

Ethnobotanical Study of Medicinal Flora in the North East of Algeria - An Empirical Knowledge in Djebel Zdimm (Setif)

Sabah Chermat^{1*} and Rachid Gharzouli²

1. Department of Pharmacy, Faculty of Medicine, University of Setif, Setif 19000, Algeria

2. Department of Plant Ecology, Faculty of Natural Sciences and Life, University of Sétif, Setif 19000, Algeria

Abstract: On the high plains of Setif, the old inhabitants have built a real knowledge of medicinal plants properties. Traditional knowledge about plants and their properties are still fairly common. Our scientific motivation stems from the absence of any flora and ethnobotanical study in this area. During different field campaigns, we identified 93 medicinal species belonging to 32 botanical families. This number reflects the wealth of medicinal plants that are still traditionally used. To gather as much information on the use of plants, a series of ethnobotanical surveys were conducted in the field during periods of picking from villagers, herbalists and traditional healers. According to those surveyed, the fresh leaves and seeds are considered the most popular and common parts that can address several diseases where oral and dermal administration are recommended. The most used plants are: *Artemisia herba-alba*, *Argyrobium saharae*, *Gymnosporia senegalensis*, *Ormenis africana*, *Pallenis spinosa*, *Thymus ciliatus*, *Pistacia atlantica*, *Paronychia arabica*, *Globularia alypum*, *Ajuga iva*, *Peganum harmala*, *Ruta chalepensis*, *Tapsia garganica*, *Pituranthos scoparius*. Djebel Zdimm offers floristic diversity and a sizeable traditional therapeutic knowledge. The safeguarding and preservation of this ancestral heritage is one of our objectives in this semi-arid steppe.

Key words: Medicinal plants, ethnobotany analysis, semi-arid steppe, preservation.

1. Introduction

Plants have occupied a prominent place and have been for man, a privileged point of contact with nature and health [1]. Herbal remedies are increasingly popular and used based on sound values. They are tested by our ancestors, many of whose virtues confer a significant place in traditional therapy. Medicinal plants are still a source of medicinal care in developing countries in the absence of a modern medical system [2]. According to United Nations Environment Programme [3], a significant number of spontaneous species in North Africa have potential value in terms of medicine. Within the Algerian, traditional medicine company occupies an important place in treating certain diseases. On the high plains of Setif, djebel Zdimm contains a

large fortune because of its plant biogeography that offers a very high ecological and floristic diversity; it is a geographically and climatically remarkable barrier between the Atlas Tellien in the north and the Sahara in the south [4]. Since there are no scientific studies on the flora and vegetation in djebel Zdimm, having an exceptional biological context with 117 taxa comprising of 93 medicinal species, this study seems necessary for us to present our first results. Surveys we have undertaken point to the presence of a relatively rich and varied flora. Djebel Zdimm is rich in medicinal plants belonging to different botanical families with rare endemic and protected species such as *Pistacia atlantica* and *Argyrobium-saharae*. These natural remedies were the primary use of medicine for our ancestors, despite the current development of the pharmaceutical industry and its great contribution in the treatment of many diseases,

Corresponding author: Sabah Chermat, lecturer, research fields: plant biology and medicinal plants. E-mail: Sabahchermat@yahoo.fr.

medicinal plants and remedies were never abandoned, and the local population in djebel Zdim still uses traditional medicine, which has let the therapeutic keep alive traditions left by our grandparents in this region. Algerian medicinal flora are still almost unknown until now, only in a fragmentary and empirical way. Following our floristic investigations in the high plains of Setif, our ethnobotanical research on the medicinal flora, were made in the djebel Zdim area to: i) gather information on the use of plants; ii) protection of the knowledge acquired by the local population; iii) translate the popular knowledge that is currently owned by few people especially the elderly and illiterate women; iiiii) implement operating strategies and sustainable management of the plants used by herbalists and consumers.

2. Materials and Methods

2.1 Presentation of the Area Study

Djebel Zdim is located in the north-eastern of Algeria between 5°23'-5°29' east longitude and between 36°-36°27' north latitude (Fig. 1). This mountainous massif culminates to 1258 m of altitude with the piedmonts around 900 m. It is formed during the Tertiary, characterized by a homogeneous geological substrates and are largely covered by shallow stony soils, dolomitic limestone and

calcareous marl [5]. Djebel Zdim belongs to the North African steppe area [6-8], in the sector of Highlands [9]. The climate is characterized by a hot, dry summer and a cool, wet winter with average rainfall amounts of 482 mm/year, The minimum average temperature of the coldest month "m" is 1.94 °C and that of the warmest month "M" is 37.7 °C. According to the index of [10] (Q2 = 47.53), the study area is characterized by a hot bioclimate "lower semi-arid", with a dry season from 5 months and a half. Djebel Zdim tends to take its climate, its shallow soils and vegetation rarely low shrub steppe zones as a character (semi-arid steppes).

