

# Floristic diversity and therapeutic proprieties of medicinal plants in the region of Tlemcen (Western Algeria)

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## ABSTRACT

This study is devoted to assessing the floristic diversity (systematic, biology, chorology) and therapeutic properties of medicinal plants in the region of Tlemcen (Western Algeria); a survey was conducted over four successive study years (2014–2015–2016–2017) in the study area. The objective of this study was to contribute to the knowledge and description of these plant groups through an inventory of vegetation. The floristic inventory showed us to identify 71 medicinal plants belonging to 34 families; including the dominance of Asteraceae (15.5%) followed by Lamiaceae (11.3%) and Poaceae (8.5%). The biological spectrum of these species is characterized by a high presence of Therophytes (26.8%) followed by Chamaephytes (23.9%). In biogeographical terms, Mediterranean species are the most represented and constitute more than half of the medicinal flora (54.9%). These plants are principally used in order of importance in the treatment of digestive pathologies (15.3%), dermal diseases (13.8%), and diuretics (9.4%). The results obtained are a very valuable source of information for the region studied and for the national medicinal flora.

## KEY WORDS

Diversity; Inventory; Medicinal plants; Therapeutic proprieties; Tlemcen.

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## INTRODUCTION

Due to its particular geographical location, Algeria benefits from very varied climates favoring the development of a rich and diversified flora. The Algerian flora contains more than 3140 plant species (about 3139 are listed in Quézel & Santa, 1962-1963), most of which lives in a spontaneous state. Spontaneous plant resources are to this day a primary source of interest for man and his needs (Bouallala et al., 2014).

The region of Tlemcen contains more than 300 species, belonging to more than 50 families

(Chemouri et al., 2015), some of which are used by the population as medicinal plants.

The work that will be exposed here aims to list the medicinal plants of the Tlemcen region by their floristic analysis, to provide information on their ecology and their therapeutic properties.

## MATERIAL AND METHODS

### *Study area*

Our study area was located in northwestern Al-

geria between 0°32' to 02°00'W and 34°30' to 35°49'N. Administratively, it is located at the junction of the provinces of Tlemcen and Aïn Témouchent (Fig. 1). The bioclimatic study of the region of Tlemcen by the application of a new Global Bioclimatic Classification reveals two macrobioclimates (Mediterranean and Temperate), four ombrothermic horizons (from lower dry to lower sub-humid) (Souddi & Bendi Djelloul-Ghezlaoui, 2021).

#### *Data collection and plants identification*

The floristic surveys were carried in the optimum period of vegetation (March-June) during the years 2014–2015–2016–2017 according to the sigmatiste method (Braun-Blanquet, 1952) on a homogeneous floristic surface using the “minimal area” approach adapted to the type of vegetation (Guinochet, 1973). To determine the species recorded in the region of Tlemcen, the work of Quézel & Santa (1962–1963) was used. Plants have been classified into biological types according to their life form sensu Raunkiaer (1934).

#### *Medicinal plants*

To select medicinal species and their traditional uses we have used the books published on phy-

totherapy and ethnobotany (Baba-Aissa, 1991; Beloued, 1998; Baba-Aissa, 2000) and ethnobotanical research (Chermat & Gharzouli, 2015; Benalia et al., 2018; Nouar et al., 2021; Zatout et al., 2021).

## RESULTS AND DISCUSSION

### *Floristic composition*

The analysis of the inventoried flora amounted to 134 species in total, of which 71 medicinal plants were recorded (Table 1). The taxa belonged to 34 botanical families (Fig. 2). The most represented families were Asteraceae (11 species, 15.5%), Lamiaceae (8 species, 11.3%), Poaceae (6 species, 8.5%), Amaranthaceae (5 species, 7.1%), Liliaceae (4 species, 5.7%). The predominant place occupied by Asteraceae is justified since this is a family that is very well represented in Algerian flora (Quézel, 1964). The other families represent low participation with a percentage of less than 5% each (Fig. 2).

