

Full Length Research Paper

An ethnobotanical survey of medicinal plants used in the Tata Province, Morocco

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An ethnobotanical survey was conducted in the Tata Province (South-eastern Morocco) with the aim to collect the detailed information about the usage of plants in human therapy. The survey was carried out over a period of 24 months, by means of semi-structured and structured interviews. A total of 900 interviews were conducted with traditional health practitioners and knowledgeable villagers. A total of 163 plant species representing 134 genera and 56 families were used in the treatment of various diseases. The most encountered medicinal plant families were Lamiaceae (12.3% of use-reports), Asteraceae (7.4%), Apiaceae and Fabaceae (6.7%). Plant leaves were the most commonly used plant part, and decoction and infusion were the most common methods of traditional drug preparation. This study has established a monograph of medicinal plants used in traditional herbal medicine in Tata Province. This work is a contribution to the preservation of local knowledge in traditional herbal medicine.

Key words: Ethnobotanical survey, medicinal plants, traditional medicine, Tata Province, Morocco.

INTRODUCTION

Today, despite the many advances in modern medicine, there is a marked revival of interest with respect to medicine and traditional pharmacopoeia. In the rural areas of developing countries, herbal medicines serve the health needs of about 80% of the world's population (Azaizeh et al., 2003). Plants are important sources of therapeutic drugs and play an important role in the survival of the tribal and ethnic communities. Traditional medicinal plants have several advantages; they are affordable, easily accessible, and there is no evidence of resistance to whole-plant extracts (Al-Adhroey et al., 2010). Morocco is known for its rich vegetation and plant biodiversity (Msanda et al., 2005), due to its geographical and climatic conditions. It is one of the Mediterranean countries with a long tradition in the field of phytotherapy (Jouad et al., 2001; Scherrer et al., 2005). The local

traditional pharmacopoeia continues to be an important source of remedies for primary healthcare in the country (Merzouki et al., 2000).

The knowledge of the use of medicinal plants and the procedures applied to their preparation is usually transmitted from generation to generation, but it is often in danger because transmission between older and younger generation is not always assured (Addo-Fordjour et al., 2008; 2012). Consequently, it is essential to document the medicinal component of the flora of any country for conservation and sustainable use. Many authors have studied the traditional pharmacopoeia in different areas of Morocco (Bellakhdar, 1997; Bellakhdar et al., 1991; Sijelmassi, 1993; Ziyat et al., 1997; Merzouki et al., 2000; Jouad et al., 2001; Eddouks et al., 2002; El-Hilaly et al., 2003; Tahraoui et al., 2007). However, no ethnobotanical work has been carried out in Tata region. Therefore, the aim of this study was to systematically collect information about the usage of plants in human therapy in Tata province (south-eastern

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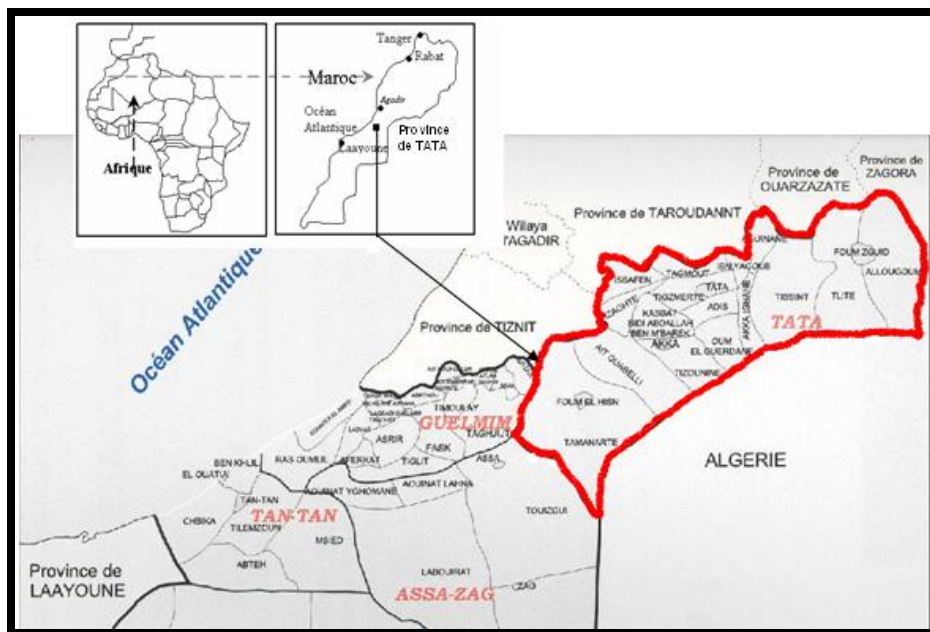


Figure 1. Location of study area.

Morocco). In this region traditional plant medicines have always held a strong position for its ethnobotanical values and therapeutic importance.

MATERIALS AND METHODS

Study area

The study was carried out in different areas of Tata region, situated in the southeast of Morocco. Geographically the area corresponds to the southern side of the mountains of the Anti-Atlas and occupies an area of 26,274 sq.km. The area is characterized by a hyperaridity marked by low rainfall of around 100 mm, of stormy character, and large fluctuations in the daily and yearly temperatures. Its population is mainly rural (70%). The region is a center of excellence at national level in folk-medicine with a strategic location between North Africa, the Sahara and Sahel, and historical events such as an intermingling of civilizations Amazigh (Berbers), Jews, Saharan and Arab-Muslim in these oases. Data was collected in 27 localities in Tata Province (Figure 1). The study sites were selected based on utilization of traditional herbal medicines by the community in this region.

Data collection

An ethnobotanical survey was carried out in province of

Tata from March 2009 to March 2011, during which we conducted 900 interviews in different regions of the province. The data was collected through semi-structured and structured interviews with traditional healers (called "Achab" in local dialect) and with people having knowledge of traditional medicine. Information was analyzed with the SPSS program. The people interviewed were either born or had been living in the region for more than 20 years. The medicinal plants listed in this inventory were only included if they satisfied, two criteria: the herbal remedies handed down from oral tradition, and only those plant species that could be directly identified and/or collected by the person interviewed are cited in this paper.

At each interview, the following data were gathered and set on an identity card:

- Age, sex, and cultural level;
- Geographic locality;
- Date and place of gathering information;
- Vernacular name (Arab or Berber) of the used plants and their distribution, local or imported, cultivated species or spontaneous;
- Part of the plant being used;
- The reasons for using medicinal plants;
- Form of use, mode of preparation and administration.

A medicinal property was accepted as valid only if it was mentioned by at least five independent interviewees. Most of the interviews and discussions were held in Berber, the dialectal language of the region.

The medicinal plants mentioned by interviewees were

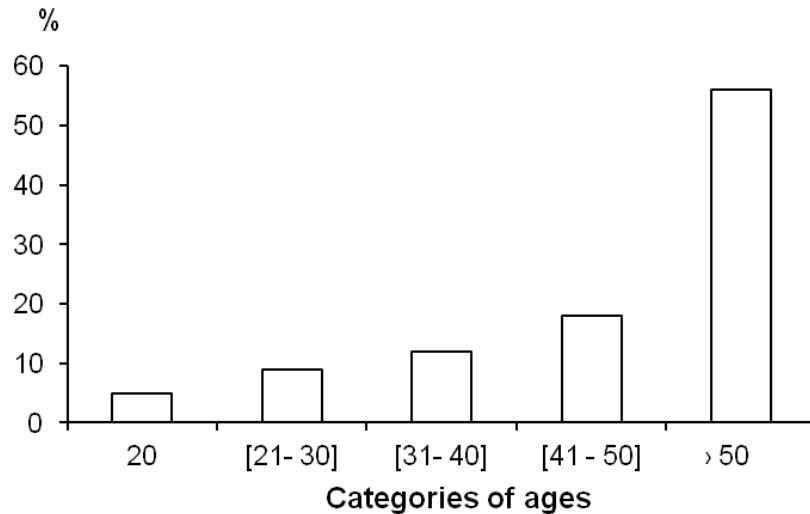


Figure 2. Demographics of interviewees.

collected and voucher specimens were deposited at the herbarium of the Laboratory of Biotechnology and Valorization of Natural Resources (LBVRN), Faculty of Sciences, Ibn Zohr University, Agadir. The plant species were identified following 'Moroccan Flora' (Fennane et al., 1999, 2007); 'Vascular Flora of Morocco, Inventory and Chorology' (Fennane and Ibn Tattou, 2005, Ibn Tattou and Fennane, 2008), 'Flora of North Africa' (Maire, 1952-1980), 'Moroccan Plants Catalogue' (Jahandiez and Maire, 1931-1934) and 'Flora of Sahara' (Ozenda, 1977).

RESULTS AND DISCUSSION

Demographic characteristics of interviewees

Traditional healers and herbal medicine play an important role in the healthcare of rural areas in Morocco (El-Hilaly et al., 2003). Local people have different kinds of indigenous knowledge systems to utilize local herbs. Majority of interviewees acquired the traditional medical knowledge from members of their families mainly grandparents and parents. Among a total of 900 respondents, 612 were living in villages and 288 were living in city centers. Majority of respondents replied that they use herbal medicine to treat their illness. A total of 420 individuals depend on herbal medicine alone, 400 individuals use both herbal medicine and modern medicine, and 80 people have recourse to modern medicine alone. Majority of people opted for a traditional treatment because of its low cost compared to modern medicine; that reflects the reality that local families have low incomes and therefore resort to traditional medicine that is cheap. Ethno-pharmacological surveys on the use of traditional medicinal materials conducted in other countries revealed similar trends where plants

represented most of all the traditional medicinal substances (Addis et al., 2001; Maroyi, 2011).

Previous studies have reported a wide range of the rate plant use (50-95%), which varied from region to region according to ethnology, richness of medicinal plant sector and home environment (Sijelmassi, 1993; Bellakhdar, 1997; Ziyat et al., 1997; Hmammouchi, 1999; Jouad et al., 2001; Eddouks et al., 2002; El-Hilaly et al., 2003; Tahraoui et al., 2007). We observed that women frequently used more (67 %) medicinal plants than men (33 %). In contrast to men, women learn mainly from their mothers through routine observations. Similar findings were also reported in other parts of Morocco (Ziyat et al., 1997; Jouad et al., 2001; Eddouks et al., 2002) and elsewhere in world (Savo et al., 2011; Packer et al., 2012). The study showed that the frequency of medicinal plant use increased with age (Figure 2).