2.2 Methodology

The location of the various investigations circles was spotted by the techniques of stratified sampling [11-13]. These techniques were seemed adequate to achieve ethnobotanical surveys varied from one site to another within the study area. We have defined and surveyed six sites closest to the massif. To gather as much information on the use of plants, two field campaigns were conducted during the years 2009 and 2010, during periods of pickings. Using 240 list questionnaires (N = 240), dividing into six strata that correspond to the numbers of urban districts, the proportion of people of each sample is 40 people in

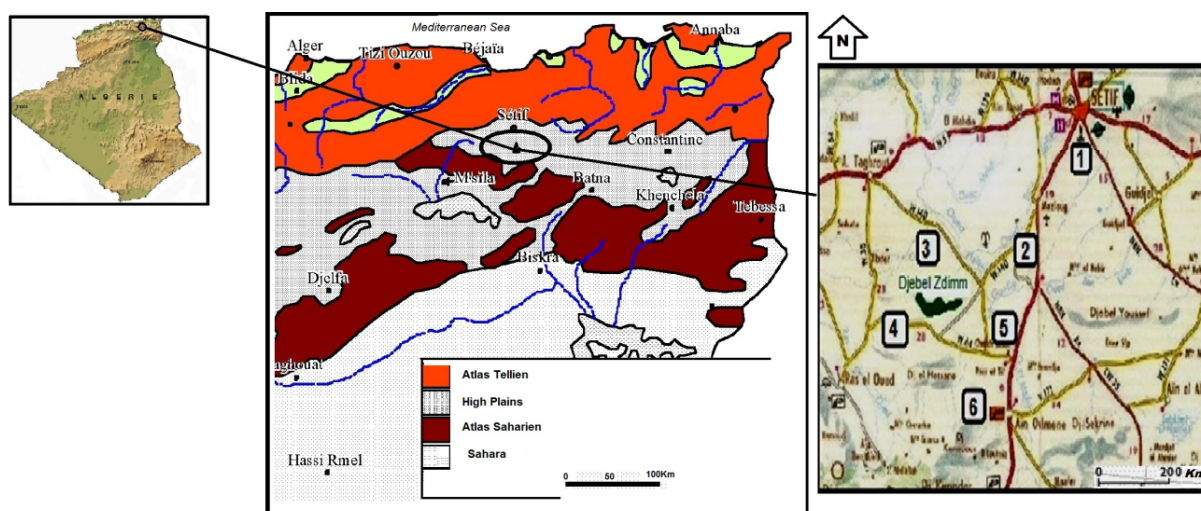


Fig. 1 Geographical location of the area study. Urban districts: 1 (Sétif), 2 (Guedjel), 3 (Guellal), 4 (Ksar-El Abtal), 5 (Bir Hadada) and 6 (Ain-Oulmen).

each stratum, which is proportional of stratified sampling

This ethnobotanical research aims to floristic analysis (biology and chorology), taxonomic (identification and botanical description) and herbal analysis (uses and diseases treated) of medicinal plants in the study area. Phytoecological statements we have made in the region, were used as database. For the determination of species and their chorology, we used the floras Quézel and Santa [9], Maire [14], and Ozenda [15]. Biological types were assigned from the work of Raunkiaer [16]. Ethnobotanical investigations were conducted using 270 question cards to the population.

3. Results and Discussion

3.1 Floristic Analysis

The floristic analysis helped distinguish 93 species medicinal species listed in 74 genera and botanical 33 families (Table 1, and Fig. 2). Among these identified families, those are the most representative: *Asteraceae* with 20.43%, followed by *Lamiaceae* (9.67%), *Liliaceae* (7.52%), *Apiaceae* (6.45%) and *Fabaceae* with 4.30%. The *Plantaginaceae*, *Poaceae*, *Thymeliaceae* and *Zygophyllaceae* have the same rate of 3.22%. The other remaining families have only one or two species with estimated rates from 1.07% to 2.15%. The study of biological types shows the abundance of Therophytes (32.26%) followed by phanerophytes (20.43%), the chamaephytes (19.35%), hemicryptophytes (17.20%) and Geophytes with 10.75% (Fig. 3).

In addition, the biogeographical and ecological conditions of the steppe region that overlap between the Tell and the Sahara, are favorable to both the Mediterranean flora (42 species or 45.16%) and Saharan Africa (18 species or 19.35%). The number of endemic species used in traditional medicine represents a rate of 16.12% of the species studied (Table 2): *Daucus biseriatus*.Murb, *Brassica dimorpha*

Coss. and Hard, *Thymus algeriensis* Boiss and Reut. *Thymus ciliatus* Desf. subsp. *eu-ciliatus* Maire, *Paronychia arabica* (L.) Dc, *Hertia cheirifolia* (L.) OK, *Ferula cossoniana* Batt. and Trab., *Pituranthos scoparius* Coss. and Dur. *Atractylis polycephala* Coss., *Helianthemum apertum* Pomel., *Astragalus armatus* Willd. subsp *tragacanthoides* (Desf.) Maire, *Scilla lingulata* poiret., *Thymelaea microphylla* Coss. and Dur. *Stachys mialhesi* de Noé. *Pistacia atlantica* Desf.et *Argyrolobium saharae* Pomel .These last three species are rare and protected species in Algeria reported for the first time on djebel Zdimm 2013 [4].

3.2 Ethnobotanical and Pharmacological Analysis

3.2.1 Part Used

The most widely used plant parts are leaves with a rate of 50% and seeds (24%). The whole plant is used with a rate of 8.65%.The organs of the underground part (root, rhizome) are less used with 8.18%, plant extracts (tar, latex and resin) are also used (7.19%).The flower is used to a lesser measurement with 6.73%. (Fig. 4).The high frequency of use of leaves can be explained by the ease and speed of harvest [17, 18], but also by the fact that they are the site of photosynthesis and sometimes storage of secondary metabolites of the biological properties of the plant [19, 20]. It should be noted that the uses of plant organs are sometimes combined. For some plant, leaves and fruits are used together (*Rhus tripartitum*, *Rhamnus alaternus*). For others, it is the leaves and stem (*Zygophyllum simplex*, *Argyrolobium uniflorum*) or leaves and seeds (*Peganum harmala*, *Osyris alba*).

