

Original Article

Plant Resources Use in the Province of Taza (North of Morocco)

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Abstract

This work concerns researches on flora uses in the Pre-Rif of Taza (North of Morocco). An inquiry conducted among the local population and field surveys have raised real direct values of plant resources (food, traditional medicine, etc.), and plead for the conservation of the local flora. The local plant diversity has been estimated at 140 species, corresponding to 55 botanical families, and represents 3.11% of the national specific richness. *Fabaceae*, *Lamiaceae*, *Rosaceae*, *Poaceae* and *Asteraceae* are the most used, and constitute 43.6% of the inventoried species. Aerial part, fruits, leaves and inflorescences are the most exploited with respective rates of 24%, 22%, 20% and 15%. A high diversification of the social behaviors related to traditional medicine has also been underlined. Species with therapeutic virtues represent 51.4% of the specific inventory, and of which 20.7% interest herbalism activity in the region. *Origanum compactum* Benth. and *Rosmarinus officinalis* L. are the more used. The melliferous flora, generating a profit for the local population, corresponds to 19.3% of the identified species.

Keywords: Northern Morocco, flora, socio-economy

1. Introduction

According to formal documentation, the Moroccan flora would include c. 8000 species, and little information is available on some plant groups with high ecological and socioeconomic interest, and many sites of Morocco have almost never been prospected. Morocco is among the euro-Mediterranean region having a high endemism rate of vascular flora.

Thus, 4500 taxa of vascular, indigenous or naturalized plants, distributed between 920 genera and 130 families, 800 to 951 taxa are endemic to Morocco [e.g. 5, 18].

In the Northern Morocco, we expect particular works on the vascular-flora diversity [28] as well as on its uses [e.g. 13-15, 18, 20, 23].

On the other hand, use and exploitation mode of natural habitat are the source of a cultural richness, expressed by a mosaic of folklores, architectures, local products and a varied handicraft and customs [5]. It is the way of which people with a particular culture use indigenous plants in various domains (food, shelters, medicines, clothes, hunt and religious ceremonies), expressing the relation between a society and its environment [1].

The phyto-diversity studies have generally recourse to the taxonomic richness, in addition to the factors that influence it. Direct values of flora diversity (cut of wood, collecting, picking, etc.) are sometimes raised outside of its real values (indirect use, option, etc.). In this context, we were interested in the diversity and the socioeconomic importance

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of the plants used in the province of Taza (North of Morocco).

Study area

The province of Taza, county town of Taza (34°13'00" N, 4 °01'00" W), cover a global surface of 15 020 km²; its population is about 720 000 inhabitants. It is bounded to the North, East, South and West by the provinces of Al Hoceïma and Nador, the province of Taourirt, the province of Boulmane, and the provinces of Taounate and Sefrou in the same order, referring to official data.

The survey zone is characterized by a rugged relief, constituting a constraint for its development. The main mountains are Jbel Akechars (at most 2009 m of altitude), Jbel Kouine (1883 m) and Jbel Aberchane (1774 m). The outcropping rocks are tender and impervious [21]. The climate is of Mediterranean type, particularly semi-continental to Mediterranean influence, humid in winter and semi-arid in summer.

With reference to officials of the Water & Forestry Department, 468 000 ha of forests and alfa grass occupy 42.5% of the province of Taza area; 401 339 ha of which correspond to forests. Holm oak, thuja, Aleppo pine, cork oak and cedar (especially from the national park of Tazekka) overrun respectively 130 704 ha, 50 151 ha, 30 028 ha, 11 737 ha and 9 907 ha. As for the grazing and uncultivated lands, they spread on 644 000 ha, i.e. 44.7% of the province surface.

In addition, the man encourages the soil erosion, due to overgrazing and clearing activities [21]. The pre-Rif is one of the areas of early settlement, and considered with the Moroccan mountains as the Moroccan humanity cradle. The oriental Rif, in this case its southern sides, was for a long time forsaken and marginalized; these mountainous zones are submitted to a strong natural, economic and spatial unbalance [7]. Agriculture constitutes a fundamental economic sector for the province of Taza. It occupies the quasi-totality of the farming population. This is cereal-based subsistence farming, combined with arboriculture (mainly olive, almond and fig trees); livestock ranks second after agriculture.

2. Material and Methods

To document the local knowledge in terms of plants exploitation, we used pre-established inquiry-forms, including 45 parameters in relation with ethnobotanical information (plant names, plant parts used, etc.) and social one (age and sex of the interviewees and cultural considerations). Land visits and collection of plants have been repeatedly

led from April 2008 to April 2011 in 16 Stations (fig. 1).