Interestingly, the frequency of use of medicinal plants was inversely related to the level of education of the interviewed population; illiterate: 70%, primary education: 21.5%, secondary education: 8% and university education: 0.5%. The youngest respondents and people who studied up to the age of 20 or over were more inclined towards the modern medicines resulting in loss of valuable herbal-based knowledge.

Diversity of medicinal plants

The present ethnobotanical survey recorded information on 163 plant species, belonging to 56 families and 134 genera used to treat various ailments (Table 1). The families with the most reported plant species were Lamiaceae (20 species), Asteraceae (12 species), Apiaceae (11 species) and Fabaceae each (11 species).

The best five families which are well represented in the

Table 1. List of medicinal plants used in Tata Province (Morocco).

Scientific name and Family	Local name	Habit	Uses	Number of citations	Plant part used	Preparation	Administration
1 - <i>Acacia ehrenbergiana</i> Hayne Fabaceae	Talh - Tamat	Tree	Tanning	35	Bark, leaf	Raw	-
			Antidiarrhoeic, contraception, fever	30	Seed	Decoction	Oral
			Asthma, cough, hepatitis, neuralgia	14	Gum	Infusion	Oral
			Wound healing	12	Seed	Powder	Applied on the affected part
			Stomachic	10	Leaf	Decoction	Oral
			Eye inflammation	10	Seed	Decoction	Eye drops
			Rheumatic pains	8	Leaf	Decoction	Applied externally
Tooth pains	6	Flower, seed	Decoction	Mouthwash			
2 - <i>Acacia tortilis</i> subsp. <i>raddiana</i> (Savi) Brenan Fabaceae	Talh - Amrad	Tree	Colic, cough, pulmonary diseases	120	Leaf, gum	Decoction, infusion	Oral
			Neuralgia, asthma, hepatitis, jaundice	96	Gum	Infusion	Oral
			Astringent, demulcent, detergent, haemostatic, expectorant, angina	94	Bark	Infusion	Oral
			Kidney stones	50	Fruit	Decoction	Oral
3 - <i>Acanthorrhinum ramosissimum</i> (Coss. & Durieu) Rothm. Scrophulariaceae	Ansfoul	Shrub	Helminthiasis	54	Whole plant	Decoction	Oral
4 - <i>Aizoon canariense</i> L. Aizoaceae	Lghassoul	Herb	Warts, face and hair care	70	Leaf, aerial part	Powder Cataplasm/mask	Applied externally
			Emetic	62	Whole plant	Decoction	Oral
			Wounds, skin care	38	Fruit	Powder Cataplasm	Applied externally
5 - <i>Ajuga iva</i> (L.) Schreb. Lamiaceae	Chendgura – Timnra iyznkad	Hemicryptophyte	Stomach ailments	38	Whole plant	Decoction	Oral
			Antiseptic, anxiety, antispasmodic, bone care, carminative, intestinal ailments, colds, diabetes, flatulence, rheumatism, rabies, tonic, stomachic, hypotensive, diuretic, febrifuge, migraine, gastralgia	32	Leaf, stem, flower or aerial parts	Decoction, tisane	Oral
			Helminthiasis, sinusitis, female infertility	31	Aerial parts	Decoction	Oral
			Menstrual pains	26	Leaf, flower	Tisane	Oral
			Wounds	20	Whole plant	Powder	Applied externally on the affected parts
6 - <i>Allium cepa</i> L. Liliaceae	Lbsala - Azalim – Tazalimt	Geophyte	Skin abscesses	51	Bulb	Cataplasm, decoction	Applied externally
			Eyes infection	43	Bulb	Juice	Eye drops
			Helminthiasis, deterrent	42	Bulb	Decoction	Oral
			Fever, anti parasitic	34	Bulb	Raw	Oral
			Asthma	20	Seed	Mixed with honey	Oral
			Vertigo	18	Bulb	Raw	Inhalation

Table 1 Contd.

			Hypotensive, colds, helminthiasis, depurative, sterility, colic	106	Bulb	Decoction, raw	Oral
7 - <i>Allium sativum</i> L.	Thouma – Tiskrt	Geophyte	Snake and scorpion bite	35	Bulb	Cataplasm	Applied externally
Liliaceae			Antitoxic	30	Bulb	Raw	Oral
			Migraine, headache	22	Stem	Fumigation	Inhalation
			Intestinal pains	18	Bulb	Raw	Oral
			Stye, cutaneous infection, antifungal	15	Bulb	Boiled in oil	Applied externally
8 - <i>Aloysia citriodora</i> Palau	Lwiza	subshrub	Digestive, antiseptic, carminative, sedative, gastric lavage, calming, calefacient	132	Leaf	Infusion	Oral
Verbenaceae							
9 - <i>Alpinia officinarum</i> Hance	Khudenjal	Geophyte	Rheumatism, sexual impotence, calefacient, menstrual pains, depurative, galagtagogue	164	Root	Powder mixed with Ras El Hanout	Oral
Zingiberaceae							
10 - <i>Ammodaucus leucotrichus</i> Coss. Durieu	Lkmmoun soufi Talkmount Lkmmoun n'taarabin	Herb	Hypotensive , stomach ache, colic, digestive, diarrhea, emetic, cough, pulmonary diseases, anorexia, allergy, tachycardia, Labour pains , spasmodic, helminthiasis, , gastroenteritis Otitis	190	Fruit, seed	Decoction	Oral
Apiaceae				60	Seed	Decoction	Oral
				30	Fruit	Decoction	Ear drops
11 - <i>Anabasis articulata</i> (Forssk.) Moq.	Tifrt	Subshrub	Eczema, headache, fever	73	Aerial parts	Decoction	Applied externally, oral
Chenopodiaceae							
12 - <i>Anastatica hierochuntica</i> L.	Lkmcha	Herb	Labour pains, menstrual pains, epilepsy, constipation, sterility, colds, rheumatoid arthritis	57	Whole plant	Decoction	Oral
Brassicaceae			Ophtalmia	21	Whole plant	Decoction	Eye drops
13 - <i>Anvillea radiata</i> Coss. & Durieu	Nagd – Ojrg	Shrub	Cholagogue, vaginal antiseptic	66	Flower	Decoction	Oral, applied externally
Asteraceae			Liver diseases, stomachic hypoglycaemic	43	Whole plant	Infusion	Oral
			Colds, digestive	29	Leaf, stem	Infusion	Oral
14 - <i>Apium graveolens</i> L.	Lkrafess	Hemicryptophyte	Kidney stones	85	Leaf	Decoction	Oral
Apiaceae			Aphrodisiac	81	Aerial parts	Decoction	Oral
			Bladder infections	48	Fruit	Decoction	Oral
15 - <i>Argania spinosa</i> (L.) Skeels	Argan	Tree	Skin and hair care	70	Seed	Oil	Applied externally
Sapotaceae			Invigorating, aphrodisiac	49	Seed	Oil	Oral
			Gastritis, ulcers	32	Leaf	Decoction	Oral
			Scalp treatment, hair care, eczema, chapped skin, burns	30	Seed	Freshly powder	Applied externally
			Hives, fungus, parasites, anti dandruff	27	Leaf	Decoction	External use
			Diabetes	12	Root	Decoction	Oral

Table 1 Contd.

			Tanning	10	Wood	Raw	-
16 - <i>Artemisia absinthium</i> L.			Colds, hypertensive, laxative, vermifuge, stomachic, heart disease, carminative, antiseptic, diuretic, febrifuge, antitoxic	88	Leaf	Infusion	Oral
Asteraceae	Chiba	Subshrub	Otitis	22	Leaf	Infusion	Ear drops
			Treat wrinkles, cutaneous infections	10	Leaf	Powder mixed in oil	Applied externally on the affected parts
17 - <i>Artemisia huguetii</i> Caball.			Colds, gastric pains, spasmolitic, carminative, vermifuge, rheumatic diseases, emmenagogue, diuretic, stomachic, sedative, intestinal antiseptic, cholagogue, hypoglycaemic	462	Leaf	Decoction	Oral
Asteraceae	Chih- Izri	Shrub	Respiratory diseases, obesity	208	Leaf	Infusion	Oral
18 - <i>Asphodelus tenuifolius</i> Cav.			Rheumatoid arthritis, colds, rheum	66	Fruit	Decoction	Oral
Liliaceae	Tazia – Tizyit	Herb	Antidiarrhoeic, measles, anemia	63	Aerial parts	Infusion	Oral
			Indigestion, constipation, stomach pains	57	Leaf, fruit	Decoction	Oral
			Dermatosis	52	Leaf, fruit	Powder	Applied externally
19 - <i>Asteriscus graveolens</i> Less.			Rheumatic pains, spasmolitic, tiredness	83	Aerial parts	Decoction	Oral
Asteraceae	Tojrgt	Shrub					
20 - <i>Atractylis gummifera</i> L.			Abortifacient, toxic	72	Root	Decoction	Oral
Asteraceae	Addad	Hemicryptophyte	Skin care	22	Root	Powder mixed with oil	Applied externally
			Pulmonary and respiratory diseases, hepatitis, diabetes	51	Leaf, fruit	Infusion	Oral
21 - <i>Balanites aegyptiaca</i> (L.) Delile			Skin and face care, dermatitis, burns	41	Almond	Oil	Applied externally
Zygophyllaceae	Hlilaje – Taberkat	Tree	Rheumatism	36	Leaf, fruit, almond	Infusion, oil	Oral, massage
			Digestive disorders, dysepsie, constipation, helminthiasis	31	Leaf, fruit	Decoction	Oral
			Tooth pains	22	Stem	Raw	Chewed
			Jaundice	17	Leaf	Decoction	Oral
22 - <i>Bassia muricata</i> (L.) Asch.			Skin diseases	26	Leaf	Cataplasm	External use
Chenopodiaceae	Tasnant	Herb	Hypoglycaemic	24	Aerial parts	Infusion	Oral
23 - <i>Boswellia carterii</i> Birdw.			Respiratory ailments, cosmetic, ritual and magic practices	243	Root, resin	Fumigation	Inhalation, external use
Burseraceae	Salaban	Tree					

Table 1 Contd.