3.2.2 The Treated Diseases

Thirty diseases are treated with medicinal plants inventoried, some number of chronic diseases such as the hypertension and diabet. The results obtained (Table 1) show that most medicinal plants are involved in the treatment of digestive disorders (34.41%), followed by dermatological (20.43%), metabolic disorders (13.97%), respiratory diseases (11.25%), rheumatology diseases (9.60%), gynecological disorders

Table 1 Native species of djebel Zimm's pharmacopoeia.

Species	Botanical family	Floristic area	Biological type	Part used	Traditional uses
<i>Pistacia atlantica</i> Desf.	Anacardiaceae	End. N.A	Ph	Resin-seed-leave	Leishmaniasis, dental pain, gingivitis, thrush
<i>Rhus tripartitum</i> (Ucria.) DC.	Anacardiaceae	Sah-Med	Ph	Seed-leave	Gastric disorders
<i>Daucus biseriatus</i> .Murb.	Apiaceae	End	The	Rhizome	Bronchitis, digestive disorders coliques
<i>Daucus setifolius</i> Desf.	Apiaceae	Ibero-Maur	The	Rhizome	Fatigue, constipation
<i>Eryngium ilicifolium</i> Lam.	Apiaceae	Ibero-Maur	The	Aerial part	Rheumatoid arthritis, aphrodisiac
<i>Ferula cossoniana</i> Batt.et Trab.	Apiaceae	End.N.A	He	Seed, resine	Epileptic seizure
<i>Pituranthos scoparius</i> Coss. et Dur.	Apiaceae	End.N.A	Ch	Leave-stem	Migraine, asthma; dermatoses, nervous breakdown
<i>Tapsia garganica</i> L.	Apiaceae	Med	He	Rhizome	Rheumatoid arthritis
<i>Nerium oleander</i> L.	Apocynaceae	Med	Ph	Leave	Hypotension, dermatoses
<i>Pergularia tomentosa</i> L.	Asclepiadaceae	Sah. Sind.	Ch	Latex	Abscesses, boils
<i>Anthemis cotula</i> L.	Asteraceae	Cosm.	He	Flower	Bloating, stomach pain
<i>Anthemis pedunculata</i> Desf.	Asteraceae	Ibero.Maur	He	Flower	Bloating, colic, diabetes
<i>Artemisia campestris</i> L.	Asteraceae	Circumbor	Ch	Leave	Intestinal bloating ,intestinal parasites
<i>Artemisia herba-alba</i> Asso.	Asteraceae	Med .Step	Ch	Leave	Stomach pain, genital diseases
<i>Asteriscus pygmaeus</i> Coss.et Kral.	Asteraceae	Sah-Sind	The	Leave	Genital infection
<i>Atractylis gummifera</i> L .	Asteraceae	Med	Ch	Latex	Genital infection, syphilis
<i>Atractylis polycephala</i> Coss.	Asteraceae	End.N.A	Ch	Root	Cholelithiasis, hepatitis
<i>Brocchia cinerea</i> (Del.) Vis.	Asteraceae	Sah	The	Leave-flower	Cough, rheumatoid arthritis
<i>Calendula aegyptiaca</i> Desf.subsp- aegyptiaca M.	Asteraceae	Med	The	Leave-flower	Intestinal worms, warts, Chilblains
<i>Echinops spinosus</i> L.subsp Bovei. (Boiss).Maire	Asteraceae	S. Med.Sah	The	Root-fruit	Labor pains, abortion, neuralgia,
<i>Helichrysum staechas</i> (L.) DC . subsp. <i>rupestre</i> (Raf.)M.	Asteraceae	W. Med	He	Flower	Helminth infections, antipelluculaire.
<i>Hertia cheirifolia</i> (L.) O.K.	Asteraceae	End.Alg. Tun	Ch	Seed	Fatigue, Intestinal worms ,eye Inflammation
<i>Inula graveolens</i> (L.)Desf.	Asteraceae	Sub.Med	The	Leave	Cicatrizing wounds
<i>Launaea acanthoclada</i> M.	Asteraceae	Ibero.maur	Ch	Leave	Digestive disorders, exhaustion, anorexia
<i>Launaea arborescens</i> (Batt.)M.	Asteraceae	Ibero.Maur. Sah.	Ph	Latex	Gastric ulcer, asthma, leishmaniasis
<i>Ormenis africana</i> L	Asteraceae	N.A.	Ph	Leave	Helminth infections, dysmenorrhea, digestive disorders, Hypertension
<i>Pallenis spinosa</i> (L.)Coss	Asteraceae	Eur. Med	Ch	Flower, seed	Skin lesions, eczema
<i>Scozonera indulata</i> Vahl. subsp . alexandrina (Boiss.) M	Asteraceae	Med	The	Leave-flower	Varicose veins, hypertension, digestive disorders
<i>Senecio flavus</i> (Dec.)Sch. Bip.	Asteraceae	Sah-Sind	He	Leave-flower	Dysmenorrhea, varicose veins, nephritis
<i>Anchusa undulata</i> L.	Boraginaceae	Med	The	Leave-stem	Diabetes, stomach aches
<i>Borago officinalis</i> L.	Boraginaceae	W.Med	The	Leave-flower	Diuretic, helminthiasis
<i>Brassica dimorpha</i> Coss. et Dur.	Brassicaceae	End	The	Leave-stem	Bronchitis, digestive disorders
<i>Moricandia arvensis</i> Oc.	Brassicaceae	Med.Sah. Sind.	He	Leave-stem	Rheumatism, burns, infected injuries
<i>Herniaria hirsuta</i> L.	Caryophyllaceae	Paleo.Temp	The	Whole plant	Eczema, psoriasis