### *Biological types*

The determination of biological spectra was made from the classification of Raunkiaer (1934). The classification of species by biological types was marked by the dominance of Therophytes (19 species; 26.8%) followed by Chamaephytes (17 species; 23.9%), Phanerophytes (16 species; 22.5%), Hemicryptophytes (12 species; 16.9%) and finally Geophytes (7 species; 9.9%) (Fig. 3). The dominance of therophytes indicates resistance to dry periods at high temperatures and is characteristic of Mediterranean vegetation in arid and semi-arid zones (Quézel, 2000).

### *Chorological types*

The analysis of the chorological spectrum of flora shows the predominance of Mediterranean biogeographical species (Med) with 39 species (54.9%), this reflects the global and logical affinity of our flora to the Mediterranean region and its climatic conditions (Quézel, 1983; Le Houérou, 1995). Secondly, come the Cosmopolitans elements with 6 species (8.4%), followed by the Euro-Mediterranean and the Saharo-Mediterranean (3 species; 4.3%), then the North African Endemic, Paleo-

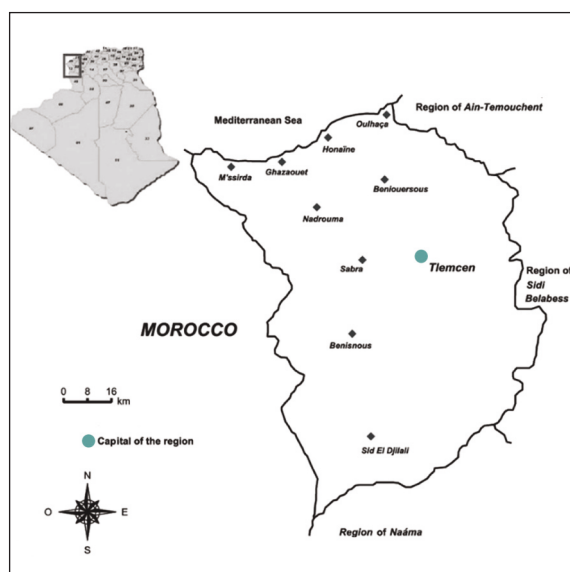


Figure 1. Study area.

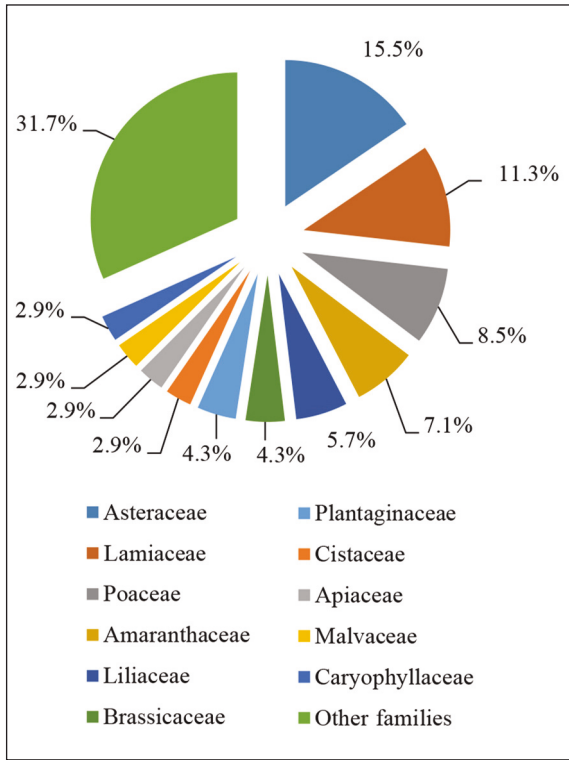


Figure 2. Composition of medicinal plants by family.