24 - <i>Boswellia frereana</i> Birdw.	Ljawi	Tree	Respiratory ailments, cosmetic, ritual and magic practices	232	Root, resin	Fumigation	Inhalation, external use
Burseraceae							
25 - <i>Brassica nigra</i> (L.) W.D.J. Koch	Lkhrdl	Herb	Bladder ailments, bronchitis, constipation digestive, emetic, rheum stimulant	113	Seed	Infusion	Oral
Brassicaceae							
			Rheumatism, wounds ritual and magic practices,	72	Seed	Cataplasm	Applied externally (for rheumatism and wounds)
			Wounds healing, cough	32	Root	Decoction	External use
			Tonsillitis, jaundice, dysentery, vermifuge	30	Root	Decoction	Oral
26 - <i>Calotropis procera</i> (Aiton) W.T. Aiton	Tourja – Tawrzat - Tawrza	Subshrub	Warts, boils	30	Latex	Raw	Applied externally
Asclepiadaceae							
			Dermatosis	26	Root and leaf	Powder	Applied externally
			Helminthiasis, asthma, cough	23	Leaf	Fumigation	Inhalation
			Constipation, fever	20	Leaf	Infusion	Oral
			Stomach pains	12	Leaf	Cataplasm	External use
			Asthma, epilepsy	11	Leaf	Powder	Applied externally
			Syphilis, rheumatism, skin parasites	8	Leaf	Powder	Oral
			Abortifacient	8	Latex	Diluted	Oral
27 - <i>Cannabis sativa</i> L.			Narcotic, sedative, antiemetic, stomachic	20	Female flowering tops, stem, leaf	Powder	Smoked
Cannabaceae							
	Lkif	Herb	Hair care	16	Seed, leaf	Powder mixed with oil	Application on hair
			Cholagogue	11	Leaf	Decoction	Oral
			Skin diseases	6	Leaf	Cataplasm	Application externally
28 - <i>Capparis spinosa</i> L.	Lkbbar– Tayloulout	Shrub	Cholagogue, colds, intestinal atony, flatulence, spleen swelling, liver bile insufficiency	76	Root	Infusion	Oral
Capparaceae							
			Headache, migraine	32	Leaf	Decoction	Oral
			Cancer, rheumatism, alopecia	31	Leaf, flower, fruit	Powder mixed with oil, cataplasm	Oral, application, external use
			Cutaneous neoplasms	15	Leaf	Cataplasm	External use
29 - <i>Carum carvi</i> L.	Lkwiya, Lkrwit	Hemicryptophyte	Gastric pains, kidney diseases, antidiabetic, emmenagogue, stimulant, blood diseases, colds, galactagogue, aroma, refreshing	112	Seed	Decoction	Oral
Apiaceae							
			Stomachic, spasmolytic, carminative	47	Fruit	Infusion mixed with milk	Oral
30 - <i>Cassia fistula</i> L.	Aod salib	Tree	Ritual and magic practices	125	Leaf, Stem	Fumigation	-
Fabaceae							

Table 1 Contd.

31 - <i>Cassia senna</i> L.			Constipation, gastric ailments	103	Leaf, fruit	Decoction	Oral
Fabaceae	Sana- Sana makki	Tree	Pancreas ailments, cholagogue, sedative	62	Leaf, fruit	Infusion	Oral
			Skin and hair care	43	Leaf, fruit	Powder with oil and <i>Lawsonia inermis</i>	External use
32 - <i>Cedrus libani</i> subsp. <i>atlantica</i> (Endl.) Batt. & Trab.							
Pinaceae	Kdran	Tree	Skin and hair care	92	Resin	Raw	External use
33 - <i>Ceratonia siliqua</i> L.							
Fabaceae	Kharroub – Tikida - Ikido	Tree	Antidiarrhoeic, stomachic, intestinal and gastric ailments,	86	Leaf, fruit, root	Powder, infusion	Oral
			Headache, migraine, fever	106	Leaf	Cataplasm	External use
34 - <i>Chenopodium ambrosioides</i> L.			Menstrual pains, detersive, antitussive, carminative, febrifuge, calming, galactagogue, antidiarrhoeic	53	Leaf	Decoction	Oral
Chenopodiaceae	Lmkhinza - Tawijant	Herb	Asthma, colds	36	Seed	Infusion	Oral
			analgesic, anthelmintic	18	Seed	Raw	Fumigation of the vagina
35 - <i>Cicer arietinum</i> L.							
Fabaceae	Lhms	Herb	Tonic, stimulant, antidiarrhoeic	62	Seed	Infusion	Oral
36 - <i>Cinnamomum camphora</i> (L.) J. Presl.							
Lauraceae	Lkafour	Tree	Vermifuge	51	Resin	Powder	Oral
			As aroma	43	Resin	Raw	-
37 - <i>Cinnamomum zeylanicum</i> Blume							
Lauraceae	Lkorfa	Tree	Spasmodic, digestive pains, stomachic, spice, calefacient, aphrodisiac, antiemetic, stimulates circulation	109	Stem, leaf	Infusion	Oral
38 - <i>Cistus salvifolius</i> L.							
Cistaceae	Irgl	Shrub	Uterine pains, bronchitis, sterility	116	Seed	Powder	Oral
			Rheumatism, syphilis, tuberculosis, spasmodic	53	Fruit	Infusion	Oral
39 - <i>Citrullus colocynthis</i> (L.) Schrad.			Skin diseases, wound healing	47	Fruit	Powder	External use
Cucurbitaceae	Hedja – Handal - Afrziz	Geophyte	Scorpion bite, dermatitis	36	Seed	Cataplasm, raw, or cooked	Applied on the affected parts
			Diabetes, stomach ache	26	Seed	Decoction	Oral
			Rheumatic pains, genital infections	24	Seed	Powder	External use
			Insecticide	13	Seed	Powder	-

Table 1 Contd.

40 - <i>Citrus aurantium</i> L.	Lamej	Subshrub	Headache, hepatitis	36	Fruit	Juice	Oral
Rutaceae			Tonsils care	28	Fruit	Juice with honey	Oral
41 - <i>Citrus limon</i> (L.) Burm. f.	Lhamed	Subshrub	Hypotensive, antiseptic, diarrhea, angina	62	Fruit	Juice	Oral
Rutaceae			Cosmetic, face care	53	Flower	Maceration	External use
			Headache, fever	46	Fruit	Cataplasm	External use
42 - <i>Citrus vulgaris</i> Risso	Limoun – Litchin	Subshrub	Haemostatic, analgesic, sedative, vermifuge, carminative	59	Leaf and flower	Infusion	Oral
Rutaceae			Headache, fever	42	Fruit	Cataplasm	External use
			Face care	36	Leaf and flower	Maceration	External use
43 - <i>Cleome africana</i> Botsch.	Lmkhinza	Herb	Fever	80	Leaf	Cataplasm, decoction	External use, oral
Capparaceae			Headache, cough, flatulence	66	Leaf	Decoction	Oral
			Colds, rhume, rheumatoid arthritis	36	Leaf	Powder with oil	Ointment
			Diuretic, rheumatism	32	Whole plant	Infusion, maceration	Oral
44 - <i>Commiphora africana</i> (A. Rich.) Engl.	Ljawi laswad	Tree	Respiratory ailments, cosmetic, ritual and magic practices	92	Root, resin	Fumigation	External use
Burseraceae							
45 - <i>Convolvulus trabutianus</i> Schweinf. & Muschl.	Asghrghjd	Shrub	Wound healing, stop haemorrhage, microbial infection	41	Leaf, aerial parts, root	Stupe, powder	Applied on affected parts
Convolvulaceae			Hypertension	36	Root	Decoction	Oral
			Cough, pertussis, gastric pains	23	Whole plant	Decoction	Oral
			Constipation, hepatitis	18	Leaf	Tisane	Oral
			Helminthiasis	10	Aerial parts	Decoction	Oral
46 - <i>Coriandrum sativum</i> L.	Kasbour	Herb	Bladder ailments, gastric and intestinal pains, insomnia, rheumatic pains, diarrhea, sedative, stomachic, carminative	94	Leaf, seed	Decoction	Oral
Apiaceae			Muscular and rheumatic pains	34	Aerial parts mixed with oil	Ointment	Applied externally
47 - <i>Cotula cinerea</i> Delile	Grtofa – Broba	Herb	Colic, diarrhoea, cough, colds	76	Leaf, whole plant	Infusion, decoction	Oral
Asteraceae			Pulmonary diseases	41	Aerial parts, flower	Fumigation	Inhalation
			Rheumatoid arthritis	38	Whole plant	Powder mixed with oil	Applied externally
			Ophtalmia, kidney diseases, dysmenorrhea, gastric pains, headache,	33	Whole plant	Infusion, decoction, cataplasm	Oral, applied externally
			Measles, teething in babies, fever	26	Leaf, root	Infusion	Applied externally on the affected parts
	Spasmodic, sore throat, itchy skin	23	Flowering plant	Decoction	Oral		

Table 1 Contd.

