First floristic and ethnobotanical study of medicinal plants on a Bou Saada-Djelfa Transect (Algeria)

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The aim of this work is to determine the traditional uses of medicinal plants by local people on a Bou Saada-Djelfa transect. This area contains a rich and diversified medicinal flora.
The floristic inventory of medicinal plants in the field and the ethnobotanical surveys carried out using questionnaire forms enabled us to inventory 68 medicinal species belonging to 35 botanical families, and to collect as much information as possible concerning local traditional therapeutic uses. These results can be considered as a source of information for scientific research in the field of phytochemistry and pharmacology.

Keywords: Inventory, medicinal plants, Ethnobotany, Steppe region, Bou Saada, Djelfa.

1.Introduction

Medicinal plants are a precious heritage and a real treasure for mankind, and are in great demand worldwide, particularly in developing countries[14]. These medicinal plants are still a source of medical care in developing countries due to the absence of a modern medicinal system[19].
These medicinal plants are important for pharmacological research and drug synthesis not only when their constituents are used directly as therapeutic agents, but also as raw materials for drug synthesis or models for pharmacologically active compounds[1].
Traditional herbal medicine was well developed in Algeria, but the use of conventional medicine has led to the neglect of these ancestral practices, which are in danger of being forgotten[18].

In parallel with the programs of international bodies such as the World Health Union (IUCN), which is interested in promoting biodiversity conservation and the sustainable use of natural resources in North Africa, and also the involvement of local communities in biodiversity conservation[19].

The use of plants to cure disease, or phytotherapy, has been known since ancient times, and every culture has a history of using medicinal flora.

The aim of the ethnobotanical studies carried out on a Bou Saada -Djelfa transect is to obtain a floristic inventory of the medicinal plants used by the population, and to gather as much information as possible on the therapeutic uses practised in the study area. Preserving this knowledge is a key factor in the conservation and development of resources[18], as part of the sustainable development of the study area.

2. Materials and methods

2.1. Geographical location of the study area

The study area is located on a transect of two Bou Saada - Djelfa regions (between the communes of Bou Saada and those of Djelfa). The area is bordered to the north by Médéa, Bouira and Bou Arreridj, to the east by Sétif, Batna and Biskra, to the west by Tiaret and Laghouat and to the south by Laghouat, Ghardaïa and Ouargla (Figure 1).

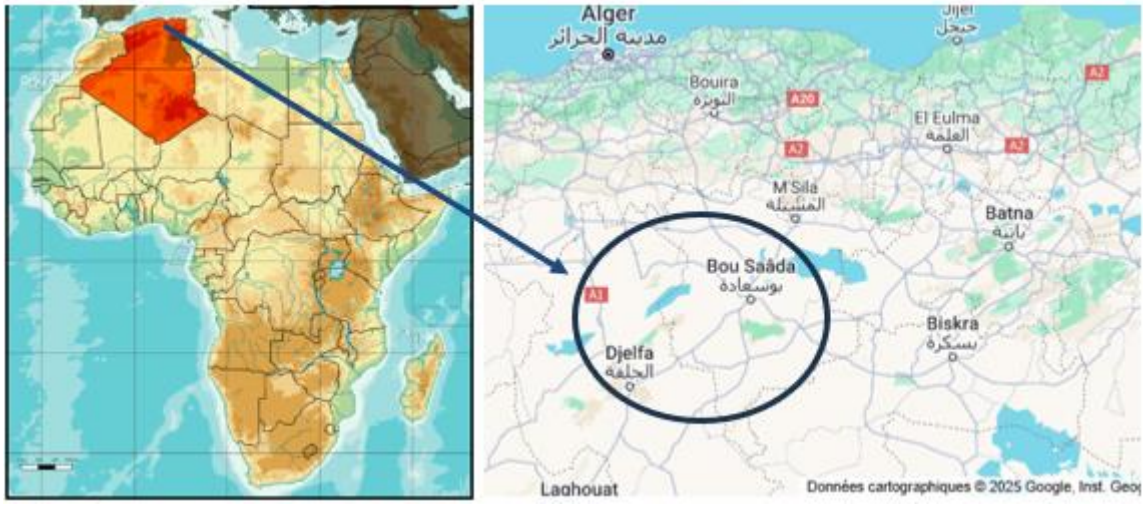

Figure 1. Geographical location of the study area (Bou Saada-Djelfa transect)