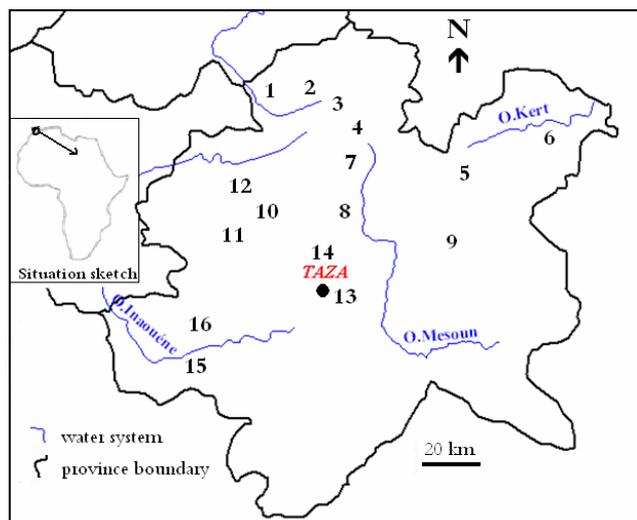


Figure 1. Study area, Pre-Rif of the province of Taza [25]. **Caption.** 1-Boured; 2-Ajdir; 3-Ain hamra; 4-Aknoul; 5-Tizi ousli; 6-Sidi Ali Bourkba; 7-Bouhdoud; 8-Jbarna; 9-Mezguitem; 10-Beni Fteh; 11-Had Msila; 12-Taineste; 13-Taza; 14-Sebt Boukalal; 15-Oued amlil; 16-Had Oulad Zbayr.

For this work, we adopted the same methodological gait, when compared to other studies [1, 2, 8, 10, 13-14, 19, 22, 27].

In parallel, we have botanized and identified the quasi-totality of collected plants by using the available floras as well as other specific works [3-4, 6, 9, 13-14, 16-17, 26-27]. The gathered information was transferred into a database, processed and analyzed.

3. Results and discussion

Interviewees

During this survey, we interviewed 291 people, and we explored the main “douars” (rural towns), the quasi-totality of local “souks” or weekly markets, and many sites with ecological interest. A total of 783 “station – plant - interviewee” combinations were established, averaging 48.9 combinations by station.

The interviewees (12.1% of feminine sex and 87.9% of masculine one) are represented essentially by “fellahs” or local farmers (38.2%), farming inhabitants (17.1%), bee-keepers (10.7%), vegetables sellers (9.19%), herbalists (6.38%), “hanatas” or local merchants (4.85%), responsible for Agricultural Service (2.68%), workers (2.42%), university graduates (1.66%), responsible for Waters & Forests Service (1.53%), communal councillors (1.14%), shepherds (1.14%), NGO

presidents (1.14%), students (0.89%), and winnowers, drivers and responsible for of nurseries (0.63%).

In this respect, our survey showed that the middle age of interrogated people is 45.1 ± 12.9 years (60.7 ± 18.8 years for the feminine sex and 42.9 ± 10.9 years for the masculine one). Therefore, popular knowledge on plants use persist locally in people young enough. This factor is raised distinctly in Europe, where the interviewees middle-age varies from 63 to 72 years [8, 2, 19, 24], vs. from 50 to 65 years for populations of the Northern Africa [19, 22]. However, farming exodus, culture and lifestyle evolution, and death of people having a nontranscribed knowledge contribute to the loss of traditional know-how, and consequently, call for such studies [e.g. 13, 19].

Exploited flora

The survey of floristic diversity revealed 140 species which are locally exploited and recognized by the local population, and represent 3.11% of the national specific richness of vascular plants. This specific inventory corresponds to 55 botanical

families, i.e. 42.3% of families of vascular plants from Morocco (table 1).

The inventoried plants are locally designated by 1 to 3 vernacular names since the province of Taza is populated mainly by Berber and Arab tribes: Ghiyata, Branès, Tsoul, Gzennaya, Mtalsa, Ait Ourrain, Meghrawa, Houara and Senhaja. These plants names include sometime their use, e.g. "Chaṭaba" that means broom. Other local appellations are used to indicate different species, as "Kaliteus" for *Eucalyptus camaldulensis* and *E. globulus*, and "Chaṭaba" for *Anthyllis cytisoides*, *Cytisus arboreus* and *Cistus albidus*.

Plants taxa are rare taxa such *Crataegus monogyna*, *Anthyllis cytisoides* and *Zizyphus zizyphus*, highly threatened like *Muscaria comosum*, and/or endemic to Northern Africa, such *Coriaria myrtifolia*. For Morocco, the distribution of this species is limited in the Rif [16]. According to our data, other traces of plants endemism in the study area would be revealed for *Thymus zygis* L., *T. riatarum* Humbert & Maire, *Origanum elongatum* (Bonnet) Emb. & Maire, *O. grosii* Pau & Font Quer and *Teucrium gypsophilum* Emb. & Maire.