48 - <i>Crocus sativus</i> L.			Tonic, laxative, labour pains, aphrodisiac, menstrual pains	87	Stigma	Infusion	Oral
Iridaceae	Zaafraan	Geophyte	Sterility	38	Stigma	Raw	Oral
49 - <i>Crotalaria saharae</i> Coss.			Scorpion and snake bite	28	Whole plant	Cataplasm	Application on affected parts
Fabaceae	Taqayt iyznkad	Subshrub					
50 - <i>Cucumis melo</i> L.			Digestive, laxative	62	Seed, pulp	Decoction, raw	Oral
Cucurbitaceae	Lbtikh – Lemnoun	Herb					
51 - <i>Cucurbita maxima</i> L.			Diuretic, vermifuge, stomach and intestinal pains	86	Seed	Decoction	Oral
Cucurbitaceae	Lgraa – Akhsay – Takhsayt	Herb					
52 - <i>Cuminum cyminum</i> L.			Gastric and intestinal pains, carminative, antiemetic, diarrhea, galactagogue, stomachic	93	Fruit, seed	Infusion mixed with milk, decoction, Cataplasm	Oral, external use
Apiaceae	Lkmmoun	Herb	Spasmodic, vermifuge, emmenagogue	26	Seed	Decoction	Oral
			Seasoning	17	Seed	Powder	Oral (in food)
			Mumps	7	Seed	Cataplasm	Applied externally
53 - <i>Cynodon dactylon</i> (L.) Pers.			Rheumatism, uterus disease, dysmenorrhea, kidney pains, stomachic	24	Rhizome	Decoction	Oral
Poaceae	Njem Afar	Geophyte	Urinary and bilious tracts, arthritis	15	Aerial parts	Decoction, tisane	Oral
54 - <i>Datura stramonium</i> L.			Narcotic, hallucinant, sedative, toxic	70	Leaf, seed	Tisane, decoction	Oral
Solanaceae	Chdeq jmel – Taborzingnt	Herb	Asthma	19	Leaf	Infusion, cataplasm	Oral, external use
			Cough, tremor in the elderly	17	Leaf	Tisane, cataplasm	Oral, external use
			Frigidity, jaundice	7	Flower	Tisane	Oral
55 - <i>Daucus carota</i> L.			Gastric pains, helminthiasis	54	Seed	Decoction	Oral
Apiaceae	Khizzou	Geophyte					
56 - <i>Echinops spinosus</i> L.			Colds, kidney stones detersive, diuretic, hypoglycaemic	32	Root, flowered aerial parts	Decoction	Oral
Asteraceae	Taskra – Bongar	Hemicryptophyte	Abortifacient, labour pains	27	Branch, root	Decoction	Oral
			Neuralgia, tiredness	11	Flower	Tisane	Oral
57 - <i>Ephedra alata</i> Decne.			To gain weight, calefacient	52	Leaf, branch	Powder	Oral
Ephedraceae	Tamatrt	Subshrub	Colds, influenza, respiratory ailments	46	Leaf, branch	Powder	Inhalation
			Diabetes, asthma, hypertension	27	Leaf, branch	Decoction	Oral
			Rheumatoid arthritis	18	Leaf, branch	Decoction	Massage
58 - <i>Eucalyptus globulus</i> Labill.			Fever, colds, antitussive, cough, grippe, respiratory ailments	44	Leaf	Decoction, infusion, fumigation	Oral, inhalation
Myrtaceae	Lkalitos – Kalatos	Tree	Hair care	19	Leaf	Decoction	External use
			Migraine, thorax ailments	9	Leaf	Cataplasm	External use

Table 1 Contd.

59 - <i>Euphorbia calyptata</i> Coss. & Kralik	Moulbina – Tinora (Remmada, Sak-leghrab)	Herb	Skin diseases, scorpion bite	56	Latex	Cataplasm	Application on affected parts
Euphorbiaceae							
60 - <i>Euphorbia falcata</i> L.	Hayat Ianfus	Herb	Aphrodisiac, rheumatism	62	Leafy stem	Powder with honey, infusion	Oral
Euphorbiaceae							
61 - <i>Euphorbia officinarum</i> subsp. <i>echinus</i> (Hook. f. & Coss.) Vindt	Dghmous – Tikiout	Subshrub	Diabetes	73	Aerial parts	Powder	Oral
Euphorbiaceae							
62 - <i>Euphorbia resinifera</i> * Berg.	Zaqqoum	Subshrub	Diabetes, magic practice	68	Resin	Infusion	Oral, fumigation
Euphorbiaceae							
63 - <i>Euphorbia retusa</i> Forssk.	Moulbina – Tinora	Herb	Skin diseases, snake and scorpion bite	32	Latex	Cataplasm, diluted, raw	External use
Euphorbiaceae			Digestive ailments, abortifacient, neuralgia, kidney stones,	28	Latex	Diluted	Oral
64 - <i>Farsetia aegyptiaca</i>	Laaoud labyed – Tamyout	Shrub	Spasmodic, colic, gastritis	43	Leaf	Decoction	Oral
Brassicaceae			Tooth ailments, gingivitis	26	Whole plant	Decoction	Mouth wash
65 - <i>Ferula communis</i> L.	Lfasoukh - Lboubal	Geophyte	Spasmodic	67	Fruit	Infusion	Oral
Apiaceae							
66 - <i>Ficus carica</i> L.	Lkermouss – Tazart - Iqorran	Tree	Diabetes, laxative, stomach pains	54	Fruit	Raw	Oral
Moraceae			Sedative	33	Fruit	Decoction	Oral
			Skin abscesses, insect bite	13	Latex	Raw	External use
67 - <i>Foeniculum vulgare</i> Mill.	Nafaa, Lbesbass	Hemicryptophyte	Spasmodic, carminative	46	Fruit and bulb	Infusion, decoction	Oral
Apiaceae			Digestive, diuretic expectorant, galactagogue	38	Fruit	Decoction	Oral
			Kidney diseases, digestive pains, diabetes	27	Seed	Decoction	Oral
			As aroma	13	Seed	Raw	-
68 - <i>Forsskaolea tenacissima</i> L.	Tltaq – Talghmimt	Herb	Haemostatic, wounds healing	49	Leafy stem, leaf	Powder	External use
Urticaceae			Rheumatoid arthritis, bile stones	46	Leaf	Tisane	Oral
69 - <i>Fraxinus excelsior</i> L.	Lsan ttir	Tree	Diabetes, kidney stones	32	Leafy stem	Decoction	Oral
Oleaceae			Rheumatism, laxative, tuberculosis, diuretic	62	Fruit	Infusion	Oral
			Skin diseases, astringent.	37	Leaf	Powder with oil	External use

Table 1 Contd.

70 - <i>Globularia alypum</i> L. Plantaginaceae	Ain lamab – Tasselgha	Shrub	Hypoglycemic, digestive, choleric, laxative, purgative, stimulant, depurative, antiseptic, antimycotic, constipation, gastric ulcers	82	Leaf	Infusion, decoction	Oral
			Wound healing, abscesses, cutaneous neoplasms	36	Leaf	Decoction	External use
71 - <i>Glycine max</i> (L.) Merr. Fabaceae	Soja	Herb	Diabetes	49	Fruit	Maceration	Oral
72 - <i>Glycyrrhiza glabra</i> L. Fabaceae	Aarq souss	Geophyte	Mouth infections	82	Root	Raw	Chewed
			Cough, hoarseness	65	Root	Infusion	Oral
			Gastric and intestinal ailments, carminative, constipation, ulcers, stomatitis	48	Root	Decoction	Oral
73 - <i>Gymnocarpos decandrus</i> Forssk. Caryophyllaceae	Asras	Shrub	Helminthiasis	53	Whole plant	Tisane	Oral
			Kidney stones	39	Aerial parts	Tisane	Oral
74 - <i>Hammada scoparia</i> (Pomel) Iljin Chenopodiaceae	Remt – Assay	Shrub	Indigestion	51	Leaf	Decoction	Oral
			Cutaneous neoplasms	37	Leafy stem	Cataplasm	External use
			Scorpions and snake bite, dermatitis	28	Aerial parts, leaf	Tisane, cataplasm	Oral, external use
			Diabetes, stomach ache, gastroenteritis, food poisoning	26	Root, seed	Decoction	Oral
			Colds, rheum	17	Root	Tisane	Oral
			Scabies, wound healing	15	Aerial parts	Powder	External use
75 - <i>Haplophyllum vermiculare</i> (Forssk.)Hand.-Maz. Rutaceae	Tiwermit	Shrub	Contraception , diuretic, abortifacient, , stomach pains, helminthiasis, circulatory	36	Leaf, flower	Tisane, powder with honey	Oral
			Rheumatic pains, , anemia, intestinal and liver pains, labour pains, fever	26	Aerial parts	Decoction	Oral
			Headache, scorpion bite	18	Aerial parts	Cataplasm	External use
			Epilepsy	14	Leaf, flower	Powder with honey	Oral
			Antiemetic, flatulence	6	Leaf, flower	Tisane	Oral
			76 - <i>Helianthemum lippii</i> (L.) Dum-Cours. Cistaceae	Amenterfass – Wiroudn	Shrub	Galactagogue, gout, rheumatoid arthritis, microbial infection, irregular menstrual cycle	35
Helminthiasis	16	Root	Decoction			Oral	
77 - <i>Heliotropium crispum</i> Desf. Boraginaceae	Liqamt Ikhla	Shrub	Skin diseases, burns	32	Leaf	Powder	Applied on affected parts
			Tonsillitis	19	Aerial parts	Decoction	Gargle
78 - <i>Herniaria cinerea</i> DC. Caryophyllaceae	Herrast lahjar	Herb	Kidney and pancreas ailments, colds, urinary pains	86	Leaf	Decoction	Oral
			Skin face care	42	Leaf	Powder with oil	External use

Table 1 Contd.

79 - <i>Homalothecium aureum</i> (Spruce) H. Rob.	Assenbal	Herb	Bladder and kidney ailments	65	Leaf	Infusion	Oral
Brachytheciaceae							
80 - <i>Hordeum vulgare</i> L.	Chaaire – Tomzin	Herb	Antidiarrhoeic, gastrointestinal ailments, digestive insufficiency	73	Fruit	Decoction	Oral
Poaceae							
81 - <i>Hyoscyamus muticus</i> L.	Lbettima – Saykran	Hemicryptophyte	Hair care	32	Seed	Infusion	External use
			Palpitations, anxiety, toxic,	26	Leaf	Infusion	Oral
			Gastritis, colic, asthma,	21	Leaf	Decoction	Oral
			Dermatitis	17	Fruit	Powder in oil	External use
			Spasmodic, back pains	13	Leaf	Cataplasm, decoction, infusion	External use, oral
			Fortifying	11	Root	Tisane	Oral
			Hypnotic	9	Fruit	Decoction	Oral
			Tooth ailments	7	Flower, fruit	Tisane, decoction	Mouthwash
Eye inflammation	6	Leaf	Maceration	Eye drops			
Solanaceae							
82 - <i>Ifloga spicata</i> (Forssk.) Sch. Bip.	Tamrt	Herb	Skin diseases	32	Whole plant	Decoction	Applied externally
			Cardiac ailments	18	Whole plant	Decoction	Oral
Asteraceae							
83 - <i>Juglans regia</i> L.	Swak – Grgaa	Tree	Tooth and gums care	82	Root, leaf	Decoction, massage	Mouthwash, external use
			rheumatism, hypertensive, tonic	53	Leaf	Infusion	Oral
Juglandaceae							
84 - <i>Lagenaria siceraria</i> (Molina) Standl.	Slawi – Takhsayt – Taslawiy	Herb	Respiratory ailments	49	Seed	Decoction	Oral
Cucurbitaceae							
85 - <i>Launaea arborescens</i> (Batt.) Murb.	Oum Ibina – Iferski	Subshrub	Hypoglycaemic	76	Root	Decoction	Oral
			Weaning	34	Latex	Raw	Applied to the nipples
Asteraceae							
86 - <i>Laurus nobilis</i> L.	Warqat sidna moussa	Tree	Liver, pancreas and digestive pains	38	Leaf, fruit	Infusion	Oral
			Face care	25	Leaf, fruit	Oil	External use
			Rheumatism	24	Leaf, fruit	Decoction	Oral
Lauraceae							
87 - <i>Lavandula coronopifolia</i> Poir.	Amgrzwa	Shrub	Antiseptic, diuretic, sedative, rheumatism, calefacient,	110	Flowering tops	Infusion	Oral
			Inflammation of the uterus, menstrual pains, vaginal antiseptic	80	Aerial parts	Decoction	Applied in vagina
			Microbial infection	70	Aerial parts	Powder /decoction	External use
			Diarrhea in children, stomach ailments, hepatitis	63	Aerial parts	Decoction	Oral
			Colds, chest pains, heartburn, spasmolytic, colic	57	Aerial parts	Tisane	Oral
Lamiaceae							

Table 1 Contd.

