	Ch	All divisions
	<i>Ononis spinosa</i> L.		Ch	AA HA MA Mam Man Om LM R
	<i>Retama monosperma</i> (L.) Boiss.	<i>rtem, algou</i>	NPh	Ms AA HA Mam Man Om LM R
	<i>Retama raetam</i> (Forssk.) Webb	<i>rtem, algou</i>	NPh	Ms
	<i>Retama sphaerocarpa</i> (L.) Boiss.	<i>talggut, algou</i>	NPh	Ms As HA MA Op
	<i>Senna italica</i> Mill.	<i>agerger, swina, znina</i>	Ch	R Ms
<i>Spartium junceum</i> L.	<i>habbur</i>	NPh	Mam Man R	

Fagaceae	<i>Castanea sativa</i> Miller	<i>qestal</i>	Ph	RR	MA? R
	<i>Quercus coccifera</i> L.	<i>kermez</i>	Ph		MA Om LM R
	<i>Quercus faginea</i> Lam. (s.l.)	<i>techt</i>	Ph		HA MA Man R
	<i>Quercus pyrenaica</i> Willd	<i>techt</i>	Ph		R
	<i>Quercus rotundifolia</i> Lam.	<i>kerrouch, ballout lakhdar</i>	Ph		As AA HA MA Mam Man Om LM R.
	<i>Quercus suber</i> L.	<i>ferchi, felline, lfernane</i>	Ph		HA MA Man Om LM R.
Gentianaceae	<i>Blackstonia perfoliata</i> (L.) Hudson		Th		HA MA Man Om R
	<i>Centaurium erythraea</i> Rafn	<i>gousset-l-hayya, merraret lehnech</i>	Th		AA HA MA Mam Man Om LM R
	<i>Centaurium pulchellum</i> (Swartz) Druce	<i>gousset-l-hayya, merraret lehnech</i>	Th		Ms AA HA MA Man LM R
	<i>Centaurium spicatum</i> (L.) Fritsch	<i>gousset-l-hayya, merraret lehnech</i>	Th		Ms AA HA Mam Man Op Om LM R
Geraniaceae	<i>Erodium ciconium</i> (L.) L'Her.	<i>abou machgha, aghanbou</i>	Th		HA AA Mam Man Om LM R
	<i>Geranium robertianum</i> L.		Th		AA HA MA R
	<i>Globularia alypum</i> L. (<i>Globulariaceae</i>)	<i>taselgha, aïn larneb</i>	Ch		Ms As AA HA MA Mam Man Op Om LM R
	<i>Ribes uva-crispa</i> L. (<i>Grossulariaceae</i>)	<i>adil n-wussen, fadijji</i>	NPh		AA HA MA LM? R
Hypericaceae	<i>Hypericum montanum</i> L.		Ch		MA Man R
	<i>Hypericum perforatum</i> L.	<i>roummane-al-anhar</i>	Ch		Ms AA HA MA Mam Man Op Om LM R
	<i>Hypericum tetrapertum</i> Fries		Ch	RR?	Man? R
Iridaceae	<i>Iris pseudacorus</i> L.	<i>as-susan lasfar ; sif-eddib</i>	G		HA MA Mam Man Om? LM R
	<i>Iris tingitana</i> Boiss. & Reuter		G		HA MA Mam Man Op Om LM R
Juncaceae	<i>Juncus acutus</i> L.	<i>smar, azlaf, azmay</i>	Hém		Ms HA MA Mam Man Op LM R
	<i>Juncus articulatus</i> L.	<i>smar, azlaf, azmay</i>	GR		HA MA Mam Man Om LM R
	<i>Juncus bufonius</i> L.	<i>lehyet el-âtrous</i>	Th		All divisions
Lamiaceae	<i>Ajuga iva</i> (L.) Schreber	<i>chendgoura, tûf tolba</i>	Hém		All divisions
	<i>Cleonia lusitanica</i> (L.) L.		Th		HA MA Mam Man Op LM R
	<i>Clinopodium alpinum</i> (L.) Kuntze		Ch		AA HA MA Man Om LM R
	<i>Clinopodium nepeta</i> (L.) Kuntze	<i>mentha</i>	Ch		HA MA Man Op Om LM R
	<i>Clinopodium</i> spp.				AA HA MA Mam Man Op Om LM R
	<i>Clinopodium vulgare</i> L.		Ch		HA MA Man Om LM R
	<i>Hyssopus officinalis</i> L.	<i>ssouf el-yabes, tefrourd</i>	Ch		As HA
	<i>Lavandula dentata</i> L.	<i>taymerza, khzama, halhal</i>	Ch		AA HA MA Mam Man LM Op Om R
	<i>Lavandula mairei</i> Humbert	<i>igiz, tizrit</i>	Ch		• Ms AA HA
	<i>Lavandula multifida</i> L.	<i>kohhayla, igiz, tizrit</i>	Ch		AA HA MA Mam Man Op Om LM R
	<i>Lavandula</i> spp.		Ch		All divisions
	<i>Lavandula stoechas</i> (s.l.)	<i>halhal</i>	Ch		AA HA MA Mam Man LM Om R.
	<i>Marrubium deserti</i> (De Noé) Cosson	<i>j-jaâda</i>	Ch		Ms As AA HA Mam Op
	<i>Marrubium vulgare</i> L.	<i>marriout, ifezzi</i>	Ch		All divisions
	<i>Melissa officinalis</i> L.	<i>trounj, titizwit</i>	Ch		HA MA Man Op LM R
	<i>Mentha longifolia</i> (L.) Hudson	<i>tahindest</i>	Hém		HA MA Man Op LM?
	<i>Mentha pulegium</i> L.	<i>fliyou, afillgou</i>	Hém		AA HA MA Mam Man Op Om LM R
	<i>Mentha suaveolens</i> Ehrh.	<i>timerchad, mchichtrou, marsita, timijja, tifergali</i>	Hém		Ms As AA HA MA Mam Man Op Om LM R
	<i>Nepeta apuleii</i> Ucria	<i>qestân</i>	GR		AA HA MA Mam Man Op Om LM R
	<i>Origanum compactum</i> Benth.	<i>zaâtar, azwi</i>	Ch		MA Mam Man R
<i>Origanum elongatum</i> (Bonnet) Emb. & Maire	<i>zaâtar, azwi</i>	Ch	V	• MA Op LM R	