Table 1. Synoptic list of uses of inventoried species int the Pre-Rif of the province of Taza

Taxon	Vernacular name (s)	Used part(s)/Use(s), Toxicity/Plant type	Uf (%)
Lamiaceae			17.2
<i>Ajuga iva</i> (L.) Schreb.	changoura	L, R / M, V, Api, H/ Sp	1.02
<i>Calamintha sylvatica</i> Bromf.	t'minṭa, manṭa	Ap, L / A (additive to bread and tea), M, H, collected and sold in local bazaars / Sp	1.15
<i>Lavandula multifida</i> L	L'khzama	Ap, L / M, C (in mixture with <i>Lawsonia inermis</i>), H, firewood / Sp	0.26
<i>Lavandula stoechas</i> L	r'harḥar, l'halḥal, l'hashḥas	Ap, I, L / M, H, Api, firewood / Sp	0.38
<i>Marrubium vulgare</i> L	marouy, m'riwa	L, R / M, C, H / Sp	0.64
<i>Mentha pulegium</i> L.	fliyou, flayou, friyou	I, L / M, H, Api, collected and sold in local bazaars / Sp	0.89
<i>Mentha spicata</i> L.	naânaâ	Ap / A (additive to tea) / Ct	0.38
<i>Mentha suaveolens</i> Ehrh.	m'chichro	Ap, L / A (culinary, additive to bread and tea), M, H / Sp	1.40
<i>Origanum compactum</i> Benth.	zaâtar, zouy	Ap, I, L / A (culinary, additive to bread, dairy flavor), M, H, Api, collected and sold in local bazaars / Sp	5.87
<i>Rosmarinus officinalis</i> L.	azir	Ap, L, I / M, H, Api, firewood, Bs (fumigation, bad eye) / Sp	3.58
<i>Salvia officinalis</i> L.	salmiya	L / M, H / Ct	0.26
<i>Thymus zygis</i> L.	z'douchan, z'âitra	Ap, I / A (culinary, dairy flavor, additive to tea), M, H, Api, collected and sold in local bazaars / Sp	1.40
Fabaceae			11.5
<i>Anthyllis cytisoides</i> L.	targouit, tachṭabt, ch'ṭaba	Ap, I / Api, Pa, sweeping tool, firewood / Sp	1.40
<i>Calycotome villosa</i> (Poir.) Link	l'gandoul	Ap, I / Api, Pa, firewood / Sp	1.02
<i>Lens culinaris</i> Medik.	raâ'das, laâ'das	S, Sr / A, M / Ct	1.92
<i>Phaseolus vulgaris</i> L.	d'joubacht, loubya	Fr / A / Ct	0.77
<i>Vicia ervilia</i> (L.) willd.	qarsana, q'r'sana	Fr, Sr / M, animal feed / Ct	1.40

Table 1. Synoptic list of uses of inventoried species in the Pre-Rif of the province of Taza – continued