88 - <i>Lavandula dentata</i> L.	Lkhzama	Shrub	Urinary system ailments, calefacient	67	Leafy stem	Decoction	Oral
Lamiaceae							
89 - <i>Lavandula mairei</i> * Humbert	Timzoria	Shrub	Diabetes, menstrual pains, colic, hepatitis, gastrointestinal ailments, lung disorders, stomach ailments, microbial infection, headache, fever	386	Aerial parts	Decoction, infusion	Oral
Lamiaceae			Cystitis, cough, asthma, flatulence	94	Flowering tops	Tisane	Oral
90 - <i>Lavandula maroccana</i> * Murb.	Iguiz	Shrub	Headache, fever, hypotensive, diabetes, menstrual pains	146	Aerial parts	Decoction, infusion	Oral
Lamiaceae							
91 - <i>Lavandula officinalis</i> Chaix	Lkhzama	Subshrub	Kidney diseases, tannic, antiseptic, diuretic, sedative, rheumatism	132	Leaf	Infusion	Oral
Lamiaceae							
92 - <i>Lavandula stoechas</i> L.	Halhal	Shrub	Rheumatism, gastric ailments	112	Leaf, flower, flowering tops	Infusion, decoction	Oral
Lamiaceae							
93 - <i>Lawsonia inermis</i> L.			Hair care	150	Leaf	Powder	External use
			Antifungal, burns, sprains	86	Leaf	Powder	External use
Lythraceae	Lhenna	shrub	Hypotensive, emetic, stomach pains, digestive disorders	80	Leaf	Decoction	Oral
			Migraine, asthma, colds, tonic, calefacient, digestive, bone care, influenza, sterility, labour pains, galactagogue	64	Seed	Infusion	Oral
94 - <i>Lepidium sativum</i> L.	Hebb rchad	Herb	Antidiarrhoeic, ulcers	48	Seed	Decoction	Oral
Brassicaceae			Skin diseases	32	Seed	Powder	Applied externally
			Sexual impotence	25	Seed	Powder	Oral
95 - <i>Linum usitatissimum</i> L.	Zarriaat Al Kettane – Tafst	Herb	Laxative, diuretic, anthelmintic	87	Seed	Infusion	Oral
Linaceae			Cutaneous infection	32	Seed	Oil	External use
96 - <i>Lycium intricatum</i> Boiss.	Imzerki	Subshrub	Helminthiasis	47	Seed	Decoction	Oral
Solanaceae							
97 - <i>Maerua crassifolia</i> Forssk.	Atil	Tree	Toothache, fever	73	Leaf, stem	Cataplasm, decoction	Oral, external use
Capparaceae			Antiemetic, stomach ache, vulnerary	45	Leaf	Decoction	Oral
			Scalp care	36	Leaf	Decoction	External use
			Headache	31	Bark	Decoction	Oral
98 - <i>Malva sylvestris</i> L.	Lbaqoula – Lkhobbiza	Hemicryptophyte	Asthma, cough, colds, analgesic	62	Leaf	Infusion, decoction	Oral
Malvaceae							

Table 1 Contd.

99 - <i>Marrubium deserti</i> (De Noe) Coss.	Mriwt – Ifzi	Shrub	Respiratory disorders, fever, diabetes, jaundice, hypertension, stomach ailments, problems of digestion, spasmolitic, colic, colds, helminthiasis	170	Leaf, flowering tops, aerial parts	Infusion	Oral
Lamiaceae			Cough, dysmenorrhea, allergy	130	Leaf, branch	Infusion, powder	Oral
			Headache	50	Leaf	Powder	Inhalation
100 - <i>Marrubium vulgare</i> L.	Mriwt – Ifzi	Shrub	Bilious care, antitussive, hypoglycaemic, mouth care, asthma, colds, cough, intestinal and stomach ailments	80	Leaf	Infusion	Oral
Lamiaceae			Febrifuge, stomachic, pulmonary diseases, antitoxic, antiseptic, diuretic, slimming	42	Leaf	Infusion	Oral
			Eczema	26	Leaf	Massage	External use
			Otitis	22	Leaf	Infusion	Ear drops
			Antipyretic	18	Leaf	Cataplasm	External use
101 - <i>Matricaria chamomilla</i> L.	Babunj	Herb	Insomnia, calming, cough, stomach and gastric ailments, spasmolitic	86	Flower	Infusion	Oral
Asteraceae			Wounds	32	Leaf	Powder	Applied on affected parts
102 - <i>Matricaria pubescens</i> (Desf.) Sch. Bip.	Grtufa – Taraght	Herb	Measles, fever, spasmolitic, sore throat, itchy skin, stomach ailments, colic	66	Aerial parts, flower	Infusion	Oral
Asteraceae			Toothache	35	Aerial parts, flower	Decoction	Mouth wash
			Ulcers, asthma, carminative, digestive	35	Flower	Tisane	Oral
			Neuralgia, tiredness, rheum, sunburn, anorexia, helminthiasis	23	Leaf	Decoction	Oral
			Dysmenorrhea, cough, kidney ailments	17	Flower	Infusion	Oral
103 - <i>Mentha pulegium</i> L.	Flyou	Hemicryptophyte	Cholagogue , carminative, sedative, stomachic, colds, cough, respiratory ailments, antiemetic, tonic, antitussive, calefaciant, spasmolitic, tachycardia	620	Stem, leaf	Infusion	Oral
Lamiaceae							
104 - <i>Mentha suaveolens</i> Ehrh.	Timija	Hemicryptophyte	Tachychardia, calefaciant, tonic	510	Stem, leaf	Infusion	Oral
Lamiaceae							
105 - <i>Mentha viridis</i> (L.) L.	Nanaa – Liqamt	Hemicryptophyte	Carminative, vermifuge, diarrhea, colds, renal colic, headache, bone care	214	Stem, leaf	Infusion	Oral
Lamiaceae							
106 - <i>Morettia canescens</i> Boiss.	Tazwagt	Herb	Anemia, anorexia, colds, rheum	53	Seed	Raw	Oral
Brassicaceae			Hair care	32	Flowered stem	Powder mixed with <i>Lawsonia inermis</i>	Applied externally

Table 1 Contd.

107 - <i>Myristica fragrans</i> Houtt. Myristicaceae	Lgouza – Bssibssa – Gouza ttib	Tree	Rheumatism, sexual impotence, digestive, cholagogue, stomachic, calefacient, colds, gynecological pains, labour pains, asthma	132	Seed	Powder mixed with <i>Ammodaucus</i> <i>leucotrichus</i> and honey	Oral
108 - <i>Myrtus communis</i> L. Myrtaceae	Rihane	Subshrub	Hair care	118	Leaf, fruit	Powder mixed with <i>Lawsonia inermis</i>	Applied externally
			Baby massage	56	Leaf	Decoction	Applied externally
			Cardiac and digestive weakness	32	Leaf, fruit	Decoction	Oral
109 - <i>Nerium oleander</i> L. Apocynaceae	Defla – Ailii	Subshrub	Detersive, bone care, headache, diabetes	42	Leaf	Decoction	External use
			Dermatosis, colds, rheum, cough rheumatism, scabies	35	Leaf	Powder mixed with oil or fresh powder	Cataplasm, massage
			Oliguria, tooth ache, Vertigo, cephalagia, to remove the evil eye	27	Leaf	Juice	Oral
				24	Root	Fumigation	Inhalation
			Food poisoning, diuretic	18	Root	Powder (mixed with Ras El Hanout)	Oral
			Syphilis, analgesic, sternutatory	16	Latex	Infusion	Oral
			Eczema	15	Latex	Raw	Applied externally
			Abortifacient (high dose)	12	Leaf, latex	Infusion	Oral
110 - <i>Nigella sativa</i> L. Ranunculaceae	Habba sawda – Sanouj – Chanouj	Herb	Asthma, colds, cough, stomach pains, aphrodisiac	120	Seed	Powder mixed with honey	Oral
			Cholagogue, diuretic, galagtagogue, spasmolitic	114	Seed	Powder	Oral
			Rheumatism	90	Seed	Oil	Massage
			Tonic	86	Seed	Raw	Oral
111 - <i>Ocimum basilicum</i> L. Lamiaceae	Lahbaq	Herb	Anthelmintic, aroma	85	Leaf	Infusion	Oral
			heart diseases	43	Seed	Decoction	Oral
112 - <i>Olea europaea</i> L. Oleaceae	Zitoun	Tree	Stomachic, digestive, diabetes, vermifuge, Cough, colds, otitis	124	Leaf	Decoction	Oral
				82	Fruit	Oil	Oral, ear drops
113 - <i>Opuntia ficus-barbarica</i> A. Berger Cacataceae	Lhndia – Aknari	Subshrub	Antidiarrhoeic, diuretic	66	Flower, fruit	Infusion, raw	Oral
			Colds, stomachic	48	Flower	Powder	Oral
114 - <i>Origanum compactum</i> Benth. Lamiaceae	Zaatar	Shrub	Bronchitis, colds, stomach and intestinal pains, heart diseases, spasmolitic, sedative, emmenagogue	209	Stem and leaves	Infusion	Oral
115 - <i>Origanum majorana</i> L. Lamiaceae	Merdeddouch	Herb	Stomach pains, headache, fever, cough, insomnia, Rheumatism	106	Stem and leaves	Infusion	Oral
				63	Stem and leaves	Decoction	External use
116 - <i>Panicum turgidum</i> Forsk. Poaceae	Mrokba – Afezou	Hemicrypt ophyte	Constipation	75	Root	Decoction	Oral
			Skin diseases	43	Aerial parts	Decoction	External use
			Scabies , wounds healing, vulnerary	32	Stem	Infusion, powder	External use

Table 1 Contd.