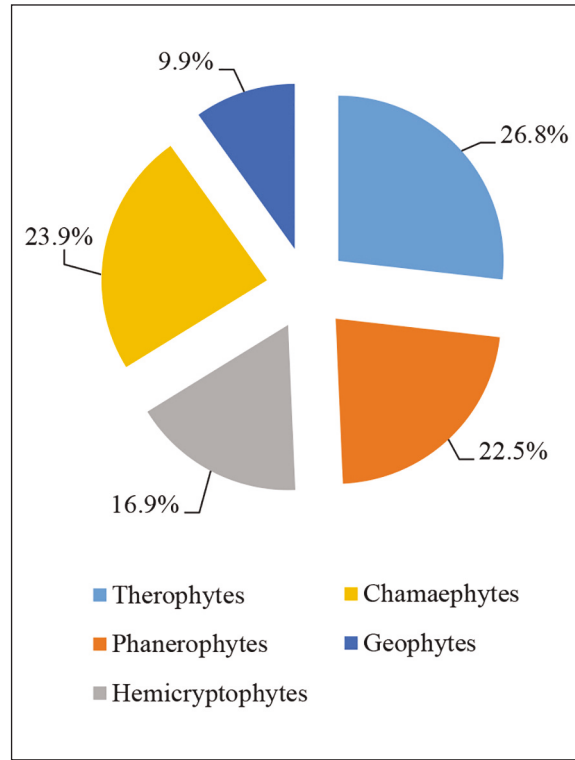


Figure 3. Biological spectrum of medicinal plants.

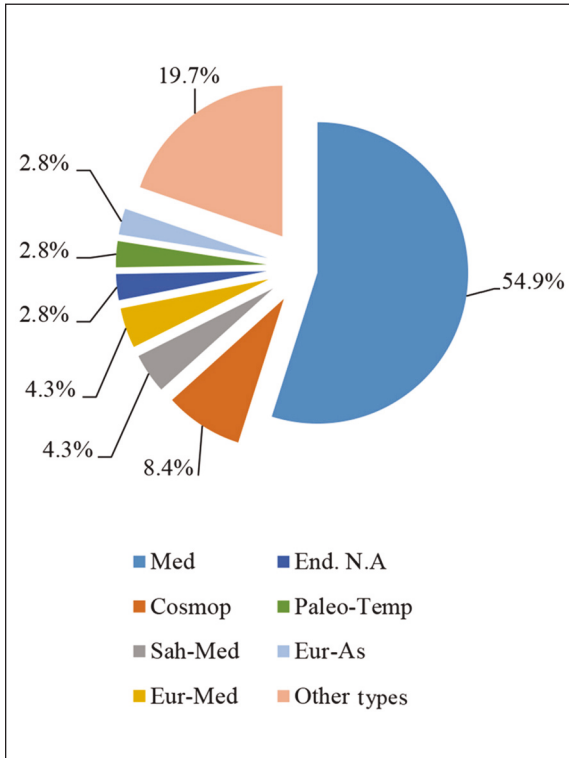


Figure 4. Chorological spectrum of medicinal plants.

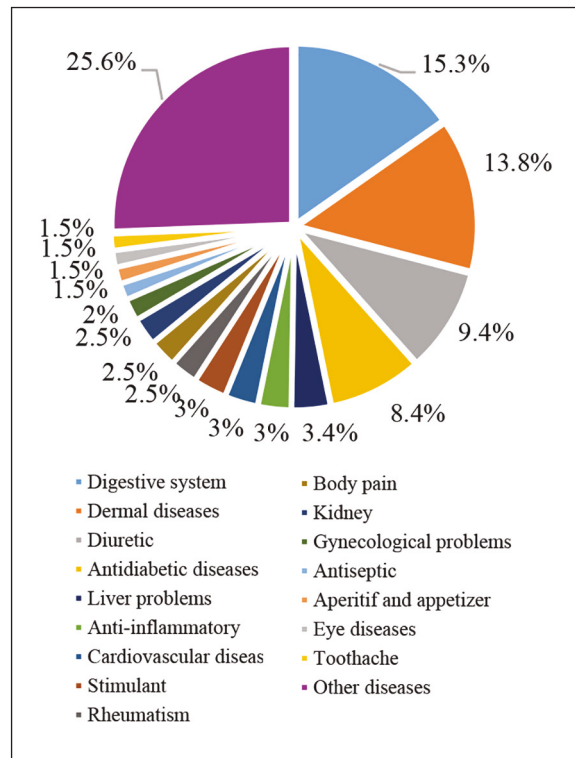


Figure 5. Diseases treated by medicinal plants.