	<i>Origanum vulgare</i> L.	zaâtar	Ch		HA MA
	<i>Phlomis purpurea</i> L.		Nph, Ch		LM R
	<i>Rosmarinus officinalis</i> L.	azir, ikkil al-jabal, touzzalt	NPh		As HA MA Om Op R
	<i>Salvia aegyptiaca</i> L.	tazoukennit, keff-jmel	Ch		Ms As AA HA Mam Man Op LM R
	<i>Salvia lavandulifolia</i> Vahl.	tifessit	Ch		HA MA R
	<i>Salvia</i> spp.				All divisions
	<i>Salvia verbenaca</i> (L.) Briq.	khiyata, keff-jmel	Hém		All divisions
	<i>Satureja</i> spp.				All divisions
	<i>Sideritis hirsuta</i> L.		Ch		HA MA Man? R
	<i>Teucrium chamaedrys</i> L.	jâydiya	Ch		Ms HA MA R
	<i>Teucrium polium</i> L.	jâydiya, jaâda, ayrar	Ch		AA HA MA Mam Man Op Om LM R
	<i>Thymus broussonetii</i> Boiss.	zâitra, zaâtar lahmi		Ch	• HA
	<i>Thymus riatarum</i> Humbert & Maire		Ch		• MA R
	<i>Thymus satureioides</i> Cosson	azoukenni	Ch		As AA HA MA Mam
	<i>Thymus</i> spp.				All divisions
	<i>Ziziphora hispanica</i> L.	fliyou berri	Th		As HA MA Op Om R
	<i>Laurus nobilis</i> L. (Lauraceae)	chajrat sidna moussa	Ph	R	MA R
	<i>Lemna minor</i> L. (Lemnaceae)		HyN		All divisions
	<i>Linum bienne</i> L. (Linaceae)	kettan, el-feltas, el-atal	Th-b		AA HA MA Mam Man Op Om LM R
	<i>Viscum album</i> L. (Loranthaceae)	lenjbar	Ch-p	RR	R
	<i>Viscum cruciatum</i> Boiss. (")	lenjbar, asemnum, âmrives	Ch-p		As AA HA MA Man Op R
	<i>Lythrum junceum</i> Banks & Solander (Lythraceae)	rihan el-ma	Hém		All divisions
Malvaceae	<i>Alcea rosea</i> L.	ward zawân, tîbînshert			Om
	<i>Malva parviflora</i> L.	khubbayz, âbejjir	Th, Hém		Ms As
	<i>Malva sylvestris</i> L.	khubbayz, âbejjir	Hém		AA HA MA Mam Man Op Om LM R
	<i>Corrigiola litoralis</i> L. (Molluginaceae)	serghina, tawsargine	Th		Ms AA HA MA Mam Man Op R
	<i>Corrigiola telephiifolia</i> Pourret (")	serghina, tawsargine	Hém		AA HA MA Mam Man R
	<i>Myrtus communis</i> L. (Myrtaceae)	rrihane	NPh		Man Om LM? R
	<i>Nitraria retusa</i> (Forssk.) Asch. (Nitrariaceae)	guerzim	NPh		Ms AA Mam
	<i>Nymphaea alba</i> L. (Nymphaeaceae)		HyF	RR	Man R
Oleaceae	<i>Fraxinus angustifolia</i> Vahl	dardar, aseln, tuzzalt	Ph		HA MA Mam Man Om LM R
	<i>Fraxinus dimorpha</i> Cosson & Durieu	aseln, tuzzalt	Ph		As AA HA MA Om Op
	<i>Ligustrum vulgare</i> L.		NPh	RR	MA
	<i>Olea oleaster</i> Hoffmanns. & Link	berri, zebbouj	Ph		AA HA MA Mam Man Op Om LM R
	<i>Phillyrea angustifolia</i> L.	metwâl, imtutel, qtom	Ph		As? HA MA Man R
	<i>Phillyrea latifolia</i> L.	metwâl, imtutel, qtom	Ph		As AA HA MA Mam Man Om LM R
Orchidaceae	<i>Ophrys</i> spp.	l-heyya l-miyyta, hushat l-kelb, bayd n-hal	G		AA HA MA Mam Man Om LM R
	<i>Orchis italica</i> Poiret		G		MA Mam Man LM? R
	<i>Orchis morio</i> L.		G		HA MA Mam Man Op Om LM R
	<i>Orchis</i> spp.	l-heyya l-miyyta, bayd n-hal, hushat l-kelb	G		AA HA MA Mam Man Op Om LM R
Orobanchaceae	<i>Cistanche mauritanica</i> (Cosson & Durieu) G. Beck.	ddânnun, tartût, îderghis	G-p	RR	LM
	<i>Cistanche phelypaea</i> (L.) Coutinho	ddânnun, tartût, îderghis	G-p		Ms AA Mam Man Op LM R
	<i>Cistanche violacea</i> (Desf.) G. Beck	ddânnun, tartût, îderghis	G-p		Ms AA