117 - <i>Papaver rhoeas</i> L.	Belaaman	Herb	Sterility and dysmenorrheal , cough, pulmonary infection, insomnia of children, sedative, calefacient, analgesic, spasmolytic	102	Fruit, seed	Infusion	Oral
Papaveraceae							
118 - <i>Peganum harmala</i> L.	Lhermi	Shrub	Rheumatism, back pains, fever, colds, diabetes, emmenagogue, jaundice, anxiety hallucinant, sudorific, helminthiasis, spasmolytic, sterility, uterus diseases, vermifuge, abortifacient	83	Seed	Decoction, powder mixed with oil	Oral
Zygophyllaceae							
			Ritual, magic practice and to relieve bad fate	80	Seed	Fumigation	-
			Ulcers	46	Seed	Powder mixed with oil	Oral
			Hair care, eczema, neoplasms	21	Seed	Powder mixed with oil	Applied externally
119 - <i>Pennisetum typhoides</i> (Burm.f.) Stapf. & C.E. Hubb.	Illan	Herb	Rheumatism, uterus pains, dysmenorrhea, kidney diseases, prevents abortion	78	Seed	Decoction	Oral
Poaceae							
			Fractures, bone care	67	Seed	Powder mixed with oil	Oral
			Influenza, bronchitis, constipation	67	Root	Powder	Oral
120 - <i>Pergularia tomentosa</i> L.	Tazirt - Laghlag	Shrub	Dermatosis, burns, skin allergy, depilatory	42	Aerial parts	Cataplasm	Applied on affected parts
Asclepiadaceae							
			Vermifuge, abortifacient	35	Aerial parts	Decoction	Oral
			Angina, ringworm	22	Leaf and flower	Fumigation	Inhalation
			Abscesses, boils	17	Latex	Raw	Applied on affected parts
			Tooth pains	12	Latex	Diluted	Mouth wash
			Rheumatic pains	51	Aerial parts, seed	Decoction	Applied externally
121 - <i>Periploca angustifolia</i> Labill.	Aslif	Subshrub	Rheumatoid arthritis	36	Root	Cataplasm	Applied externally
Asclepiadaceae							
			Snake and scorpion bite	32	Leaf	Cataplasm	Applied externally
			Hypertension	22	Root	Decoction	Oral
			Bronchitis	19	Aerial parts, seed	Decoction	Oral
			Abortifacient, hypoglycaemic	17	Fruit, root	Decoction	Oral
122 - <i>Petroselinum sativum</i> Hoffm.	Lmaadnousse	Hemicryptophyte	Carminative, diuretic, expectorant, stomachic	104	Leaf and fruit	Infusion	Oral
Apiaceae							
			Hypoglycemic, expectorant, tonic, aphrodisiac, antidiarrhoeic,	67	Seed, fruit, immature fruit	Infusion, raw	Oral
123 - <i>Phoenix dactylifera</i> L.	Nkhl - Agjouf	Tree	Tiredness, childhood enuresis, arrhythmia, colds	43	Fruit, immature fruit	Powder, raw	Oral
Areaceae							
			Gingivitis	25	Immature fruit	Raw	Mouthwash, chewed
			Emetic	12	Leaf	Tisane	Oral
			Sterility	11	Male flower	Tisane	Oral

Table 1 Contd.

			Pulmonary pains	7	Seed	Infusion	Oral
124 - <i>Pimpinella anisum</i> L.			Spasmodic, carminative, stomachic, diuretic, expectorant, stimulant kidney diseases, gastric pains, diabetes, antiemetic, galactagogue	86	Fruit	Infusion, decoction	Oral
Apiaceae	Habbat hlawa	Herb	Tooth care	24	Fruit	Powder	Chewing
125 - <i>Piper nigrum</i> L.			Cough, spice	72	Fruit	Decoction	Oral
Piperaceae	Lbzar	Lian					
			Helminthiasis, gastric ailments, stomach ache, spasmodic, colic, gastroenteritis	46	Leaf, fruit	Decoction, infusion	Oral
126 - <i>Pistacia atlantica</i> Desf.			Emetic	36	Leaf	Decoction	Oral
Anacardiaceae.	Btem Drou - Igg	Tree	Tooth care, gengivitis, mouth infections, purifies breath	36	Fruit and leaf	Powder	Chewed
			Tooth care, tooth ache	32	Gum	Infusion	Mouthwash
			Asthma	25	Gum	Powder mixed with honey	Oral
			To relieve bad fate	16	Leaf	Raw	External use
127 - <i>Pistacia lentiscus</i> L.			Gastric pains, mouth care	35	Leaf	Decoction	Oral
Anacardiaceae	Tidgt	Subshrub					
128 - <i>Prunus ameniaca</i> L.			Face care, eczema	45	Seed	Trituration	Applied externally
Rosaceae	Lmechmach	Tree					
129 - <i>Prunus dulcis</i> (Mill.) D. A. Webb			Face care, eczema, cosmetic	69	Seed	Trituration	Applied externally
Rosaceae	Louz morr – Louz imzig	Tree					
130 - <i>Punica granatum</i> L.			Intestinal antiseptic, haemostatic, stomachic, diabetes, hoarseness	73	Pericarp	Infusion	Oral
Punicaceae	Rman	Tree	Eczema	35	Leaf	Decoction	Applied externally
			Food poisoning, sterility	58	Leaf	Tisane	Oral
131 - <i>Reseda villosa</i> Coss.			Hair and skin face care, sunburn	48	Leaf	Fresh powder	Applied externally
Resedaceae	Igriji	Herb	Digestive ailments, diarrhea.	33	Aerial parts	Infusion	Oral
			Rheumatism, spasmodic	27	Aerial parts	Decoction	Massage
132 - <i>Retama raetam</i> (Forssk.) Webb			Skin diseases	42	Leaf, fruit	Decoction	External use
Fabaceae	Rtm – Tilguit – Talgout	Subshrub	Abortifacient, toxic	36	Stem	Decoction	Oral
			Rheumatism	31	Aerial parts	Infusion	Oral
			Scorpion bite, wounds healing	24	Aerial parts	Cataplasm	External use

Table 1 Contd.

133 - <i>Ricinus communis</i> L. Euphorbiaceae	Lkherwaa - Wawriwit	Tree	Menstrual pains, gastric pains	38	Leaf	Tisane	Oral
			Sprains, tears	32	Leaf	Decoction	Massage
			Galls	27	Leaf	Cataplasm	External use
			Rheumatism, bone care, toxic	23	Seed	Powder mixed with oil, raw	Massage, cataplasm
			Fever	18	Leaf	Decoction	Oral
134 - <i>Rosa canina</i> L. Rosaceae	Nar Ibareed	Subshrub	Laxative, febrifuge, diuretic, vermifuge, anemia	93	Leaf, flower, fruit	Maceration	Oral
			135 - <i>Rosa centifolia</i> L. Rosaceae	Lward	Subshrub	Hair and face care	117
Digestive ailments, laxative	43	Flower				Infusion	Oral
136 - <i>Rosmarinus officinalis</i> L. Lamiaceae	Azir	Subshrub	Spasmodic, carminative, sedative, diuretic, rheumatism, kidney pains, helminthiasis, vulnerary, cholagogue, digestive, wounds healing, contusions, abscesses	92	Leaf	Decoction, infusion	Oral, external use
			Digestive pains	86	Aerial parts	Decoction	Oral
			Stomachic, emmenagogue.	24	Leaf	Infusion	Oral
137 - <i>Rumex vesicarius</i> L. Polygonaceae	Lhemmda – Basmom – Wasmim	Herb	Cutaneous infection , laxative, diuretic, digestive, stomachic	67	Leaf, root	Infusion	Oral
138 - <i>Ruta chalepensis</i> L. Rutaceae	Iwermi	Shrub	Magic practices	78	Aerial parts	Raw	Fumigation
			Hypoglycemic , toxic, abortifacient, rheumatism, intestinal and liver ailments, sterility, helminthiasis, epilepsy, antipyretic	72	Aerial parts	Decoction	Oral
			Vitiligo	43	Aerial parts	Powder	Applied externally
139 - <i>Salsola tetrandra</i> Forssk. Chenopodiaceae	Tasra	Shrub	Gastric ailments, stomach ache, gastritis	56	Aerial parts, fruit	Decoction	Oral
			Hypertension, arrhythmia	41	Fruit	Decoction	Oral
			Hair care	35	Fruit	Powder mixed with oil	Applied externally
			Butons	26	Aerial parts, fruit	Cataplasm	Applied externally
140 - <i>Salsola vermiculata</i> L. Chenopodiaceae	Tasra	Shrub	Helminthiasis, antiseptic	22	Aerial parts	Decoction	Oral, applied externally
			Gastric ailments, stomach ache, gastritis	59	Aerial parts, fruit	Decoction	Oral
			Hypertension, arrhythmia	36	Fruit	Decoction	Oral
			Production of soap	35	Aerial parts	Decoction	Applied externally
			Hair care	27	Fruit	Powder mixed with oil	Applied externally
Butons	20	Aerial parts, fruit	Cataplasm	Applied externally			
Helminthiasis, antiseptic	18	Aerial parts	Decoction	Applied externally, oral			

Table 1 Contd.