Families	Taxa	Biological type	Chorological type	Therapeutic use
<b>Amaranthaceae</b>	<i>Hammada scoparia</i> (Pomel) Iljin	CH	Sah-Med	Antidiabetic.
	<i>Atriplex halimus</i> L.	CH	Cosmop	Eczema, healing, some diseases of the skin (scab), Antidiabetic, Cancer.
	<i>Beta macrocarpa</i> Guss.	GE	Med	Anaemia, Wound healing.
	<i>Noaea mucronata</i> (Forsk) Asch et Schw.	CH	Med-Iran-Tur	Inflamed wounds poulticed, anti-inflammatory.
	<i>Salsola vermiculata</i> L.	CH	Sah-Med	Antidiabetic.
<b>Anacardiaceae</b>	<i>Pistacia lentiscus</i> L.	PH	Med	Body pain, stomachache.
<b>Apiaceae</b>	<i>Daucus carota</i> L. (sensu lato)	HE	Cosmop	Diuretic, improves the vision, enhances liver's action, and stimulates the urinary production, junk's elimination through kidney, struggle cystitis, menstrual.
	<i>Thapsia garganica</i> L.	HE	Med	Diuretic, emetic and purgative.
<b>Apocynaceae</b>	<i>Nerium oleander</i> L.	PH	Med	Hypertension.
<b>Araliaceae</b>	<i>Hedera helix</i> L.	PH	Eur-Med	Rheumatism, venomous (snakes, scorpions).
<b>Areaceae</b>	<i>Chamaerops humilis</i> L.	PH	Med.	Stomach ulcer, colon and body pain.
<b>Asparagaceae</b>	<i>Agave americana</i> L.	PH	Med-Amer	Hair loss.
<b>Asteraceae</b>	<i>Artemisia herba-alba</i> Asso	CH	Med	Treatment of diabetes.
	<i>Atractylis serratuloides</i> Sieb.	CH	Sah	Biliary lithiasis, Circulatory disorders.
	<i>Bellis annua</i> L.	TH	Med	Analgesic, anti-inflammatory, diuretic.
	<i>Bellis sylvestris</i> L.	TH	Med	Analgesic, anti-inflammatory, diuretic.
	<i>Calendula arvensis</i> L.	TH	Sub-Med	Depurative, emmenagogue, antispasmodic and stimulating.
	<i>Centaurea pullata</i> L.	HE	Med	Increase the pressure.
	<i>Echinops spinosus</i> L.	HE	Med	Diuretic, hypoglycemic, for stomachic effects, liver disorders, and postpartum care.
	<i>Launaea resedifolia</i> O. Ktze	TH	Med-Sind	Diarrhea, gastrointestinal tracts, as anti-inflammatory, for skin diseases, treatment of infected wounds, hepatic pains, children fever, as soporific, lactagogue, diuretic.
	<i>Micropus bombycinus</i> Lag	TH	Cosmop	Treatment of wound healing.
	<i>Pallenis spinosa</i> (L.) Cass	HE	Med	Antidiabetic, anti-inflammatory.
	<i>Scorzonera undulata</i> Vahl.	HE	Med	Stimulant tonic, astringent and used like food.