Papaveraceae	<i>Paeonia coriacea</i> Boiss. (Paeoniaceae)	<i>habersis</i>	GR		HA MA R
	<i>Fumaria agraria</i> Lag.	<i>bu-dzurrin, waunifs, blighed</i>	Th		AA HA MA Mam Man Op Om LM R
	<i>Fumaria officinalis</i> L.	<i>khnumet naâja, shibâna</i>	Th		AA HA MA Mam Man Op Om LM R
	<i>Fumaria parviflora</i> Lam.	<i>dbayba, ijujer, qlila</i>	Th		Toutes les divisions
	<i>Papaver dubium</i> L.	<i>belaâmane, taludat, tikuk</i>	Th		As AA HA MA Mam Man Op Om LM? R
	<i>Papaver rhoeas</i> L.	<i>belaâmane, taludat, tikuk</i>	Th		All divisions
Pinaceae	<i>Abies marocana</i> Trabut	<i>chohh</i>	Ph	R	R
	<i>Cedrus atlantica</i> (Endl.) Carrière	<i>larz, îddil</i>	Ph		HA MA R
	<i>Pinus halepensis</i> Miller	<i>snouber, taïda</i>	Ph		As HA MA Om LM R
	<i>Pinus pinaster</i> Aiton	<i>snouber, taïda</i>	Ph		HA MA R
Plantaginaceae	<i>Plantago afra</i> L.	<i>zentet l-khrouf</i>	Th		All divisions
	<i>Plantago albicans</i> L.	<i>lyalma</i>	Hém		All divisions
	<i>Plantago coronopus</i> L.	<i>rjel l-ghrab</i>	Th		All divisions
	<i>Plantago major</i> L.	<i>rjel l-ghrab</i>	Th		HA MA Mam Man Op Om LM R
	<i>Plantago ovata</i> Forssk.		Th		All divisions, except As
	<i>Plantago</i> spp.	<i>zentet l-khrouf, rjel lghrab, lyalma</i>	Th, Hém		All divisions
Plumbaginaceae	<i>Armeria alliacea</i> (s.l.)	<i>êrg-wadmi</i>	Hém		AA HA MA R
	<i>Armeria simplex</i> Pomel	<i>êrg-wadmi</i>	Hém		Mam Man R
	<i>Limoniastrum ifniense</i> (A. Caball.) Font Quer	<i>zeyyat</i>	NPh		Ms AA Mam
	<i>Limonium lobatum</i> (L. fil.) Chaz.	<i>gârsha, tigursi</i>	Th		All divisions
	<i>Limonium sinuatum</i> (L.) Miller	<i>gârsha, tigursi</i>	Hém		Ms As AA HA MA Mam Man Op LM R
	<i>Limonium</i> spp.		Th, Hém		All divisions
	<i>Plumbago europaea</i> L.	<i>le'sham, swak erraâyan</i>	Ch, NPh		AA HA MA Mam Man Om LM R
Poaceae	<i>Arundo donax</i> L.	<i>kseb</i>	GR		All divisions
	<i>Cymbopogon schoenanthus</i> Spreng.	<i>idkhir, tadoumest, chajrat trab,</i>	Hém		Ms As AA HA MA Mam Man Op
	<i>Cynodon dactylon</i> (L.) Pers.	<i>njem, njil, tribatt, affar</i>	GR		All divisions
	<i>Elytrigia repens</i> (L.) Nevski	<i>rjel leghrab, njem</i>	G		HA MA Mam Man Op Om LM R
	<i>Imperata cylindrica</i> (L.) Rauschel	<i>silt, tibestaw, tebanawt</i>	G, Hém		Ms As Mam Man Op LM? R
	<i>Lolium</i> spp.	<i>zwan, gesmata, saylam, el-medhoun, afar, tibbatt</i>	Th		Ms As AA HA MA Mam Man Op Om LM R
	<i>Panicum miliaceum</i> L.	<i>tafsût, jawars</i>	Th		HA Mam Man ... ?
	<i>Panicum turgidum</i> Forssk.	<i>mou-rokba, tigusin</i>	Ch		Ms Mam
	<i>Phragmites australis</i> (Cav.) Steudel	<i>qseb, âganin</i>	GR		All divisions except Op
	<i>Stipa bromoides</i> (L.) Dörfl.	<i>l-behma, l-gumwidiya</i>	Hém		HA MA Man Om LM R
	<i>Stipagrostis pungens</i> (Desf.) De Winter	<i>drinn</i>	G		Ms As Op
Polygonaceae	<i>Persicaria hydropiper</i> (L.) Spach		Th		MA Man R
	<i>Polygonum aviculare</i> L.	<i>wadmou, betbet, gordab</i>	Th		AA HA MA Man LM R
	<i>Polygonum equisetiforme</i> Sm.	<i>wadmou, betbet, gordab</i>	Ch		Ms AA HA MA Mam Man Op R
	<i>Polygonum maritimum</i> L.	<i>ziyyata, ûd-mserser</i>	Ch		AA Mam Man LM R
	<i>Rumex acetosa</i> L.	<i>hummeida</i>	Hém		AA HA MA Man LM R
	<i>Rumex bucephalophorus</i> L.		Hém		All divisions
	<i>Rumex pulcher</i> L.		Hém		AA HA MA Mam Man Op Om LM R
	<i>Rumex</i> spp.	<i>hummeida, tasamam, gurisha, henzab, hazzu</i>			Ms As AA HA MA Mam Man Op Om LM R
	<i>Rumex vesicarius</i> L.		Hém		Ms AA HA Mam Op Om LM R?