Taxon	Vernacular name (s)	Used part(s)/Use(s), Toxicity/Plant type	Uf (%)
<i>Vicia faba</i> L.	ibawane, l'foul	Fr, Sr / A / Ct	2.04
<i>Arachis hypogaea</i> L.	Qawqaw	T / A / Bp	0.13
<i>Astragalus</i> spp.	ch'brag	Ap / firewood, Pa / Sp	0.13
<i>Cytisus arboreus</i> (Desf.) DC.	taytount, tachtabt, ch'taba	Ap, I / Api, firewood, sweeping tool / Sp	0.13
<i>Glycine max</i> (L.) Merr.	Şoja	S / A / Bp	0.13
<i>Glycyrrhiza glabra</i> L.	âar'ksous	St / M / Bp	0.13
<i>Medicago sativa</i> L.	l'fasa, r'fasa	Ap, I / Api, animal feed / Ct	0.26
<i>Ononis natrix</i> L.	Afzaz	L / M, V, H / Sp	0.51
<i>Ononis</i> spp.	zanbouţ ighaţen	Ap / Pa / Sp	0.13
<i>Pisum sativum</i> L.	jalbane, j'rbane	S, Sr / A / Ct	0.51
<i>Trigonella foenum-graecum</i> L.	l'halba, r'horbat	S / M, C, H / Ct	0.38
<i>Ulex</i> spp.	tfayra	Ap / firewood, Pa / Sp	0.26
<i>Lotus ornithopodioides</i> L.	tizdouzine	Ap / To (for cows) / Sp	0.26
Poaceae			10.1
<i>Arundo donax</i> L.	laqsab, ghanime	Ap, Rh / M, C, farms closing, plantation against flood, basketry, Pa, very old use / Ct	1.66
<i>Avena sativa</i> L.	l'kharţal	Ap / animal feed / Ct	0.13
<i>Cynodon dactylon</i> (L.) Pers.	an'jam	Ap / M, H / Sp	0.13
<i>Hordeum vulgare</i> L.	ch'âir, z'raâ	S, Sr / A, animal feed / Ct.	3.32
<i>Macrochloa tenacissima</i> (L.) Kunth	ari, l'halfa	Ap / crafts, basketry / Sp	1.28
<i>Pennisetum glaucum</i> (L.) R. Br.	ilan	S / M / Bp	0.13
<i>Triticum aestivum</i> L.	farina	S, Sr / A / Ct	0.26
<i>Triticum monococcum</i> L.	tichanţacht	Ap / craft / Ct	0.26
<i>Triticum turgidum</i> L.	ir'dan, laqmaḥ	S, Sr / A / Ct	2.68
<i>Zea mays</i> L.	d'ra	S / A / Ct	0.26
Rosaceae			7.3
<i>Crataegus monogyna</i> Jacq.	admam	L, I / A (edible fruit), M, Api / Sp	0.26
<i>Cydonia oblonga</i> Mill.	s'farjal, s'farz'r	Fr, R / A, M / Ct	0.51
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	lamzaḥ, ramzaḥ	Fr, L, I / A, M, Api / Ct	0.26
<i>Malus sylvestris</i> Mill.	atafaḥ, t'faḥ	Fr / A / Ct	0.38
<i>Prunus armeniaca</i> L.	L'machmach, r'machmach	Fr / A / Ct	0.26
<i>Prunus communis</i> L.	Boâ'wida	Fr / A / Ct	0.13
<i>Prunus domestica</i> L.	l'barqouq, r'barqouq	Fr / A / Ct	0.51
<i>Prunus dulcis</i> (Mill.) D. A. Webb	l'woz, d'jouz	Fr, I / A, reforestation, Api / Ct	4.47
<i>Prunus persica</i> (L.) Batsch	l'Khoukh, r'khoukh	Fr / A / Ct	0.26
<i>Rosa montana</i> Chaix ex Vill.	takhfart	Fr / A (edible fruit) / Sp	0.13
<i>Rubus fruticosus</i> L.	astîf	Fr, R / A (edible fruit), M / Sp	0.13
Oleaceae			6.39
<i>Olea europaea</i> L. subsp. <i>europaea</i>	zachtoun, zayţoun	Fr, Re, olive oil / A, M, , reforestation / Ct	6.13
<i>Phillyrea latifolia</i> L.	m'riras	L / M, H / Sp	0.26
Asteraceae			5.76
<i>Artemisia herba-alba</i> Asso	achiḥ	Ap, L/(dairy flavor),M,H,Api,Bs (fumigation)/ Sp	1.53
<i>Artemisia absinthium</i> L.	chiba, ch'hiba	L / A (culinary), M, V / Ct	0.38
<i>Achillea odorata</i> L. subsp. <i>pectinata</i> (Lam.) Briq. & Cavill.	tizriţ, ch'wiḥa, daqart achiḥ	L, I / M, V, Api / Sp	0.38
<i>Carlina lanata</i> L.	r'âasfar	Ap, I / Api, Pa / Sp	0.26
<i>Chamaemelum fuscum</i> (Brot.) Vasc.	babounej	Ap / M, C, H / Ct	0.13

Table 1. Synoptic list of uses of inventoried species in the Pre-Rif of the province of Taza – continued