141 - <i>Salvia aegyptiaca</i> L.			Fever, digestive diseases	56	Aerial parts	Infusion	Oral
Lamiaceae	Salmia	Shrub	Eyes infection	34	Seed	Decoction	Eyes drops
			Wound healing, anti-hemorroid	23	Aerial parts	Decoction	Applied externally
142 - <i>Salvia officinalis</i> L.			Colds, cough, diabetes rheumatism, stomachic carminative, choleric, tonic, anti-sudorific, spasmolitic	72	Leaf	Infusion, decoction	Oral
Lamiaceae	Salmia	Shrub	Throat pains, stomach pains	37	Leaf	Infusion	Oral
			Antiseptic, haemostatic	25	Leaf	Decoction	Oral
143 - <i>Sesamum indicum</i> L.							
Pedaliaceae	Jnjlan – Zenjlan	Herb	Spasmolitic, aromatic	95	Seed	Powder mixed with honey	Oral
144 - <i>Solanum nigrum</i> L.			Wounds healing	24	Leaf	Cataplasm	Applied externally
Solanaceae	Aaneb eddib – Adil ouchen – Tidila	Herb	Edema pregnancy	15	Stem, leaf	Decoction	Oral
			Emetic	12	Leaf, stem	Infusion	Oral
145 - <i>Styrax benzoin</i> Dry.							
Styracaceae	Jawi – Ljawi	Tree	Aromatic, incense in ritual and magic practices	153	Resin	Fumigation	-
146 - <i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry			Hair care,	86	Clove	Powder mixed with <i>Lawsonia inermis</i>	Applied externally
Myrtaceae.	Qranful	Tree	Aphrodisiac, tonic, cardiac stimulant, back pains, fever	42	Clove	Infusion mixed with milk	Oral
			Tooth pains	28	Clove	Raw	Applied externally
			abortifacient, contraceptive	23	Clove	Powder	Oral
147 - <i>Tamarix aphylla</i> (L.) H. Karst.							
Tamaricaceae	Takout – Tamayt	Tree	Hair care	56	Gall, leaf	Mixed with <i>Lawsonia inermis</i>	Applied externally
			Diuretic, liver insufficient, astringent, diarrhea	39	Aerial parts	Decoction	Oral
148 - <i>Tetraclinis articulata</i> (Vahl) Mast.			Asthma, carminative, digestive, cough,	62	Leaf, fruit	Infusion	Oral
Cupressaceae	Aaraar – Azouka	Tree	Hair care, hair tonic	31	Leaf	Powder mixed with <i>Lawsonia inermis</i>	Applied externally
			Ritual and magic practices, to relieve bad fate and remove bad spirit	29	Resin , leaf	Raw	Fumigation
149 - <i>Thapsia transtagana</i> Brot.			Tooth care	48	Seed	Powder	Applied on the affected parts
Apiaceae	Wrak deriass	Geophyte	Cough, rheumatic pains, bladder pains, liver diseases	42	Leaf, root	Infusion	Oral
150 - <i>Thymus broussonetii</i> * Boiss							
Lamiaceae	Zaitra – Tazoukennit – Asrkna	Shrub	Heart ailments, digestive and	183	Aerial parts	Decoction	Oral

Table 1 Contd.

151 - <i>Thymus saturoioides</i> Coss.	Zaatar – Azokkni	Shrub	Hypotensive, digestive ailments, diabetes, colds	308	Aerial parts	Decoction	Oral		
Lamiaceae									
152 - <i>Trichodesma calcarata</i> Batt.	Taynast	Shrub	Skin diseases, antiseptic	74	Whole plant	Decoction	Applied externally		
			Diuretic, helminthiasis	62	Whole plant	Decoction	Oral		
Boraginaceae									
153 - <i>Trigonella foenum-graecum</i> L.	Lhelba – Tifidas – Tafidast	Herb	Cancer , against sunburn, tonic, diabetes, analeptic, depurative, stomachic, galactagogue, digestives ailments, to gain weight, antitussive	258	Seed	Decoction, Maceration, raw mixed with honey	Oral		
			Asthma, colds, anemia	89	Seed	Decoction, raw	Oral		
			Hair care	62	Seed	Powder mixed with oil	External use		
			Skin facial care	61	Seed	Powder mixed with olive oil and yolk	Mask		
			Bruises, swelling	60	Seed	Powder mixed with oil	Cataplasm for external use		
Fabaceae									
154 - <i>Urginea maritima</i> (L.) Baker	Bsl dib –Azalim ouchen	Geophyte	Skin diseases	79	Bulb	Cataplasm	Applied externally		
			Cancer, febrifuge, sedative, diuretic	63	Leaf, root	Infusion	Oral		
Liliaceae									
155 - <i>Urginea noctiflora</i> Batt. & Trab.	Bsl dib – Azalim ouchen	Geophyte	Helminthiasis	52	Bulb	Cooked in oil	Cataplasm		
			Ear pains , wound healing	43	Bulb	Cataplasm	Applied on the affected part		
			Pruritus, abscesses	32	Bulb	Pansement	Applied externally		
			Cystitis, colds, cardiac diseases, bronchitis, influenza	27	Bulb	Cooked in oil	Oral		
			Abortifacient	17	Bulb	Raw	Oral, external use		
			Rheumatism, cough	46	Leaf	Infusion	Oral		
Liliaceae									
156 - <i>Vitex agnus-castus</i> L.	Lkherwaa – Angarf	Subshrub	Colds	35	Leaf, fruit	Powder mixed with oil	Oral, cataplasm		
Verbenaceae									
					Back pains	28	Fruit	Infusion	Oral
					Dysmenorrhea	26	Seed	Decoction	Oral
					Tanning	24	Leaf, bark	Raw	-
			Sterility	19	Leaf	Powder mixed with honey	Oral		
Asteraceae									
157 - <i>Warionia saharae</i> Benth. & Coss.	Afezdad – Afssas	Subshrub	Rheumatoid arthritis	44	Leaf	Powder mixed with oil	Applied on affected parts		
			Hypoglycaemic , rheumatism	38	Leaf	Decoction	Oral		
			Jaundice, cardiac ailments, colds	33	Leafy stem	Decoction	Oral		
			Gastroenteritis	27	Leafy stem	Tisane	Oral		
Solanaceae									
158 - <i>Withania adpressa</i> Coss. ex Batt.	Hjojo – Aglim – Waglim	Subshrub	Alimentary	136	Fruit	Powder	Oral		
			Food poisoning	37	Aerial parts, leaf	Tisane	Oral		
			Hepatitis	25	Aerial parts	Tisane	Oral		

Table 1 Contd.

159 - <i>Zea mays</i> L.							
Poaceae	Zghb lkal – Chaar osngar	Herb	Bladder and kidney pains, diuretic, colds, rheumatism, oliguria, dysmenorrheal	83	Stigma	Infusion, decoction	Oral
160 - <i>Zilla spinosa</i> (L.) Prantl Brassicaceae	Ouchfoud – Assafo	Subshrub	Jaundice, asthma, kidney stones, helminthiasis	92	Aerial parts	Decoction	Oral
161 - <i>Zingiber officinale</i> Roscoe							
Zingiberaceae	Skinjbir	Geophyte	Aphrodisiac, colds, asthma, bronchitis, calefacient, depurative, analgesic, spice, digestive	143	Root	Powder mixed with oil, infusion	Oral
			Alimentary	70	Fruit	Raw	Oral
			Abscesses, wounds healing	52	Leaf	Powder	Applied externally
162 - <i>Ziziphus lotus</i> (L.) Lam.							
Rhamnaceae	Sedra – Nbeg – Tazgart – Azouggar	Subshrub	Stomachic, hypoglycemic, cardiac ailments, pulmonary infection, haemostatic, colic animals	43	Fruit	Decoction	Oral
			Diabetes, stomach pains, diarrhea, kidney stones.	40	Bark, root	Infusion	Oral
			Throat pains, pectoral and emollient	25	Fruit	Powder	Oral
			jaundice, pulmonary diseases,	22	Root	Decoction	Oral
			Gastric lavage, liver diseases, diabetes, helminthiasis	80	Leafy stem, leaf	Decoction, tisane	Oral
163 - <i>Zygophyllum gaetulum</i> Emb. & Maire			Diabetes, digestive	66	Aerial parts	Decoction	Oral
			Colds	55	Leaf	Tisane	Oral
Zygophyllaceae	Laagaya - Tazlozt	Shrub	Baby body care, eczema	40	Tige feuillée, leaf	Powder mixed with oil	Shower, Applied externally /Ointment
			Diarrhea, rheumatism	38	Stem	Infusion	Oral
			dermatitis, analgesic, desinfectant	34	Aerial parts	Powder	Applied externally
			Abscess, face care.	25	Leaf	Powder mixed with oil	Applied externally /ointment

*endemic of Morocco. New uses are indicated in bold.

study area, are also well distributed throughout Morocco, and also constitute the major groups of medicinal flora in most of other Mediterranean countries (Benitez et al., 2010; Savo et al., 2011). Asteraceae and Lamiaceae were also found among the predominant families in west Bengal in India (Dey et al., 2012). Most of the families recorded are represented by single or two species which shows that medicinal plants used are not concentrated only in a few families and genera. This agrees with other ethnobotanical studies carried out in Morocco and in Mediterranean area (Raja et al., 1997; Merzouki, 2000; Novais et al., 2004; Tahraoui et al., 2007; Ugulu et al., 2009).

The most commonly used plant species were *Artemisia huguetii* (cited 670 times), *Mentha pulegium* (620), *Trigonella foenum-graecum* (530), *Mentha suaveolens*

(510), *Lavandula mairei* (480), *Nigella sativa* (410), *Lavandula coronopifolia* (380), *Acacia raddiana* (360), *Marrubium desertii* (350), *Zygophyllum gaetulum* (338), *Lawsonia inermis* (316), *Thymus satuireioides* (308), *Ammodaucus leucotrichus* (280), *Cotula cinerea* (258) and *Zizyphus lotus* (252). Most of these species are widely used in other regions of Morocco. Of special interest, among four (2.5 %) of the species recorded in the current study are endemic to Morocco.

The study revealed that some plant species could be used to treat several diseases. For example, *A. huguetii* was used against diseases of digestive and respiratory tract, which explains the particular pressure exerted on the plant. The majority of medicinal plants (44%) recorded in this survey were wild species (e.g. *Acacia tortilis* subsp. *raddiana*, *Acacia ehrenbergiana*,

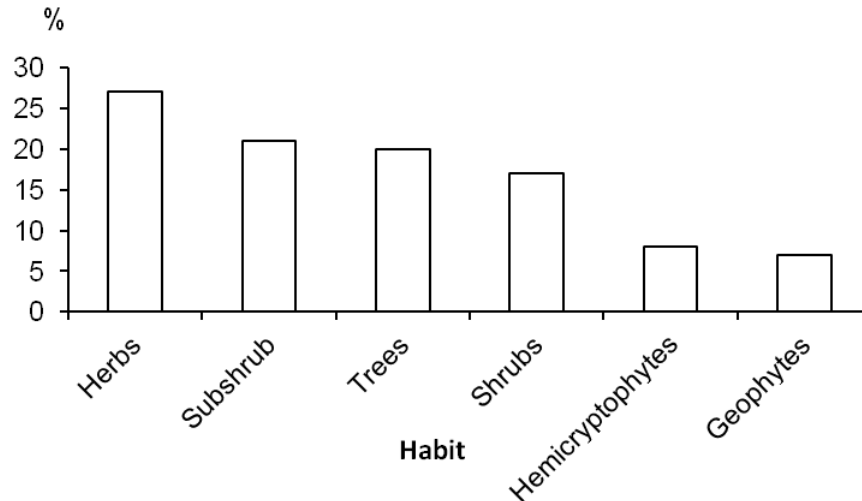


Figure 3. Growth habit of the plants used in Tata Province.