**Ethnobotanical Study of Medicinal Flora in the North East of Algeria.
An Empirical Knowledge in Djebel Zdim (Setif)**

(Table 1 continued)

Species	Botanical family	Floristic area	Biological type	Part used	Traditional uses
<i>Paronychia arabica</i> (L.) Dc.	<i>Caryophyllaceae</i>	End.Afr.N	The	Flower	kidney stones
<i>Gymnosporia senegalensis</i> (Lamk.) Loesener .	<i>Celastraceae</i>	Trop	Ph	Root-seed	Chest pain, rheumatism
<i>Helianthemum apertum</i> Pomel.	<i>Cistaceae</i>	End.N.A	The	Leave	Lactation, irregular cycle
<i>Spergularia diandra</i> (Guss.) Heldr.et Sart.	<i>Crassulaceae</i>	Sah .Sind	He	Whole plant	Sexual weakness, female sterility
<i>Juniperus oxycedrus</i> L.	<i>Cupressaceae</i>	Atl.Circum. Med	Ph	Resin	Eczema, psoriasis leishmaniose
<i>Juniperus phoenica</i> L.	<i>Cupressaceae</i>	Circum. Med	Ph	Leave, fruit	Gastrointestinal complaints, Thyroid
<i>Argyrobium saharae</i> Pomel = <i>Genista Pomeliana</i> Maire	<i>Fabaceae</i>	End. N. Sah.	Ph	Leave-seed	Wound healing, food poisoning , abscess,
<i>Astragalus armatus</i> Willd. subsp <i>tragacanthoides</i> (Desf.)Maire	<i>Fabaceae</i>	End.N.A	Ch	Root, seed	Leischamaniose, Helminthiasis
<i>Retama retam</i> Webb. (L.)Boiss.	<i>Fabaceae</i>	Sah- Sind	Ph	Leave, stem, seed	Intestinal worms, scabies, Fever, abortion
<i>Trigonella gladiata</i> Stev.	<i>Fabaceae</i>	Med	The	Aerial part, seed	Bronchitis, cardiovascular disease
<i>Calicotome spinosa</i> (L.)Link	<i>Fabaceae</i>	W-Med	Ph	Leave-flower	Hemorrhoids ,stomach pain, eye treatment
<i>Rupicapnos numidicus</i> (coss. et Dur.)Pomel	<i>Fumariaceae</i>	Alg-Tun	Ch	Whole plant	Whooping cough, bleeding
<i>Globularia alypum</i> L.	<i>Globulariaceae</i>	Med	Ph	Leave-seed	Nervousness, jaundice, anemia
<i>Ajuga chamaepitys</i> Scheber.	<i>Lamiaceae</i>	Euras -Med	The	Leave-seed	Stomach ache, injuries
<i>Marrubium deserti</i> de Noé.	<i>Lamiaceae</i>	Sah	He	Leave	Hemorrhoids ,stomach pain, eye treatment
<i>Marrubium vulgare</i> L.	<i>Lamiaceae</i>	Cosm	He	Leave	Diabetes, fever
<i>Salvia verbenaca</i> (L.) Briq.	<i>Lamiaceae</i>	Med. Atl	The	Leave	Wound healing, abscess, laryngitis
<i>Satureja graeca</i> L.	<i>Lamiaceae</i>	Ibero-Maur	Ch	Leave-flower	Spasms and colic, dizziness, neuralgia.
<i>Stachys mialhesi</i> de Noé.	<i>Lamiaceae</i>	End	The	Leave	Pulmonary affection,infected wounds.
<i>Teucrium pseudochamaepitys</i> L.	<i>Lamiaceae</i>	W. Med.	He	Leave-seed	Tonic, laxative, anti-hemorrhoidal, febrifuge
<i>Teucrium spinosum</i> L.	<i>Lamiaceae</i>	Méd	He	Leave	Bleeding, Cicatrisation injuries
<i>Thymus algeriensis</i> Boiss et Reut.	<i>Lamiaceae</i>	End. N.A	Ch	Leave-flower	Toothache, gingivitis, mouth ulcers, muguet
<i>Thymus ciliatus</i> Desf. ssp. <i>eu-ciliatus</i> Maire.	<i>Lamiaceae</i>	End. N.A	Ch	Leave-flower	intestinal bloating, bronchitis
<i>Allium flavum</i> L.	<i>Liliaceae</i>	Med	Geo	Underground part-leave	Helminthiasis, sinusitis, warts, chilblains
<i>Allium paniculatum</i> L.	<i>Liliaceae</i>	Paleotemp	Geo	Underground part, seed	Sinusitis, hypertension helminthiasis
<i>Asparagus acutifolius</i> L.	<i>Liliaceae</i>	Med	Geo	Rhizome, seed	Chest pain, spasms, fever
<i>Asparagus officinalis</i> L.	<i>Liliaceae</i>	Euras	Geo	Rhizome	Renal colic, cystitis
<i>Asphodelus microcarpus</i> Salzm.et Viv.	<i>Liliaceae</i>	Med	Geo	Tubercle	Rheumatoid arthritis; Bronchitis, Asthma
<i>Scilla lingulata</i> poiret.	<i>Liliaceae</i>	End.N.A	Geo	Underground part	Menopause, gynecological problem
<i>Urginea undulata</i> (Desf.) Steinh.subsp. <i>typica</i> M.	<i>Liliaceae</i>	Med	Geo	Whole plant	Pruritus, wound healing, abscesses
<i>Malva aegyptiaca</i> L.	<i>Malvaceae</i>	Sah.Sind	The	Leave-seed	Toothache, hemorrhoids, abscesses
<i>Malva silvestris</i> L.	<i>Malvaceae</i>	Euras	He	Leave-flower	Gastrointestinal disorders
<i>Ficus carica</i> L.	<i>Moraceae</i>	Med	Ph	Fruit-latex	Constipation, warts,