<i>Populaceae</i>	<i>Populus alba</i> L.	<i>sefsaf lebyad, tinmlelt, amellal</i>	Ph	As AA HA MA Mam Man Op Om LM R
	<i>Populus euphratica</i> Olivier	<i>merchich, sefsaf</i>	Ph	Ms Mam Op LM R
	<i>Populus nigra</i> L.	<i>blinz, bilem, sefsaf</i>	Ph	AA HA MA Man Op LM R
	<i>Portulaca oleracea</i> L. (<i>Portulacaceae</i>)	<i>rjila</i>	Th	Ms As AA HA MA Mam Man Op Om LM R
<i>Ranunculaceae</i>	<i>Aconitum lycoctonum</i> L.	<i>khlik ed-diab, nabal</i>	Hém	AA HA MA
	<i>Adonis aestivalis</i> L.	<i>belaâman sghir, dem-el-âtrous, tî-n-tacekurt</i>	Th	Ms As AA HA MA Mam Man Op Om LM R
	<i>Adonis annua</i> L.	<i>belaâman sghir, dem-el-âtrous, tî-n-tacekurt</i>	Th	Mam Man LM R
	<i>Clematis cirrhosa</i> L.	<i>louwwaya, mouqbila</i>	Ph-l	AA HA MA Mam Man Om LM R
	<i>Clematis flammula</i> L.	<i>nar l-barda, azenzou</i>	Ph-l	AA HA MA Mam Man Op Om LM R
	<i>Delphinium staphisagria</i> L.	<i>habb r-ras</i>	Hém	R R
	<i>Nigella arvensis</i> L.	<i>sanuj, l-haydwan</i>	Th	HA MA Mam Man Om LM R
	<i>Nigella damascena</i> L.	<i>sanuj, l-haydwan</i>	Th	HA MA Mam Man LM Om R
	<i>Ranunculus bullatus</i> L.	<i>ouden el-hallouf</i>	Hém	AA HA MA Mam Man Om LM R
	<i>Ranunculus ficaria</i> L.	<i>berûna</i>	Hém	HA MA Man R
<i>Ranunculus</i> spp.			All divisions	
<i>Resadaceae</i>	<i>Caylusea hexagyna</i> (Forssk.) M.L. Green	<i>demban, âzeldar, timimt</i>	Hém	Ms AA HA Mam
	<i>Cleome amblyocarpa</i> Barrate & Murb.	<i>mkhinza, takhmoujit</i>	Th	Ms As AA HA Op
	<i>Reseda luteola</i> L.	<i>al-lîrîn, zantit lakhrouf</i>	Th	All divisions
	<i>Reseda villosa</i> Cosson	<i>sbib l-khrouf, igerjdi</i>	Th	Ms As? AA HA?
<i>Rhamnaceae</i>	<i>Frangula alnus</i> Miller		Ph	R Man R
	<i>Rhamnus alaternus</i> L.	<i>amlirès</i>	NPh	AA HA MA Mam Man Om LM R
	<i>Rhamnus cathartica</i> L.	<i>l-harcha, ânerfeds</i>	Ph	R MA
	<i>Rhamnus lycioides</i> L.	<i>el-harsha, admam</i>	NPh	All divisions
	<i>Ziziphus lotus</i> (L.) Lam.	<i>sedra, azuggwar, nbeg</i>	NPh	All divisions
<i>Rosaceae</i>	<i>Agrimonia eupatoria</i> L.	<i>gaiit</i>	Hém	HA MA Mam Man LM R
	<i>Crataegus laciniata</i> Ucria	<i>admam, buzorulu</i>	NPh	HA MA Om LM R
	<i>Crataegus monogyna</i> Jacq.	<i>admam, buzorulu</i>	NPh	AA HA MA Mam Man Om LM R
	<i>Prunus lusitanica</i> L.		Ph	HA MA R
	<i>Prunus</i> spp.		Ph	As AA HA MA Mam Man Om LM R
	<i>Pyrus mamorensis</i> Trabut	<i>ijjas, bouâouid</i>	Ph	• MA Mam Man R
	<i>Rosa canina</i> L.	<i>ward,âisus, tihfert, nesrin</i>	NPh	AA HA MA Mam Man Op Om LM R
	<i>Rosa</i> spp.			AA HA MA Mam Man Op Om LM R
<i>Rubus ulmifolius</i> Schott	<i>sermu, aseddir, tabgha, akhlij</i>	NPh	AA HA MA Mam Man Om LM R	
<i>Rubiaceae</i>	<i>Plocama reboudiana</i> (Coss. & Durieu) M. Backlund & Thulin	<i>sedret ech-chikh</i>	Ch	Ms As AA HA Mam
	<i>Rubia peregrina</i> L.	<i>fuwa, tarubia, tigmit, lhamri</i>	Ch	HA MA Mam Man Om LM R
	<i>Rubia tinctorum</i> L.	<i>fuwa, ihwri, tarrubia</i>	G	R
<i>Rutaceae</i>	<i>Haplophyllum vermiculare</i> Hand.-Maz.	<i>l-fijel, awerma, tiwrajin</i>	Ch	Ms AA Op
	<i>Ruta chalepensis</i> L.	<i>l-fijel, awerma</i>	Ch	HA? Mam Man Om R
	<i>Ruta montana</i> L.	<i>l-fijel, awerma</i>	Ch	AA HA MA Mam Man Op Om LM R
<i>Salicaceae</i>	<i>Salix alba</i> L.	<i>ûd el-ma, âmmas</i>	Ph	HA MA
	<i>Salix cinerea</i> L.		Ph	HA MA Man R
	<i>Salix pedicellata</i> Desf.		Ph	Toutes les divisions, sauf Op
	<i>Salix purpurea</i> L.		Ph	AA HA MA Mam Man LM R
	<i>Salix</i> spp.	<i>âmmas, wmmas</i>	Ph	All divisions except Op