Taxon	Vernacular name (s)	Used part(s)/Use(s), Toxicity/Plant type	Uf (%)
<i>Cynara cardunculus</i> L.	ar'ḥak, r'khorchaf, l'khorchef	Ap, I / A (milk coagulation), M / Ct	0.64
<i>Dittrichia viscosa</i> (L.) Greuter	bayramane	Ap, L, I, R, pollen / A (additive to bread), M, H, Api / Sp.	1.66
<i>Scolymus hispanicus</i> L.	zarnij, l'gernine	Ap, I/A (consumed in mixture with <i>Malva sylvestris</i>), Api / Sp	0.26
<i>Tanacetum annuum</i> L.	timarsad	L, I / M, H / Sp	0,26
<i>Taraxacum erythrospermum</i> Andr. ex Besser	talma, tar'ma	Ap, Lt / A (consumed in mixture with <i>Malva sylvestris</i>), M / Sp	0,26
Solanaceae			4.09
<i>Capsicum annuum</i> L.	r'far'far, l'falfal	Fr / A / Ct	1.02
<i>Lycopersicon esculentum</i> Mill.	maâticha	Fr / A / Ct	1.15
<i>Solanum tuberosum</i> L.	baṭaṭa	L, T / A, M / Ct	1.66
<i>Hyoscyamus albus</i> L.	bounarjouf	Ap / (dairy flavor), M, V / Sp	0.26
Fagaceae			2.43
<i>Quercus ilex</i> L.	Qourich, adran	Ap, L, W, Br / A (edible fruit, dairy flavor), M, H, Crafts, Pa, fuelwood, very old use / Sp	2.43
Vitaceae			2.30
<i>Vitis vinifera</i> L.	tzayarat, adir, Laâ' nab, dalya	Fr, L / A, M / Ct	2.30
Moraceae			2.30
<i>Ficus carica</i> L.	alkarmous, r'ghar's	Fr, Lt / A (milk coagulation), M / Ct	2.30
Pinaceae			2.05
<i>Pinus halepensis</i> Mill.	tayda	S, L, W / M, fuelwood, reforestation, poles and roof manufacture / N	1.92
<i>Pinus pinaster</i> subsp. <i>escarena</i> (Risso) K.Richt.	tayda	S, L, W / reforestation, fuelwood, poles and roof manufacture / N	0.13
Apiaceae			1.92
<i>Ammi visnaga</i> (L.) Lam.	bachnikha, tab'chnikh't	S, L, I / M, H, Api, Pa, toothpick / Sp	0.89
<i>Carum carvi</i> L.	l'karwiya	S / A (culinary), M / Bp	0.13
<i>Coriandrum sativum</i> L.	r'qousbar, l'qasbor	Ap / A (culinary)/ Ct	0.26
<i>Daucus carota</i> subsp. <i>sativus</i> (Hoffm.) Arcang.	khizou	Rh / A / Ct	0.38
<i>Eryngium campestre</i> L.	tayriza	I / Api / Sp	0.13
<i>Pimpinella anisum</i> L.	ḥabat ḥlawa	S / M / Bp	0.13
Rhamnaceae			1.66
<i>Ziziphus lotus</i> (L.) Lam.	Asadra, an'bag	Ap, Fr, I / A (edible fruit), M, C (mixed with <i>Lawsonia inermis</i>), Pa, farms closing, Be / Sp	1.40
<i>Ziziphus zizyphus</i> (L.) H. Karst.	zafzouf, zfizef	Fr / A (edible fruit) / Sp	0.26
Cupressaceae			1.66
<i>Juniperus oxycedrus</i> L.	taqa	Ap / Pa, fuelwood / Sp	0.26
<i>Tetraclinis articulata</i> (Vahl) Mast.	l'âarâar, amr'zi	L, W/M, H, Api, fuelwood, charcoal, reforestation, Bs (fumigation, against the evil spirit)/Sp	1.40
Hyacinthaceae			1.53
<i>Muscari comosum</i> (L.) Mill.	touchfiṭ, bsela	Bu / A, collected and sold in local bazaars / Sp	1.53
Ericaceae			1.40
<i>Arbutus unedo</i> L.	Sasnou, mrouna, bakhnou	Fr, L, I, R / A, M, Api, firewood, Pa / Sp	1.40
Alliaceae			1.28
<i>Allium cepa</i> L.	tabsaṭch, l'basla	Bu / A / Ct	0.64
<i>Allium sativum</i> L.	tichart, atouma	Bu / A, M / Ct	0.64
Leguminosae			1.28
<i>Ceratonia siliqua</i> L.	kharoub, tasrighwa	Fr, I / A, M, Api / Sp, Ct	1.28
Globulariaceae			1.15
<i>Globularia alypum</i> L.	tasr'gha, âinlarnab	Ap, L, I / M, Api / Sp	1.15

Table 1. Synoptic list of uses of inventoried species in the Pre-Rif of the province of Taza – continued