(Table 1 continued)

Species	Botanical family	Floristic area	Biological type	Part used	Traditional uses
<i>Roemeria hybrida</i> (L.) DC.	<i>Papaveraceae</i>	Med.-Iran-Tou r.	He	Flower-leave	Diuretic, stimulating, soothing of cough
<i>Papaver dubium</i> L.	<i>Papaveraceae</i>	Med	The	Flower	Conjunctivitis, nervous breakdown
<i>Pinus halepensis</i> Mill.	<i>Pinaceae</i>	Med	Ph	Resin	Disinfectant respiratory tract antifungal
<i>Plantago albicans</i> L.	<i>Plantaginaceae</i>	Med	He	Whole plant	Abscesses, wound healing
<i>Plantago bellardii</i> All	<i>Plantaginaceae</i>	Med	The	Whole plant	Oreillons, laryngitis,diarrhea
<i>Plantago ovata</i> Forsk.	<i>Plantaginaceae</i>	Med	The	Whole plant	Diuretic, stomach pain, hepatitis
<i>Aristida obtusa</i> Del.	<i>Poaceae</i>	Sah.Sind	The	Whole plant	Wound healing
<i>Stipa parviflora</i> Desf.	<i>Poaceae</i>	Med	He	Leave	Intestinal worms, eczema
<i>Stipa tenacissima</i> L.	<i>Poaceae</i>	Ibero-Maur	Geo	Leave	Melancholy, neuralgia hypercholesterolemia
<i>Rumex vesicarius</i> L.	<i>Polygonaceae</i>	Sah-sind-Med	Geo	Leave	Goiter anemia, itching
<i>Anagallis arvensis</i> subsp. <i>phoenicea</i> (Gouan) Vollus	<i>Primulaceae</i>	Sub. Cosm	The	Flower-seed	Hair care, facial care, diuretic
<i>Anagallis arvensis</i> subsp. <i>phoenicea</i> (Gouan) Vollus	<i>Primulaceae</i>	Sub. Cosm	The	Flower	Dermatological conditions.digestive difficulties
<i>Reseda arabica</i> Boiss.	<i>Resedaceae</i>	Sah-Sind	The	Seed - flower	Diarrhea, intestinal pains
<i>Reseda villosa</i> Coss.	<i>Resedaceae</i>	Sah-Trop	He	Seed - flower	Diarrhea, intestinal pains
<i>Rhamnus alaternus</i> L.	<i>Rhamnaceae</i>	Med	Ph	Fruit - leave	Tonsillitis, skin diseases
<i>Ziziphus lotus</i> (L.) Desf.	<i>Rhamnaceae</i>	Med	Ph	Fruit -leave-seed	Stomach acidity, hypertension
<i>Crataegus azarolus</i> L.	<i>Rosaceae</i>	E. Med	Ph	Whole plant	Hypertension, blood circulation, diabetes
<i>Ruta chalepensis</i> L.	<i>Rutaceae</i>	Med	Ch	Leave-seed	Diuretic, intestinal worms,tonic, aids digestion,abortifacients
<i>Osyris alba</i> L.	<i>Santalaceae</i>	Med	Ph	Leave -seed	Aphrodisiac, Alopecia
<i>Lycium arabicum</i> Boiss.	<i>Solanaceae</i>	E.Sah	Ph	Leave	Intestinal worms
<i>Daphne gnidium</i> L.	<i>Thymeleaceae</i>	Med	Ph	Leave,seed	Hair care and anti-fall. nervous breakdown
<i>Thymelaea microphylla</i> Coss. et Dur.	<i>Thymeleaceae</i>	End.N.A	Ch	Leave	Hair care, hair loss, helminthiasis, depression
<i>Thymelaea nitida</i> Desf.	<i>Thymeleaceae</i>	Ibero-Maur	Ph	Leave	Alopecia, helminthiasis
<i>Fagonia glutinosa</i> Del.	<i>Zygophylaceae</i>	Sah-Sind	The	Aerial part	Dermatosis , healing wounds
<i>Peganum harmala</i> L.	<i>Zygophylaceae</i>	Irano.Tour. Eur	Ch	Leave-seed	Leishmaniasis, rheumatoid arthritis, seizures, depression
<i>Zygophyllum simplex</i> L.	<i>Zygophylaceae_</i>	Af-Trop-Arab	The	Leave -seed	Diabetes, hypertension

Abbreviations:

*End: Endemic, End. Alg. Tun: Endemic of Algeria and Tunisia, End. N. A: Endemic North Africa, Sah: Saharien, Euras-Med: Asian-European and Mediterranean, Med: Mediterranean, Paleo-temp: Paleo-tempered, Cosm: Cosmopolite, Ibero. Maur: Ibero-Mauretaniens, End. N. Sah: endemic northern Sahara, Sah. Sind: Sahara-Sindien, Circumbor: Circumboreal, Med. Step: Mediterranean-steppe, W. Med: West Mediterranean, S. Med. Sah: southern Mediterranean-Sahara, Trop: Tropical, Atl. Circum: Circum Atlantique, Sah. Sind. Sahara-Sindien, N. A: Nord-Africain, Med. Atl: Mediterranean-Atlantique, Sah-Med: Saharien-Mediterranean, Af-Trop: Africain-Tropical

*He: hemicryptophyte, The: therophyte, **Geo**: geophyte, Ch: chameaphyte, Ph: phanerophyte.