2.2. Climate and bioclimate of the study area

The climate of the Bou Saada region is characterized by very hot dry summers and very cold winters, with low and irregular rainfall of around 220.6 mm/year. The climatic data used were taken from the M'Sila meteorological station (1988-2020). The mean annual temperature in the study area is estimated at 19.41°C. Average monthly temperatures show that the coldest month is January with 9.75°C, and the hottest month is July with 31.66°C. Average monthly minimum temperatures are above 3.5°C. Average maximum temperatures do not exceed 39°C. Its bioclimate is arid to temperate winter with Q2: 19, 45.

The mountain massifs receive greater quantities of water, of the order of 400-500 mm in the Saharan Atlas and reaching more than 600 mm in the Hodna Mountains and the Aurès-Belezma[9].

The Djelfa region enjoys a semi-arid climate characterized by cold, harsh winters and hot, dry summers.

Thermal amplitude is high. The department receives an average of 350 mm of rainfall per year, but this is irregular from north to south; higher in the agricultural regions of Ain Oussera and Hassi Bahbah than in the Saharan plateau in the south of the wilaya. Snowfall averages between 4 and 13 days.

The winds are characterized by their intensity and frequency. North-easterly and south-easterly, of oceanic and northern origin. Note the frequency of desert siroccos, which last from 20 to 30 days a year.

2.3. Ethnobotanical surveys

Ethnobotanical surveys on medicinal plants were carried out during March and April 2021 using a questionnaire form. These surveys enabled us to draw up a list of species used by the population of these communes in traditional phytotherapy.

There are three ethnobotanical survey methods, which are the most widely used, and the most appropriate for our case study, where we filled in 120 survey forms with people who have knowledge of the therapeutic use of plants.

2.4. Rural population surveys

This survey consists of asking villagers questions about the plants used in traditional medicine, the parts of the plant used, the methods of preparation, and the types of disease treated by each plant.

2.5. Herbalist surveys

A survey of herbalists has enabled us to draw up a list of spontaneous medicinal plants in the study area.

This survey, which was carried out when the plants were purchased, enabled us to gather the necessary information concerning the vernacular medicinal plants on sale, their therapeutic uses, dosage and the diseases treated by each plant.

2.6. Surveys of traditional practitioners

In most cases, this involves consulting a traditional practitioner about the therapeutic uses of each plant.

Some family members are known for their knowledge and healing skills, and contact with such people is more fruitful, while reliance on relations for information is a weaker approach. The pharmacological knowledge of plants acquired by traditional healers provides a basis for the perception of the natural environment and the description of illnesses[4,20].

2.7. Questionnaire sheets

Our survey tool is a two-part form, the first of which is based on the respondent (age, sex, level of education and professional status), while the second collects information on each medicinal plant studied, enabling us to assess each respondent's knowledge of the plant, its use, prescription and recommended method of preparation.

2.8. Gathering and preserving medicinal plants

Harvest in sunny weather, then dry and store in a dry place. Plants should be picked in dry weather, after sunrise, when the dew has disappeared. Plants must be picked in unpolluted areas, and must be healthy, free from any insect or fungal attack[3,13,16].

2.9. Drying

The purpose of the drying operation is to remove the water from the plants, the method of drying will vary according to the parts of the plant to be preserved, for example; stems, bark and wood will be dried in the sun or in a soft oven[8].

2.10. Conservation

To preserve plants, dead parts must be removed and then dried in an airy place; roots must be air-dried and kept away from humidity; flowers, leaves and seeds must be dried and spread out on racks or hung in small isolated bundles; they must be kept, for example, in metal tins[3].

2.11. How to prepare medicinal plants

Infusion: an infusion is obtained by pouring boiling water over the plants in a covered container, to avoid any loss of volatile essence, for 5 to 15 minutes (depending on the plant), then filtering[21].

Decoction: place the plant in cold water, then boil for 2 to 15 minutes (bark and roots take longer to boil than stems and leaves)[21].

Maceration: this is the immersion of a plant in cold water or alcohol, to obtain soluble principles over a more or less long period of time[22].