Taxon	Vernacular name (s)	Used part(s)/Use(s), Toxicity/Plant type	Uf (%)
Myrtaceae			1.02
<i>Eucalyptus camaldulensis</i> Dehnh.	kalitous	L, I / M, Api, reforestation against flood / N	0.38
<i>Eucalyptus globulus</i> Labill.	kalitous	L, I / M, Api / N	0.38
<i>Syzygium aromaticum</i> (L.) Merr. & L. M. Perry	âoud anwar, qronfal	Fr / M / Bp	0.13
<i>Myrtus communis</i> L.	riḥane	Fr, L / M, C (mixed with <i>Lawsonia inermis</i>) / Sp	0.13
Anacardiaceae			1.02
<i>Pistacia lentiscus</i> L.	fadis, aṭrou	Ap, L, W / M, H, fuelwood / Sp	1.02
Rutaceae			0.9
<i>Citrus limon</i> (L.) Burm. f.	l'ḥamd	Fr / A, M, / Ct	0.13
<i>Citrus ×aurantium</i> L.	lachine	I / Api / Ct	0.26
<i>Ruta montana</i> L.	awram, fijal	Ap, L, St / M, H, Bs (against evil spirits) / Sp	0.51
Chenopodiaceae			0.9
<i>Atriplex nummularia</i> Lindl.	lagetaf	Ap / Pa, reforestation / N	0.13
<i>Chenopodium ambrosioides</i> L.	m'khinza	Ap, L / M, H / Sp	0.51
<i>Sarcocornia fruticosa</i> (L.) A. J. Scott	bousouf	Ap / Pa, formerly used for clothes washing / Sp	0.26
Cactaceae			0.89
<i>Opuntia maxima</i> Miller	L'handiya, tahandach't	Fr, L, I / A, M, V / Ct	0.89
Areaceae			0.89
<i>Chamaerops humilis</i> L.	tiyazdanṭ, adoum	Ap / A (grows), crafts, basketry, sweeping tool, / Sp	0.89
Apocynaceae			0.89
<i>Nerium oleander</i> L.	ariri, adafila	L, St / M, C (mixed with <i>Lawsonia inermis</i>), H / Sp	0.89
Punicaceae			0.77
<i>Punica granatum</i> L.	armane	Fr, BF / A, M / Ct	0.77
Brassicaceae			0.77
<i>Brassica rapa</i> L.	alaft, djafet	Rh / A / Ct	0.38
<i>Diplotaxis catholica</i> (L.) DC.	bowardar	AP / A (young-seedlings in mixture with <i>Malva sylvestris</i>), cows feed (dried grass) / Sp	0.13
<i>Moricandia arvensis</i> subsp. <i>suffruticosa</i> (Desf.) Maire	tbawt	I, Ap / Api, Pa / Sp	0.26
Caryophyllaceae			0.77
<i>Silene vulgaris</i> (Moench) Garcke	tghighacht	Ap, R / A (in mixture with <i>Malva sylvestris</i>), very old use / Sp	0.26
<i>Herniaria hirsuta</i> L.	harast laḥjar	Ap / M, H / Sp	0.38
<i>Lepidium sativum</i> L.	ḥab r'chad	S / A / Bp	0.13
Zygophyllaceae			0.51
<i>Peganum harmala</i> L.	l'ḥarmal, r'ḥar'mar	S, I / M, Bs (fumigation, bad eye), Api, H / Sp	0.51
Cucurbitaceae			0.52
<i>Cucumis melo</i> L.	batikh	Fr / A / Ct	0.26
<i>Cucurbita pepo</i> L.	gar'âa, takhsacht	Fr / A / Ct	0.26
Cannabaceae			0.51
<i>Cannabis sativa</i> L.	L'kif, r'kif	Ap, Re / drugs / Ct.	0.51
Malvaceae			0.39
<i>Abelmoschus esculentus</i> (L.) Moench var. <i>Esculentus</i>	m'loukh'ya	Fr / A / Bp	0.13
<i>Malva sylvestris</i> L.	l'baqoula, im'zwar	Ap / A / Sp	0.26
Cistaceae			0.39
<i>Cistus albidus</i> L.	tanghroucht, tachṭab't, ch'ṭaba	L, I / Pa, Api, sweeping tool / Sp	0.13
<i>Cistus ladanifer</i> L.	touzaṭch	L, Sb / M / Sp	0.26
Juglandaceae			0.38

Table 1. Synoptic list of uses of inventoried species int the Pre-Rif of the province of Taza – continued