(6.30%) and renal diseases with a low rate of 4.08% (Fig. 5).

The digestive tract diseases are treated and the most valued species in this area belong mostly to the family Asteraceae: *Artemisia campestris* *Artemisia herba-alba*

Launaea acanthoclada *Anthemis cotula*, *Anthemis peduncalata* *Pallenis spinosa* and *Ormenis africana*. Poisonous plants used in traditional medicine are also identified in the field and reported by healers (Marabous) such as *Peganum harmala*, *Pituranthos scoparius*,

**Ethnobotanical Study of Medicinal Flora in the North East of Algeria.
An Empirical Knowledge in Djebel Zdimm (Setif)**

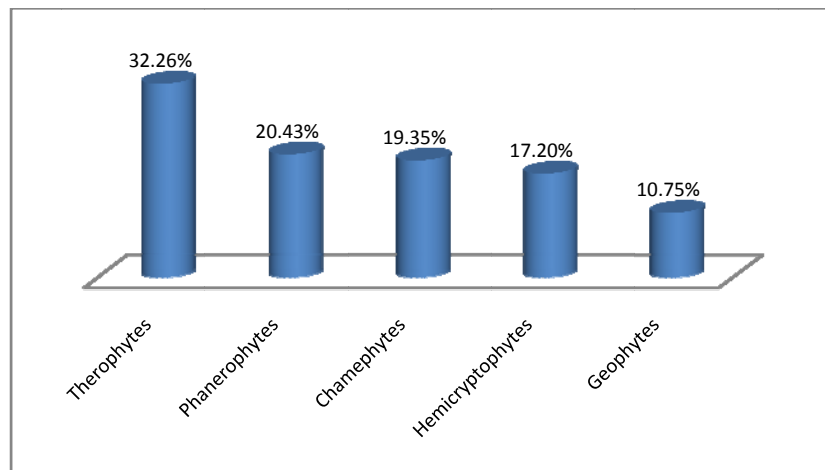


Fig. 2 Distribution of medicinal species according to the biological type.



Fig. 3 Some species used in djebel Zdimm. 1. *Astragalus armatus* Willd. subsp. *tragacanthoides* (Desf.)Maire, 2. *Pistacia atlantica* Desf., 3. *Argyrolobium saharae* Pomel = *Genista Pomeliana* Maire, 4. *Roemeria hybrida* (L.) DC., 5. *Hertia cheirifolia* (L.) O.K., 6. *Brocchia cinerea* (Del.) Vis., 7. *Teucrium pseudochamaepitys* L., 8. *Artemisia herba-alba* Asso., 9. *Gymnosporia senegalensis* (Lamk.) Loesener. (Photos: S. Chermat, 2010)

Table 2 List of Endemic species.

Espèce	Chorologie	Espèce	Chorologie
<i>Argyrobium saharae</i> Pomel = <i>Genista Pomeliana</i> Maire	End. N. Sah.	<i>Paronychia arabica</i> (L.) Dc.	End.Afr.N
<i>Astragalus armatus</i> Willd. subsp <i>tragacanthoides</i> (Desf.)Maire	End.N.A	<i>Pistacia atlantica</i> Desf.	End. N.A
<i>Atractylis polycephala</i> Coss.	End.N.A	<i>Pituranthos scoparius</i> Coss.et Dur.	End.N.A
<i>Brassica dimorpha</i> Coss. et Dur.	End	<i>Scilla lingulata</i> poiret.	End.N.A
<i>Daucus biseriatus</i> Murb.	End	<i>Thymelaea microphylla</i> Coss. et Dur.	End.N.A
<i>Ferula cossoniana</i> Batt. et Trab.	End.N.A	<i>Thymus algeriensis</i> Boiss et Reut.	End. N.A
<i>Helianthemum apertum</i> Pomel.	End.N.A	<i>Thymus ciliatus</i> Desf. subsp. <i>eu-ciliatus</i> Maire.	End. N.A
<i>Hertia cheirifolia</i> (L.) O.K.	End.Alg-Tun		

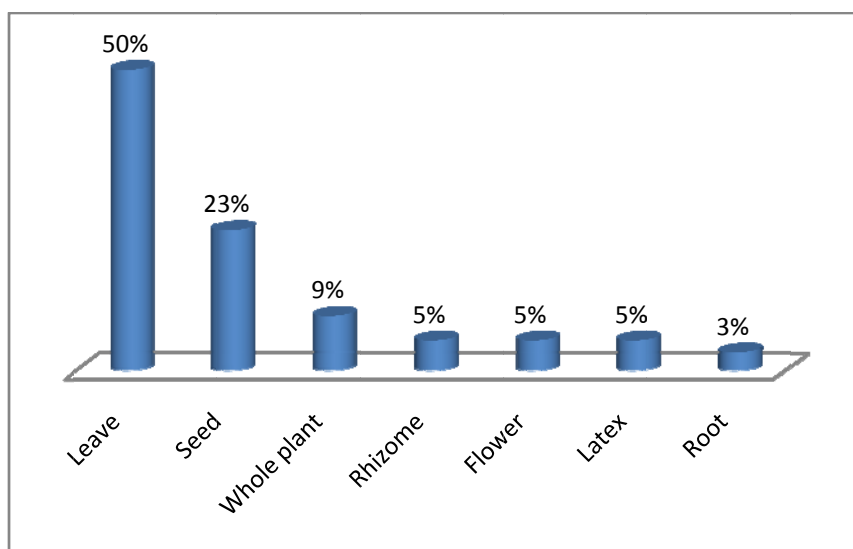


Fig. 4 Percentages of different parts used.