	<i>Salvadora persica</i> L. (Salvadoraceae)	<i>ûd al-arak, tehak</i>	Ph		Ms
	<i>Osyris lanceolata</i> Hochst. & Steud. (Santalaceae)	<i>bû-lîla, mergata</i>	NPh		Ms AA HA MA Mam Man Om LM R
	<i>Argania spinosa</i> (L.) Skeels (Sapotaceae)	<i>argan, afias, aba`u, zekmun</i>	Ph		Ms AA HA Mam Man Man Om
Scrophulariaceae	<i>Digitalis obscura</i> L.	<i>zhar el-kchatbin, kamiya</i>	Ch		LM R
	<i>Digitalis purpurea</i> L.	<i>zhar el-kchatbin, kamiya</i>	Ch		• AA MA R
	<i>Verbascum dentifolium</i> Del.	<i>meslah l-endar, aberdud</i>	Th-b		AA? HA MA Om LM R
	<i>Verbascum sinuatum</i> L.	<i>meslah l-endar, aberdud</i>	Th-b		• As AA HA MA Mam Man Op Om LM R
	<i>Smilax aspera</i> L. (Smilacaceae)	<i>luwwaya, tanesfalt, ûlliq</i>	Ph-l		As AA HA MA Mam Man Om LM R
Solanaceae	<i>Atropa baetica</i> Willk.	<i>zbib elyadur</i>	Hém		HA MA R
	<i>Atropa belladonna</i> L.	<i>zbib elyadur, adilwouchen</i>	Hém	RR	MA R
	<i>Datura innoxia</i> Mill.	<i>chdek jmel, taburzgit, krank</i>	Th		Mam
	<i>Datura stramonium</i> L.	<i>chdek jmel, taburzgit, krank</i>	Th		All divisions
	<i>Hyoscyamus albus</i> L.	<i>shikran, gengit, bu narjuf</i>	Th		AA HA MA Mam Man Op Om LM R
	<i>Hyoscyamus muticus</i> L.	<i>lebtina, falezlez, gengit</i>	Hém	R	Ms
	<i>Hyoscyamus niger</i> L.	<i>shikran, gengit, bu narjuf</i>	Th		HA MA Man LM? R
	<i>Lycium europaeum</i> L.	<i>l-gerdeg, înezzerki, timûma</i>	NPh		Mam Man Op Om LM R
	<i>Lycium intricatum</i> Boiss.	<i>l-gerdeg, înezzerki, timûma</i>	NPh		Ms AA HA Mam Man Op Om LM R
	<i>Mandragora autumnalis</i> Bertol.	<i>bid l-g hul, taryala, yabruh</i>	G		Mam Man LM R
	<i>Nicotiana glauca</i> R.C. Graham		NPh		Ms Mam Man Om LM R
	<i>Solanum nigrum</i> L.	<i>âneb dib, adil n-wuchen, bukna, touchanine</i>	Th		Ms AA HA MA Mam Man Op Om LM R
	<i>Solanum sodomaeum</i> L.	<i>lîmoun n-sara, lhdej, mathesh del-hmir</i>	NPh		Mam Man Om LM R
	<i>Withania adpressa</i> (Cosson) Batt.	<i>irremt, hjuju, aglim, irramt</i>	NPh		Ms AA HA
<i>Withania frutescens</i> (L.) Pauquy	<i>irremt, tirnet, bayyad, terta</i>	NPh		All divisions	
<i>Withania somnifera</i> (L.) Dunal	<i>lahw, bellahw, habb l-lahw</i>	Ch		Ms Mam Man Om LM R	
	<i>Tamarix</i> spp. (Tamaricaceae)	<i>l-âtris, terfa, fersig, afersi</i>	Ph		Toutes les divisions
	<i>Tamarix aphylla</i> (L.) Krast. (")	<i>l-atl, tlaya, takkawt, tabrarat</i>	Ph		Ms Mam LM Om
	<i>Taxus baccata</i> L. (Taxaceae)	<i>eddahek, igni, adgham</i>	Ph	V	HA MA R
Thymelaeaceae	<i>Daphne gnidium</i> L.	<i>lezzaz, inif, methnane</i>	Ch		As AA HA MA Mam Man Op Om LM R
	<i>Daphne laureola</i> L.	<i>lili w-adrar, walidrar</i>	NPh		HA MA LM? R
	<i>Thymelaea hirsuta</i> (L.) Endl.	<i>fititisha</i>	NPh	V	As AA HA MA Mam Op Om LM? R?
	<i>Thymelaea lythroides</i> Barrate & Murb.	<i>metnan, fititisha</i>	NPh	R	Man R
	<i>Thymelaea microphylla</i> Coss. & Dur.	<i>lezzaz, belghanbou</i>	NPh		Ms As Op
	<i>Thymelaea tartonraira</i> (L.) All.	<i>buftila, talzazt, belghanbou</i>	Ch	R	MA R
	<i>Typha angustifolia</i> L. (Thyphaceae)	<i>tabûda, âbuda</i>	HyF		HA MA Mam Man Om LM? R
	<i>Typha latifolia</i> L. (")	<i>tabûda, âbuda</i>	HyF		Ms HA MA Man LM R
	<i>Celtis australis</i> L. (Ulmaceae)	<i>taghzaz, ûfras,</i>	Ph		HA MA Man Om LM R
Urticaceae	<i>Forsskalea tenacissima</i> L.	<i>l-lessayg, lessig</i>	Th		Ms As AA HA Mam
	<i>Parietaria judaica</i> L.	<i>khawi lââchoub, hourrig lamles</i>	Hém		AA HA MA Mam Man Op Om LM R
	<i>Urtica dioica</i> L.	<i>hourriga, bent en-nar</i>	GR	RR	Mam Man R
	<i>Urtica</i> spp.	<i>hourriga, tikzinin, tazelekta</i>	Th		All divisions, except Ms
	<i>Urtica urens</i> L.	<i>l-hurrayga, imezri, tismekt</i>	Th		All divisions, except Ms
	<i>Fedia cornucopiae</i> (L.) Gaertn. (Valerianaceae)	<i>bezzult el-âouda</i>	Th		MA Mam Man LM R