Taxon	Vernacular name (s)	Used part(s)/Use(s), Toxicity/Plant type	Uf (%)
<i>Juglans regia</i> L.	al gouz	Fr, Bf / A, C / Ct	0.38
Boraginaceae			0.38
<i>Borago officinalis</i> L.	ḥandoun, bouḥamdoun	Ap, Rh / A (in mixture with <i>Malva sylvestris</i>), M / Sp	0.38
Aristolochiaceae			0.38
<i>Aristolochia fontanesii</i> Boiss. & Reut.	bar'ztem	L, R / M, H / Sp	0.38
Verbenaceae			0.26
<i>Aloysia citriodora</i> Palau	l'wiza	L / A (culinary), M / Bp	0.26
Smilacaceae			0.26
<i>Smilax aspera</i> L.	ḥab chidane, an'zlaf.	L, I / Api, rabbits feed / Sp	0.26
Ranunculaceae			0.26
<i>Nigella damascena</i> L	ḥabat l'baraka	S / A (culinary) / Bp	0.13
<i>Nigella sativa</i> L.	sanouj	S / M / Bp	0.13
Myristicaceae			0.26
<i>Myristica fragrans</i> Houtt.	al gouza	S / A (culinary), M / Bp	0.26
Lythraceae			0.26
<i>Lawsonia inermis</i> L.	l'ḥana, r'ḥani	L / M, C / Bp	0.26
Lauraceae			0.26
<i>Cinnamomum verum</i> J. Presl	l'qarfa	Sb / A (culinary), M / Bp	0.26
Iridaceae			0.26
<i>Crocus sativus</i> L.	z' âafran l'ḥor	I / A (culinary)/ Bp	0.13
<i>Gladiolus communis</i> L.	tafrou	Ap / toxic (for cows) / Sp	0.13
Euphorbiaceae			0.26
<i>Euphorbia nicaeensis</i> All.	tmisghi	Ap, Lt / (dairy flavor), treatment of source water, paper glue / Sp	0.26
Mimosaceae			0.13
<i>Acacia saligna</i> (Labill.) H. L. Wendl.	tar'yriṭ	seedlings / reforestation, soil fixation, plantation against flood / N	0.13
Typhaceae			0.13
<i>Typha latifolia</i> L.	tbouda	L / M / Sp	0.13
Polygonaceae			0.13
<i>Rumex palustris</i> Sm.	ḥomaida	L / A (in mixture with <i>Malva sylvestris</i>) / Sp	0.13
Piperaceae			0.13
<i>Piper cubeba</i> L. f.	l'kababa	S / A (culinary), M / Bp	0.13
Papaveraceae			0.13
<i>Papaver rhoeas</i> L.	b'naâman	Ap / A (in mixture with <i>Malva sylvestris</i>) / Sp	0.13
Linaceae			0.13
<i>Linum usitatissimum</i> L.	zriâat al katan	S / A, M / Bp	0.13
Juncaceae			0.13
<i>Juncus acutus</i> L.	azraf	I / M, H / Sp	0.13
Coriariaceae			0.13
<i>Coriaria myrtifolia</i> L.	orwiz	L / toxic (for goats) / Sp	0.13
Convolvulaceae			0.13
<i>Ipomoea batatas</i> (L.) Lam.	baṭaṭa ḥ'lwa	T / A / Ct	0.13
Capparaceae			0.13
<i>Capparis spinosa</i> L.	l'qabar	Fr / A, selling fruit/ Sp	0.13

Caption. A, alimentary use. Ap, aboveground part. Api, apiculture. B, bulb. Bf, fruit bark. Bp, species by-products are locally marketed. Br, Bark root. Bs, Belief and superstition. C, cosmetic use. Ct, cultivated species. H, herbalism. I, inflorescence. L, leaf. Lt, latex. M, medicinal use. N, naturalized species. Pa, pastoralism. R, root. Re, resin. Rh, rhizome. S, seed. Fr, fruit. Sb, stem bark. Sp,

spontaneous species. Sr, straw. St, stem. T, tubercle. To, toxic species. Uf, use frequency. V, veterinary use. W, wood.

The inventoried species occur spontaneously in forests, matorrals and/or scrublands (49.3%), are cultivated (33.6%), with imported by-products and marketed in the region (12.8%) or naturalized

(4.28%). According to their use frequency, *Fabaceae*, *Lamiaceae*, *Rosaceae*, *Poaceae* and *Asteraceae*, including more than 10 exploited species each (table 1), are the more used and regroup 43.6% of the inventoried species. In comparison with a recent work achieved in Southeastern of Morocco [10], we notice that the same botanical families are the more used, exception made for the *Rosaceae*, replaced for this zone by *Apiaceae*. Moreover, 16 botanical families are represented by 2 to 6 species each, vs. 34 families which are represented in the study area by only 1 species (table 1).

The local population bear interest especially to the following species: *Olea europaea* (6.13%), *Origanum compactum* (5.87%), *Prunus dulcis* (4.47%), *Rosmarinus officinalis* (3.58%), *Hordeum vulgare* (3.32%), *Triticum turgidum* (2.68%), *Quercus ilex* (2.43%), *Vitis vinifera* (2.30%), *Ficus carica* (2.30%) and *Vicia faba* (2.04%) (table 1).

The most sought-after parts of plants are the aerial part (24%), fruit (22%), leaf (20%) and inflorescence (15%). They are followed by the underground part (8%), wood and stem (7%), and resin, latex and "roots, fruits and stems" bark (4%). The high representativeness of the aerial part in the local plant exploitation would be due to the harvest ease and its high photosynthetic-metabolites content [11]. For the imported plants, the interviewees have some difficulties to identify the used parts of plants.

Exploitation types

From an economic standpoint, the two primordial uses of the local flora are herbalism, interesting 29 species, and apiculture, based on at least 27 species (table 1). The important plant-uses correspond essentially to food and the herbal medicine, with an use frequency of 29% each. They are followed by herbalism and apiculture (11% each), pastoralism (6%), firewood (5%), cosmetology (4%), reforestation (3%) and handicraft (2%) (table 1).