Ammodaucus leucotrichus, *Balanites aegyptiaca*, *Cotula cinerea*, *Lavandula coronopifolia*). Many plants (34%) are cultivated for food purposes (e.g. *Coriandrum sativum*, *Hordeum vulgare*, *Mentha viridis*, *Petroselinum sativum*, *Phoenix dactylifera*). Of the plants inventoried, 22 % are imported and used as plant parts from other regions of Morocco or other countries (e.g. *Alpinia officinarum*, *Boswellia carterii*, *Boswellia frereana*, *Cedrus libani* subsp. *atlantica*, *Euphorbia resinifera*, and *Thymus satureioides*). The large number of plant species used in the study area indicates a dependence on a great diversity of plant species to treat ailments, and represents a good indicator of the profound knowledge on herbal plants held by the local people living in Tata province.

The analysis of the growth forms of the medicinal plants used in the study area revealed that most of the species were herbs (27%) followed by subshrub (21%), trees (20%), shrubs (17%), hemicryptophytes (8%) and geophytes (7%) (Figure 3). This finding is contrary to other studies in which trees were the predominant growth form (Addo-Fordjour et al., 2008; Moshi et al., 2009). In the study area, like most regions of Morocco as well as in other countries, a conflict may be established between plant use and resources conservation (Sheldon et al., 1998; Kala, 2000; Agelet and Vallés, 2001). Some species suffer a high collection pressure with medicinal purposes. These factors combined with an increasing population pressure may lead to further reduction in natural habitats of the medicinal plants. Furthermore, during collection of plants, users tend to uproot the whole plant instead of collecting only the desired parts. This method of collection may seriously compromise the sustainability of medicinal species. Several plant species such as *Ammodaucus leucotrichus*, *Ephedra alata*, *Euphorbia falcata*, *Haplophyllum vermiculare*, *Marrubium desertii*, were becoming rare in the study area due to overexploitation and aridity.

Therapeutic uses

Plant species listed in Table 1 were used in the treatment of 161 types of diseases; some species were also used in cosmetic and ritual practice. The majority of plant species had more than a single therapeutic use. All reported ailments were structured into 14 different pathological groups: gastro-intestinal ailments, dermatological pains, respiratory system diseases, genito-urinary ailments, rheumatic diseases, poisonous bites, cardiovascular and circulatory system disorders, liver problems, skeletal-muscular problems, dental care, hair and face care, ear, nose and throat problems, cooling agents and general health. The pathological groups with the greatest number of records were the gastro-intestinal ailments (45%), skin problems (16%), respiratory system (13 %), circulatory system (10 %), followed by genito-urinary system (6%). Other diseases (e.g. rheumatic pains, liver problems) were represented by 10%. Intestinal disorders, fever, headache, cough and cold problems were treated with a large number of medicinal plants. Gastro-intestinal disorders were also found to be the most common application of medicinal plants by ethnobotanical surveys carried out in other studies (Merzouki et al., 2000; El-Hilaly et al., 2003; Mati and De Boer, 2011; Benitez et al., 2010). Almost all of the identified plant remedies are used for curative than prophylactic purposes.

A total of 72 uses of medicinal plants which were recorded in this study could not be found in literature (Table 1). Therefore, these uses are likely to be new uses reported in an ethnobotanical study from the region, some examples of these remedies are the use of a decoction of *Acacia raddiana* fruits against kidney stones; the use of *Bassia muricata* to treat diabetes; *Cistus salviifolius* seeds against uterine pains, bronchitis and sterility; the use of *Thymus broussonettii*, endemic species of Morocco, for heart ailments.

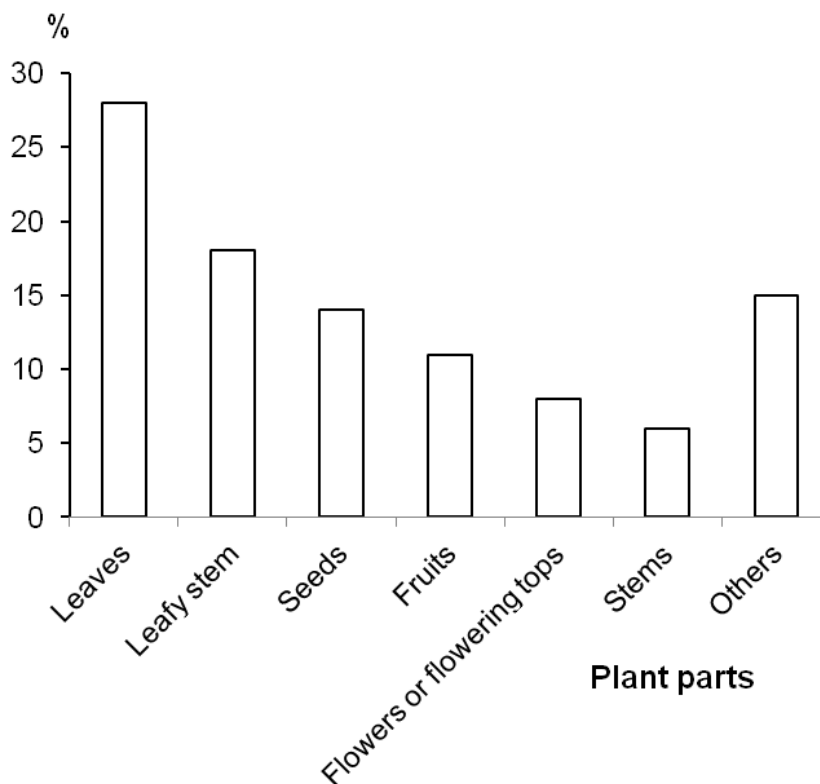


Figure 4. Plant part used in Tata Province.

Plant parts used, mode of preparation and administration

Leaves were the most frequently used plant parts (28%), followed by leafy stem (18%), seeds (14%), fruits (11%), flowers or flowering tops (8%) and stems (6%) as shown in Figure 4. Other organs (bark, bulb and root) or extracts of aerial plant parts (gum and latex) are also used for less than 5% each. The results of this study showed that aerial plant parts play an important role in herbal medicine preparation in Tata Province, agreeing with the results of Camejo-Rodrigues et al. (2003) and De-la-Cruz et al. (2007).

Most preparations were drawn from single plant, but their mixtures were also commonly used. Some remedies contain varying combinations of plant organs (7% of cases). In 13% of plant remedies all plant parts were used. The use of more than one plant species to prepare a remedy for ailments is attributed to the additive or synergistic effects that they could have (Bussman and Sharon, 2006). Most preparations are made with water as a solvent. Various plant parts were also mixed with oil, honey, milk or tea for enhancing their acceptability and medicinal properties. For example, powder of *Pistacia atlantica* mixed with honey was used against asthma. The decoction and infusion were generally the method of choice, accounting for 32 and 24% respectively, followed

by powder preparation (13%), cataplasm (9%) and maceration (7%). It was also observed that some plants were used in more than one form of preparation. Other less common ways of preparation included juice, raw consumption, fumigation, tisane, and ointment. Decoction and infusion were also the most used herbal preparations in other regions of Morocco (Ziyyat et al., 1997; Merzouki et al. 2000; El-Hilaly et al., 2003; Tahraoui et al., 2007).

The great majority of the remedies were taken orally (60%). Infusions and decoctions are usually drunk as teas. External application were also employed, accounting for 30%, and may consist, generally, in a local application to the affected part (Figure 5). Other routes of administration included eyes (3%), ears (2.5%), nasal (2%) and vaginal or rectal (1.5%). These routes of administration are similar to those reported by Agelet and Valles (2001), Ghorbani et al. (2011) and Maroyi (2011).

Conclusion

Our study showed that medicinal plants continue to play an important role in the primary healthcare system for the local people living in the Tata Province, southeastern Morocco. A great variety of plants was used by traditional healers for treatment of numerous diseases. An ethnobotanical catalogue composed of 163 plant species,

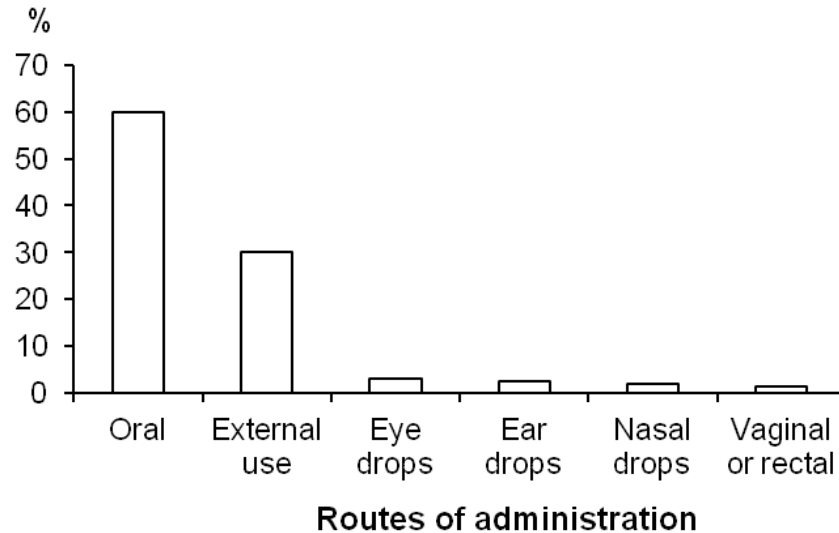


Figure 5. Routes of administration.

belonging to 134 genera in 56 families, has been developed. Moreover new or uncommon medical uses were reported. The current study represents a useful documentation, which can contribute to preserving knowledge on the use of medicinal plants in this region. Moreover, protective measures are necessary for the conservation and preservation of the natural herbal resources, to avoid their overexploitation.

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