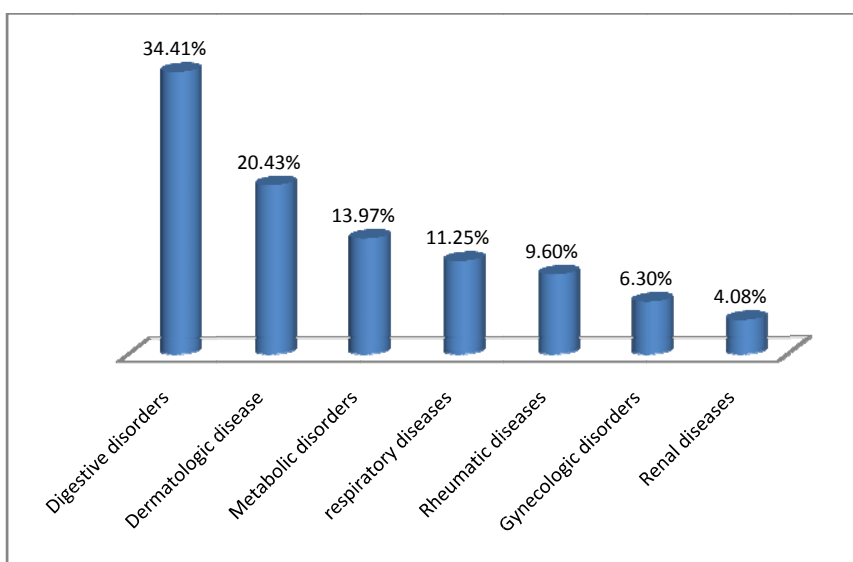


Fig. 5 percentages of different treated diseases.

**Ethnobotanical Study of Medicinal Flora in the North East of Algeria.
An Empirical Knowledge in Djebel Zdimm (Setif)**

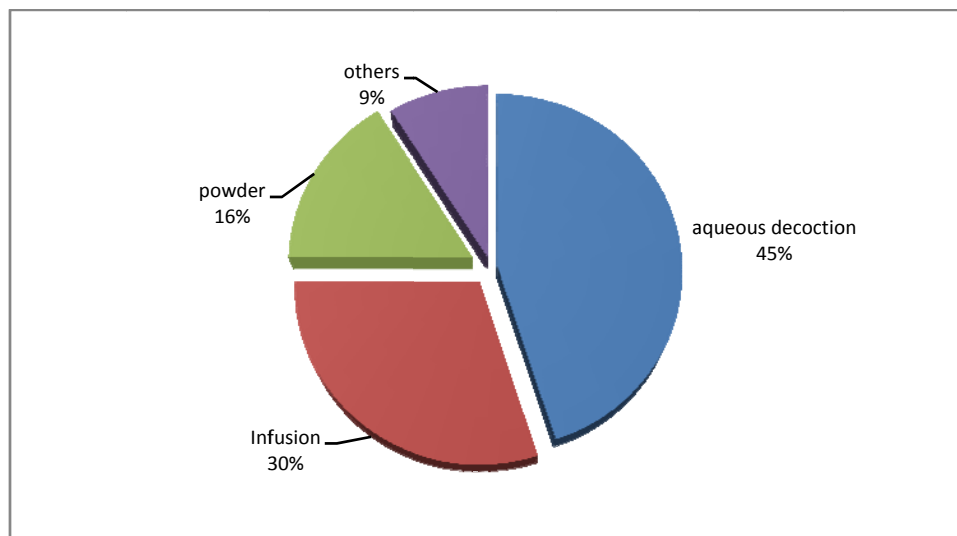


Fig. 6 Distribution of preparation methods.

Thymelaea microphylla, and *Atractylis gummifera*. These species are highly toxic at low doses and are only used by healers.

3.2.3 Methods of Preparation

Several methods of preparation are employed by the local population in Djebel Zdimm, the most used are aqueous decoction with 45%, followed by infusion (30%), powder (16%), and the other uses (9%) are all about fumigation, the poultice, maceration and whitewashing. Users always seek the most efficient and fastest method for preparing herbal medicines. Decoction and infusion are the most used methods of preparation (Fig. 6). The decoction collects the most active ingredients and attenuated or cancels the toxic effect of certain revenues [21].

4. Conclusions

The steppe ecosystem of djebel Zdimm contains flora of inestimable wealth. Among the identified taxa, 93 species have medicinal properties. The local population consumes these plants in a preferred order to treat various diseases. The choice of these plants is guided by the directives of traditional healers and elderly women, but also by the availability of the plant of the massif. At present, medicines can bring us interesting solutions to the constraints related to health especially in developing countries [22, 23]. In this

steppe, traditional therapeutic knowledge is passed from generation to generation, it is the product of associations between simple ideas and empirical experiments which is less transmitted and tends to disappear. The promotion of herbal medicine allows us to preserve the knowledge of our ancestors which is disappearing [24]. Our investigation in the southeast of the high plains of Setif, shows great diversity in the uses of plants and abundant harvest of fruits and seeds.