	<i>Verbena officinalis</i> L. (<i>Verbenaceae</i>)	<i>baymût, jâidiya</i>	Ch		All divisions except As
	<i>Vitex agnus-castus</i> L. (")	<i>angarf, angrif, kherwaâ</i>	NPh		All divisions
<i>Violaceae</i>	<i>Viola arborescens</i> L.		Ch		Mam Man Om LM R
	<i>Viola munbyana</i> Boiss. & Reuter		GR	RR	MA R
	<i>Viola odorata</i> L.	<i>banafsej</i>	Hém		HA Mam Man R
	<i>Viola riviniana</i> Reichenb.		Hém	RR	MA R
<i>Zygophyllaceae</i>	<i>Balanites aegyptiaca</i> (L.) Delile	<i>taychet, tûgga, tmer leghrab</i>	Ph	V	Ms
	<i>Fagonia glutinosa</i> Delile	<i>tlihat el-ibil</i>	Th		Ms AA Op
	<i>Peganum harmala</i> L.	<i>harmel</i>	Ch		All divisions
	<i>Tribulus terrestris</i> L.	<i>al-haska, tîmgelest, mûggayr</i>	Th		Ms HA MA Mam Man Op LM R
	<i>Zygophyllum fontanesii</i> Webb. & Berth.	<i>âggaya, tirremt</i>	Ch		Ms Mam Man
	<i>Zygophyllum gaetulum</i> Emb. & Maire	<i>âggaya, tazlost, tirta</i>	Ch		Ms