<b>Boraginaceae</b>	<i>Echium humile pycnanthum</i> (Pomel) Greuter & Burdet	TH	Sah-Med	Hepatitis.
<b>Brassicaceae</b>	<i>Eruca vesicaria</i> (L.) Cav.	TH	Med	Diuretic, appetizer, Gastro-intestinal problems.
	<i>Lobularia maritima</i> (L.) Desv.	CH	Med	Diuretic and antiscorbutic.
	<i>Sinapis arvensis</i> L.	TH	Paleo-Temp	Increases the secretion of the intestinal mucosa.
<b>Caryophyllaceae</b>	<i>Herniaria hirsuta</i> L.	TH	Paleo-Temp	Kidney stones, diuretic, renal lithiasis, biliary lithiasis.
	<i>Paronychia argentea</i> (Pourr.) Lamk.	HE	Med	Diuretic, hypoglycaemic activity.
<b>Cistaceae</b>	<i>Cistus villosus</i> L.	PH	Med	Wound, stomach ulcer, colon ailments, stomachache.
	<i>Helianthemum apertum</i> Pomel	TH	End N.A	Lactation, irregular cycle.
<b>Euphorbiaceae</b>	<i>Euphorbia falcata</i> L.	TH	Eur-Med	Cholagogue, Diuretic, skin disease (eczema), warts, fungal infection.
<b>Fabaceae</b>	<i>Calycotome spinosa</i> (L.) Lamk	PH	Med	In various episodes of intoxication and hypoglycemia.
<b>Fagaceae</b>	<i>Quercus ilex</i> L.	PH	Med	Stomachache.
<b>Hyacinthaceae</b>	<i>Drimia maritima</i> (L.) Stearn	GE	Med	Scabies.
<b>Lamiaceae</b>	<i>Ballota hirsuta</i> Pomel	HE	Med	Contusion, injuries and rheumatic pain, hypertension fungal infections, skin disease.
	<i>Lavandula dentata</i> L.	CH	W-Med	Antiseptic and stimulant agent.
	<i>Lavandula multifida</i> L.	CH	Med	Antiseptic and stimulant agent.
	<i>Salvia verbenaca</i> (L.) Briq.	HE	Med-Atl	Stimulant, tonic, antiseptic wound.
	<i>Marrubium vulgare</i> L.	HE	Cosmop	Used against diseases of the liver, diseases of the respiratory tract, antidiabetic, resolutive, sedative, stomachic and bitter tonic, toothache, Hypnotic.
	<i>Teucrium polium</i> subsp. <i>capitatum</i> L.	CH	Eur-Med	Diuretic, diaphoretic, antipyretic, antispasmodic, anti-inflammatory, antihypertensive, antinociceptive and hypolipidemic properties.
	<i>Teucrium pseudochaemaepitys</i> L.	CH	Med	Tonic, laxative, anti-hemorrhoidal, febrifuge.
	<i>Thymus ciliatus</i> subsp. <i>coloratus</i> Desf	CH	End N.A	Anti-spasmodic, diaphoretic and stimulant effects.
<b>Liliaceae</b>	<i>Asparagus acutifolius</i> L.	PH	Med	Aperitif, stomachic and diuretic.
	<i>Asparagus albus</i> L.	PH	Med	Jaundice and rheumatism, appetizer and stomachic.
	<i>Asparagus stipularis</i> Forsk.	GE	Macar-Med	Cystitis, intestine problems.