This exploitation negatively affects the biodiversity of plant cover and the future of medicinal species, this leads us firstly to preserve this ancestral heritage endangered since its loss would be fatal for humanity, if no effort is deployed to its loyal and urgent transcription.

References

- [1] Aquaron, M. 2003. "Plantes Qui Nourrissent, Plantes Qui Guérissent." In *Colloque d'Anthropologie alpine*, Gap: Librairie des Hautes-Alpes.
- [2] Tabuti, J. R. S., Lye, K., and Dhillion, A. S. S. 2003. "Traditional Herbal Drugs of Bulamogi, Uganda: Plants, Use and Administration." *J. Ethnopharmacol* 88: 19-44.
- [3] United Nations Environment Programme. 2002. "Rapport du PNUE sur L'avenir de L'environnement Mondial." <http://www.grid.unep.ch/geo/geo3/index.htm>.
- [4] Chermat, S., Djellouli, Y., and Gharzouli, R. 2013. "Dynamique Régressive de la Végétation des Hautes Plaines Sétifiennes: Érosion de la Diversité Floristique du

- Djebel Youssef (Algérie)." *Rev. Ecol.* 68: 85-100.
- [5] Glaçon, J. 1967. "Recherche sur la Géologie et les Gîtes Métallifères du Tell Sétifien (Algérie)." *Bull de géol.* 32: 1.
- [6] Maire, R. 1926. "Carte Géographique de L'Algérie et la Tunisie." *Gouv. Algérie.1 carte h.t. Alger* 1: 78.
- [7] Barry, J. P., Celles, J. C., and Faurel, L. 1974. "Notice de la Carte Internationale du Tapis Végétal et des Conditions Écologiques." *Feuille d'Alger au 1/1 000 000.* 42.
- [8] Quézel, P. 1978. "Analysis of the Flora Mediterranean and Saharan Africa." *Ann. Missouri Bot. Garden* 65: 479-537.
- [9] Quézel, P., Santa, S. 1962-1963. *Nouvelle Flore de l'Algérie et Des Régions Désertiques Méridionales.* Vol. 1-2. Paris, C. N. R. S., 1170.
- [10] Emberger, L. 1955. "Une Classification Biogéographique des Climats." *Rec. Trav. Lab. Géol. Rec. Trav. Lab. Géol. Bot. Zool. Fac. Sci. Montpellier* 7: 1-47.
- [11] Daget, P., and Godron, M. 1982. *Analyse de l'écologie Des Espèces Dans Les Communautés.* E. Paris: Masson.
- [12] Hseini, S., and Kahouadji, A. 2007. "Etude Ethnobotanique de La Flore Médicinale Dans La Région de Rabat (Maroc occidental)." In *Lazaroa* 28: 79-93.
- [13] Hmamouchi, M., and Agoumi, A. 1993. "Place des Plantes Médicinales Dans le Système de Sante au Maroc." In *Premier congrès international des plantes médicinales et phytothérapie. Tunis*, 17.
- [14] Maire, R. 1952-1987. *Flore de l'Afrique du Nord (Maroc, Algérie, Tunisie, Tripolitaine, Cyrenaïque et Sahara)*, edited by Lechevalier, P. Paris.
- [15] Ozenda, P. 1977. *Flore du Sahara.* Paris, C. N. R. S., 622.
- [16] Raunkiaer, C. 1905. "Types Biologiques pour la Géographie Botanique." In *KGL. Danske Videns Kabenes Sels Kabs*, Farrhandl, 347-437.
- [17] Bitsindou, M. 1986. *Enquête sur la phytothérapie traditionnelle à Kindamba et Odzala (Congo) et analyse de convergence d'usage des plantes médicinales en Afrique centrale.* Mem. Doc. Univ. Libre de Bruxelles. 482.
- [18] El Rhaffari, L., Zaid, A., Hammani, K., and Benlyas, M. 2002. "Traitement de la Leishmaniose Cutanée par la Phytothérapie au Tafilalet." *Revue Biologie & Santé* 1: 293-318.
- [19] Bigendako-Polygenis, M. J., and Lejoly, J. 1990. "La Pharmacopée Traditionnelle au Burundi." *Pesticides et médicaments en sante animale. Pres. Univ. Namur.* 425-442.
- [20] Salhi, S., Fadli, M., Zidane, L., and Douira, A. 2010. "Études Floristique et Ethnobotanique des Plantes Médicinales de la Ville de Kénitra (Maroc)." *Lazaroa* 31: 133-146.
- [21] Rebbas, K., and Bounar, R. 2014. "Études Floristique et Ethnobotanique des Plantes Médicinales de la Région de M'Sila (Algérie) Phytothérapie." 12: 284-291.
- [22] Novais, M. H., Santos, I., Mendes, S., and Pinto-Gomes, C. 2004. "Studies on Pharmaceutical Ethnobotany in Arrabida Natural Park (Portugal)." *J. Ethnopharmacology* 93: 183-195.
- [23] Bousta, D., and Ennabili, A. 2011. "L'Institut National des Plantes Médicinales et Aromatiques au Service du Développement de la Phytothérapie au Maroc." *Phytothérapie* 9: 297-303.
- [24] Riccardo, M. 2005. "Traditional Plant Use in the Areas of Monte Vesole and Ascea, Cilento National Park (Campania, Southern Italy)." *Journal of Ethnopharmacology* 97 (1): 129-143.