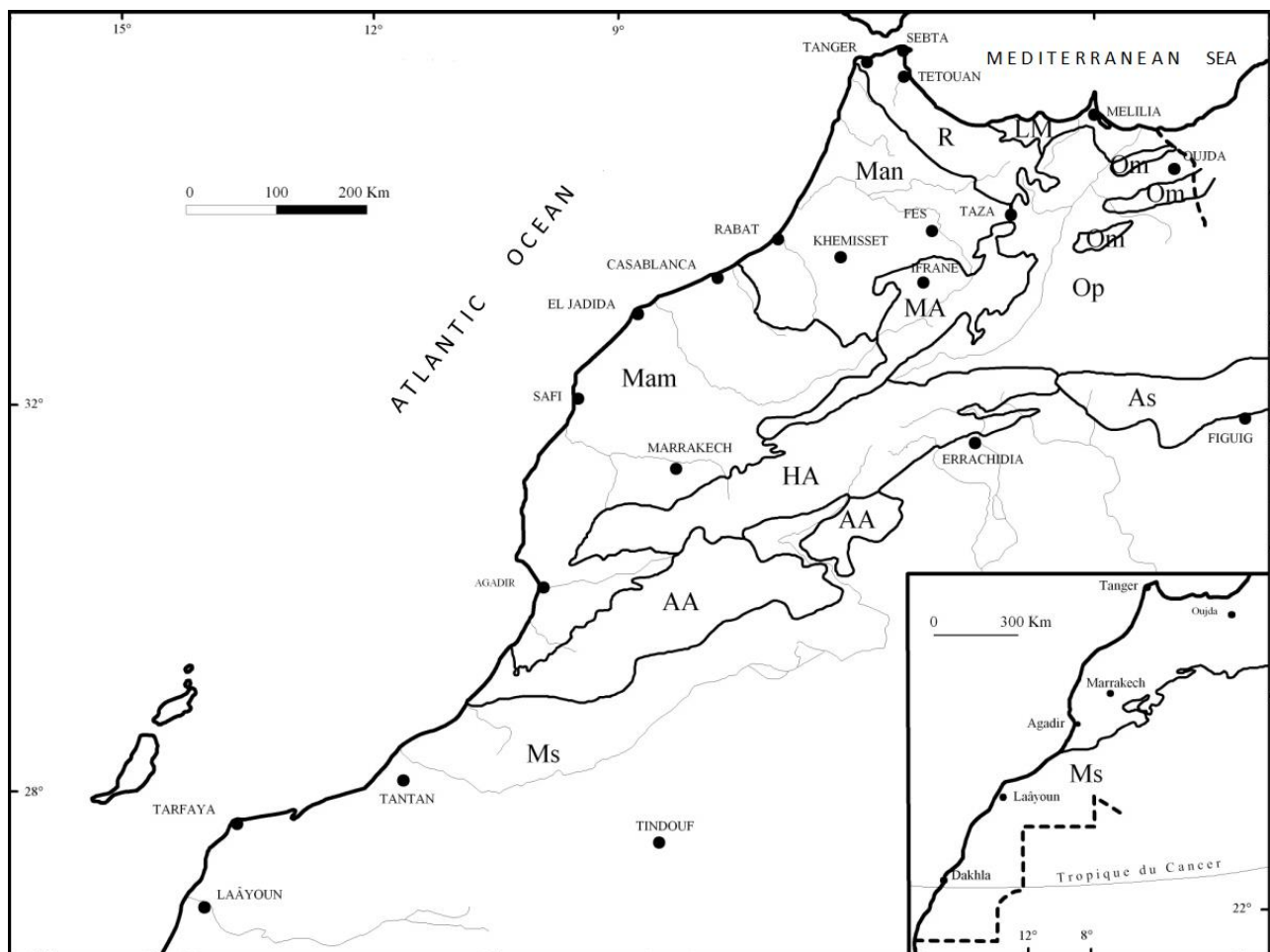


Figure 2. Geographic divisions of Morocco. Ms (Saharan Morocco), As (Saharan Atlas), AA (Anti Atlas), HA (High Atlas), MA (Middle Atlas), Mam (Middle atlantic Morocco), Man (Northern atlantic Morocco), Op (Eastern Plateaux), Om (Oriental mountains), LM (Mediterranean coast), R (Rif).

Geographical distribution

The Moroccan aromatic and medicinal plants geographical distribution shows that all regions of the country (Fig. 2) have a satisfactory richness (Fig. 3) from a minimum of 154 species at Saharan Atlas to a maximum of 375 at Rif. There is no sense to compare between regions since they have uneven surfaces and their ecological conditions, especially bioclimatic, are different.

Others informations

Most of Morocco's plant species witness more or less important gaps of scientific knowledge as far as taxonomy, biology, chronology, ecology are concerned. For aromatic and medicinal plants, this is obviously a serious handicap for their use and valorization in an economically satisfactory way and without serious environmental damage.

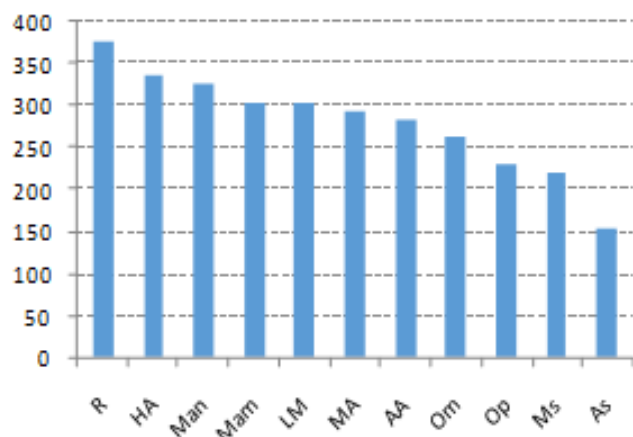


Figure 3. Regional richness in aromatic and medicinal plants

EXPLOITATION AND CONSERVATION ISSUES

Natural exploitation

All over the country, people use the aromatic and medicinal plants for their own cosmetics or health care. Overall, its use is not a danger to the sustainability of these resources. According to usage, plants are used wholly or in part only: roots, stems, leaves, flowers, fruit ...