	<i>Asphodelus microcarpus</i> Salzm. & Viv.	GE	Macar-Med	Diuretic, antirheumatic, otitis, toothache.
<b>Malvaceae</b>	<i>Malva aegyptiaca</i> L.	CH	Sah-Sub-Med	Constipation, fever, wounds.
	<i>Malva sylvestris</i> L.	TH	Eur-As	Mumps, mature a button (maturative) colds, stomach pain.
<b>Myrtaceae</b>	<i>Eucalyptus globulus</i> Labill.	PH	Austr-Med	Treatment of diabetes.
<b>Oleaceae</b>	<i>Olea europea</i> L.	PH	Med	Diabetes, hypertension.
<b>Oxalidaceae</b>	<i>Oxalis pes-caprae</i> L.	HE	Med	Stomachache.
<b>Papaveraceae</b>	<i>Papaver rhoeas</i> L.	TH	Cosmop	Body pain.
<b>Pinaceae</b>	<i>Pinus halepensis</i> L.	PH	Med	Stomach ulcer.
<b>Plantaginaceae</b>	<i>Plantago albicans</i> L.	HE	Med	Prostate, Abscesses, wound healing.
	<i>Plantago ovata</i> Forssk.	TH	Med	Diuretic, stomach pain, hepatitis.
	<i>Globularia alypum</i> L.	CH	Med	Diabetes, menstrual cramp.
<b>Poaceae</b>	<i>Ampelodesmos mauritanicus</i> (Poir.) T. Durand & Schinz	GE	Med	Antidiabetic, anti hypertensive, body pain.
	<i>Avena sterilis</i> L.	TH	Cosmop	Softening, anti-asthenic, emollient.
	<i>Hordeum murinum</i> L.	TH	Circum Bor	Urinary infection, kidney stone, hypoglycemiante.
	<i>Lygeum spartum</i> L.	GE	Med	Mycosis of the face.
	<i>Stipa tenacissima</i> L.	GE	Med	Used in the treatment of chronic scalp ulcers, treatment of kidney stones, antidiabetic, weight loss.
	<i>Bromus rubens</i> L.	TH	Med	Diuretic.
<b>Primulaceae</b>	<i>Anagallis arvensis</i> L.	TH	Cosmop	Hair care, facial care, diuretic, Dermatological conditions, Digestive difficulties.
<b>Resedaceae</b>	<i>Reseda alba</i> L.	TH	Euras	Diarrhea, colic and digestive intoxications.
<b>Rhamnaceae</b>	<i>Ziziphus lotus</i> (L.) Desf.	PH	Med	Stomachache, colon, body pain, sedative.
<b>Rutaceae</b>	<i>Ruta chalepensis</i> L.	CH	Med	Intestine disorders, liver problems, vertigo, diabetes, gout.
<b>Solanaceae</b>	<i>Withania frutescens</i> Pauquy	CH	Ibero-Maur	Dysentery and ulcers, tooth pain, and as diuretic.
<b>Tamaricaceae</b>	<i>Tamarix gallica</i> L.	PH	N-Trop.	Leucoderma, spleen trouble and eye diseases.
<b>Thymelaeaceae</b>	<i>Daphne gnidium</i> L.	PH	Med	Hair loss, hair growth.
<b>Zygophyllaceae</b>	<i>Peganum harmala</i> L.	CH	Med	Antirheumatic, diarrhea, diabetes.

Table 1. Floristic diversity and therapeutic proprieties of medicinal plants in the region of Tlemcen (Western Algeria).



Temperate and the Eurasians (2 species; 2.8%). The other elements represent low participation but contribute to the diversity of the plant genetic potential in the study area (Fig. 4).

### ***Therapeutic Properties of Medicinal Plants in the region of Tlemcen***

The analysis of the types of diseases treated by medicinal plants highlights that many of these plants are used in the treatments of the digestive system (15.3%), especially colon and stomach ulcer, stomachache, etc., dermal diseases come in second place with 13.8% such as skin disease (eczema), diuretic come in third place with 9.4% (Fig. 5). These results are consistent with the observations of Chermat & Gharzouli (2015), Bendif et al. (2018), Baziz et al. (2020).

## **CONCLUSIONS**

As a result of this study, we were able to gain knowledge about the floristic composition and therapeutic uses of medicinal plants for the treatment of diseases. The region of Tlemcen is considered a typical biotope representative of semi-arid environments. The valorization of this natural heritage requires an ethnobotany study, which allows to describe the different uses of medicinal plants by the local population and to establish the catalog of medicinal plants and their therapeutic uses. This study could be a database for further research in the fields of phytochemistry and pharmacology for searching for new natural substances.

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