Besides, 15 local plant uses, recent or very old, have been identified in different domains. Thus, *Ajuga iva*, *Achillea odorata* subsp. *pectinata*, *Artemisia absinthium*, *Ononis natrix*, *Opuntia maxima* et *Hyoscuamus albus* are used for ethno-veterinary treatments (livestock, poultries and dogs). The local farming woman uses 9 species in cosmetology and 8 species in household (flavor milk products, sweep, etc.). Very old uses of *Quercus ilex*, *Arundo donax*, *Nerium oleander*, *Sarcornia fruticosa* and *Silene vulgaris* in laundry and washing hair are underlined by the local population. The local use of *Tetarclinis articulata*, *Ruta montana*, *Peganum harmala*, *Artemisia*

herba-alba and *Rosmarinus officinalis* is also bound to the belief (bad eye, bad mind).

Otherwise, the introduction of species, representing 3.57% of the global specific inventory, concerns the reforestation to reconstitute local ecosystems, to improve the sylvo-pastoral activity and to fight against flooding (*Pinus* spp., *Tetraclinis articulata*, *Atriplex numularia*, *Acacia saligna*, *Eucalyptus* spp.). Other species are also used in arboriculture (*Prunus dulcis*, *Olea europaea* subsp. *europaea* and *Opuntia maxima*), raising the species used in reforestation to 5.71% of the identified ones.

Species with food virtue represent 52.1% of the species inventoried, vs. 55% recorded in the wadi Laou watershed, Northwestern Morocco, and 10.1% in the region of Rissani, Southeastern Morocco [10, 14]. The alimentary flora consists of 73 species, including 38 cultivated species, 23 spontaneous species and 12 species with imported by-products and marketed in the study area (table 1).

The 73 species used in the local therapy belong to 39 families, including those represented by only one species (29 families), and those exceeding the 5% of the local medicinal flora each (5 families), namely *Lamiaceae* (15.06%), *Asteraceae* (10.95%), *Fabaceae* (6.84%), *Myrtaceae* (5.47%) and *Rosaceae* (5.47%). In other regions of Morocco, the medicinal flora is more important and varies from 76 to 180 species, according to the climatic and socioeconomic circumstances, and the concerned area [10, 12-14]. The high species number of medicinal flora in the wadi Laou watershed, Northwestern Morocco, could be due to its rich phyto-diversity and/or a backup of local know-how, since the plants use in both food and traditional medicine reach 57% [14], vs. only 22.6% for this study. This confirms that the food and medicinal uses are closely bound and may be relevant to the functional-foods development [8].

Other species (1.45%) are avoided by the local population because of their toxicity, such *Coriaria myrtifolia* and *Gladiolus communis*, underlined by other works [13, 16].

Otherwise, several species have multiple use; among which, 13 species account for the needs of firewood, 16 species are used in pastoralism, 6 species in animal feed and 4 species in crafts (table 1). The clandestine exploitation of the species as wood, coal and roofing, or sold locally as aromatic plants concerns *Tetraclinis articulata*, *Quercus ilex*, *Pinus* spp., *Juniperis oxycedrus*, *Ulex* spp., *Rosmarinus officinalis*, *Ceratonia siliqua*, *Origanum compactum*, *Thymus zygis*, *Calamintha sylvatica*, *Stipa tenacissima* and *Cannabis sativa*.

The local uses of plant resources (merchandising, subsistence, traditional medicine,

etc.) show their essential role for the inhabitants of these mountainous zones. The mercantile value of these secondary products, integrated in the local food chain (edible fruits, picking foods, medicinal plants, honey, etc.) is not even recognized. However, wood sale is not representative in the survey area, contrary to the forest spaces, generally known by this activity.

The quantification of various values of the local flora is a strong argument for its preservation, and therefore, prevention against further deforestation. Unfortunately, many uses of these plants are being phased out, because of the forest decline or the progressive impoverishment of local know-how. Besides, some old traditional uses are especially recognized by the aged women.

4. Conclusion

The local flora includes at least 140 species of exploited vascular-plants, growing mainly in forests, matorrals and/or scrublands. *Fabaceae*, *Lamiaceae*, *Rosaceae*, *Poaceae* and *Asteraceae* are the more used. Aerial part, fruit and/or leaf are the most sought-after in plants from the region. They are followed by inflorescence and the underground part.

The recent or very old local-uses of plants concern leading food and traditional medicine (73 species each). They are followed by herbalism and apiculture. The melliferous flora (27 species) constitutes an asset of the study zone, and attracts roving bee-keepers.

The conservation of local flora is dependent on the direct-values appreciation of plant resources, as by-products of the forest area, combined with a policy of population awareness towards the actual values of phyto-diversity.

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