Commercial exploitation

Commercial exploitation of Morocco's aromatic and medicinal plants is aimed to satisfy the continuously increasing demands of national and international markets. Local consumption, composed essentially of raw materials (roots, leaves, fruits...) remains very modest compared to the quantities exported in the form of essential oils, solids, fruit or other. The socio-economic impact is reflected by about 500000 working days in the rural world (Ghanmi *et al.* 2009) and foreign exchange earnings. For example, in 2003, exports reached a total quantity of 44000 tons worth over 700 million dirhams (source Exchange Office 2006, quoted in HCEFLCD 2008, p. 20).

Conservation issues

The over exploitation of Moroccan aromatic and medicinal plants is part of a national context, characterized by a widespread ecosystem degradation (Benabid 2000). An ongoing study (Lamrani-Alaoui *et al.*) showed that 204 species are threatened with a very high risk, medium or low, respectively 86, 26 and 92 species.

Overall, the current exploitation methods and practices are dangerous to the natural balance. They are abusive as they do not take into consideration the ecosystem productivity and take to nature a quantity of biomass higher than what it is produced. They are anarchic, insofar as they are practiced without any monitoring or scientific support. This aspect seems essential; it involves many facets, but we will insist on five important considerations concerning species (taxonomy, chorology, biology) and ecosystems (productivity, ecology and functioning).

Taxonomy

It is fundamental to know precisely the plant to be exploited in order to avoid harvesting the rare or very rare taxa. But as seen above, there is great confusion and inaccuracies in terms of vernacular names and their corresponding scientific names. So, endemic species can be eliminated forever without anything in return if the species are very rare. Examples are numerous. Consider the case of oregano where *Origanum grosii* Pau & Font Quer and *Origanum elongatum* (Bonnet) Emb. & Maire are confused while the first is an endemic localized in the Rif. The example of sagebrush, *Artemisia herba-alba* (sensu lato) is also significant. This plant, commonly known as "chihh", is widely exploited in Morocco without particular precautions, while, in fact, there are five species whose taxonomic statuses, degrees of presence and distribution areas remain to be unclear (Ouyahya 2014).

Chorology

Regression of biodiversity, in the world, is mainly due to habitat fragmentation. Thus, it is very important to know the distribution of species exploited in order to spread crop across their land. Overuse of one or more given areas can eliminate the species concerned and thus lead to the development of isolated sub-populations, fragile and uncompetitive to survive.

Biology

The exploitation of any natural resource must respect the conditions of its survival. For aromatic and medicinal plants, it is essential to know the biological cycles and take them into account for assessing the quantities of material to be taken and the appropriate time. Particular attention should be kept, leaving, in the area, enough plant material required for the multiplication of species: roots, stems, seeds ...

Phytomass produced

The general rule is that we do not take more than what can nature produce in order to ensure sustainability of resources. To respect this rule, it is necessary to know the amount of plant biomass produced and help save the green inheritance of nature. Unfortunately, neither the productivity of exploited aromatic and medicinal plants, nor their ecosystems are studied thus making it impossible to estimate the impact of exploitation on resource exhaustion.

Ecology and ecosystem functioning

In addition to the quantity of plant biomass produced, it is important to know the ecology of ecosystems and roles played by the exploited plants to avoid disturbing the natural balance. The interactions between various species and between species and their biotope areas narrow and the overexploitation of given species affects not only its own survival, but also those of many other animals and plants besides land. For example, the elimination of certain plant species has a direct impact on wildlife related to it: parasites, breeding birds, pollinators... The negative impact, depending on its severity, eventually causes more or less serious dysfunction of the whole ecosystem.

CONCLUSION

The national potential of aromatic and medicinal plants is far from being properly assessed. Their survival is threatened by excessive and anarchic exploitation.

According to Lamrani-Alaoui *et al.* (ibid.), over 200 species are threatened at varied degrees. At least twenty should be closely followed (Ghanmi *et al.* 2009), because they are widely used for export.

The general context of this exploitation is marked by ignorance of, on the one hand, the actual productivity of ecosystems, on the other hand, the exact identity of species, their geographical distribution and their biological and ecological characteristics. Degradation of Moroccan aromatic and medicinal plants is well stressed. And it is very unfortunate that some rare or endemic plants collected in bulk with other closely related species, face the same danger, without significant added value to the user.

The national and foreign demand for aromatic and medicinal plants products are still increasing and it is absolutely urgent to work for a reasonable and rational exploitation, consistent with the spirit of sustainable development. For this reason, three things seem to be very important:

1. Develop scientific research to:

- clearly identify the taxonomic, chorological, biological and ecological aspects of species;

- evaluate the best possible productivity of exploited aromatic and medicinal plants in accordance with sustainable development.

2. Develop and adopt a national charter, with a guide of good use, setting rules and procedures to be followed to minimize damage on species and their environments.

3. Encourage the cultivation of aromatic and medicinal plants to alleviate the pressure on natural species.

These measures will certainly help to win the bet of labeling aromatic and medicinal plants products and improve Morocco's place among the largest worldwide producers and exporters. Efforts are being made to this aim. Studies have been conducted (HCEFLCD 2008, Ghanmi *et al.* 2009) or are ongoing (MAP Project 2012-2015), but unfortunately the scientific research component is not taken into account as it should really be.

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