Tinctures: to make tinctures, the plant is soaked in a solvent (water, alcohol, vinegar), then squeezed to extract the liquid. To improve the preparation process, the mixture can be left to stand in direct sunlight[12].

Compress: this involves using an infection or plant decoction, then soaking a clean towel over the part of the body to be treated[17].

Cataplasm: plants are roughly cut, then heated with a little water for 2 to 3 minutes, squeezed and placed on the painful area using a piece or strip[17].

Inhabitation: by pouring a container or extract of the aromatic plant into hot water, the resulting container is inhaled by the patient, placing his or her head underneath it to clear the upper respiratory tract[17].

Powder: prepared by spraying the plants, which are already dried in the shade and finely chopped, the resulting powders can be diluted in water or mixed with food, and can be used to treat certain diseases[21].

Creams: these are emulsions prepared using fatty substances (oil) with plant preparations (infusion, decoction...)[2].

Extracts: there are several types of extraction, including fluid extracts obtained by immersing the plant in a large mass of water or alcohol, then allowing it to evaporate until the weight of liquid and plant are equal[15].

2.12. Precautions for using medicinal plants

Despite the ease with which plants can be used, it's important to be aware of the side-effects of some of them, and to consult a specialist: some plants are badly dosed and highly toxic, while others are known for their glory, but can cause fatal effects in certain cases[7].

3. Results and discussion

The results of the ethnobotanical surveys are expressed in data sheets, which highlight the characteristics of the medicinal plants used by the local population in the study area. We provide a list of medicinal plants used by the local population in this area and their therapeutic properties and traditional uses (Table 1).

3.1. Choosing between traditional and clinical medicine

The ethnobotanical survey of medicinal plants carried out with the population of the study area, and the collection of data concerning therapeutic uses, enabled us to describe, classify and inventory medicinal plants. This floristic inventory revealed a floristic richness of 68 species belonging to 35 botanical families.

Concerning the use of medicinal plants and plant-based treatment in general, we found that the population uses phytotherapy alone or with clinical medicine with a cumulative percentage of 92% and the remaining 08% use clinical medicine, which is explained by the population's interest in traditional therapies to treat their ailments, and also by the fact of the effectiveness of therapeutic practices that people had acquired from their ancestors.

3.2. The use of medicinal plants among the people surveyed: gender, age and level of education

Both men and women are concerned by the use of medicinal plants, however, women use traditional medicine much more than men, which justifies is by the fact that women have multiple functions and responsibilities as mothers that they must give care to their family and more particularly to their children[5].

Older people in the 50-80 age group use medicinal plants more than other age groups, in terms of their knowledge and experience of plant use in traditional medicine.

The transmission of knowledge of the uses and properties of medicinal plants from one generation to the next is at risk, as it is not always guaranteed.

According to the surveys carried out with people who use medicinal plants and according to their level of education, the results obtained show that illiterate people are the most frequent users of medicinal species, followed respectively by people with secondary school education, middle school education and university education.

3.3. Plant drug information by disease treated

Analysis of the results shows that plants such as White wormwood (*Artemisea herba alba* Ass.), Alypon Globularia (*Globularia alypum* L.), Marrube blanc (*Marrubium vulgare* L.), Thymus (*Thymus ciliatus* Desf), Germandrée (*Teucrium polium* L.), Ivette (*Ajuga iva* L.), Lentisque pistachier (*Pistacia lentiscus* L.), le genévrier turbiné (*Juniperus turbinata* Guss.) are among the plants most widely used by the local population in traditional medicine.

In contrast to these plants, which are much in demand and used in the study area, there are other medicinal plants that are little used due to their toxicity, such as Laurier rose (*Nerium oleander* L), Thapsia (*Thapsia garganica* L), and also the demarcation between nutritive and curative properties is not always clear-cut.

Leaves are the plant part most frequently used in treatment preparations, followed by other plant parts. Generally speaking, the results obtained show that most plants are used in the treatment of digestive tract disorders, with a very high percentage, followed by other disorders.

4. Conclusion

Ethnobotanical studies on the use of plants in traditional medicine by the local population in the study area have enabled us to identify 68 medicinal plants belonging to 35 botanical families, the most important of which is the Lamiaceae family. Leaves are the most widely used part of the plant, and infusion and decoction are the most common methods of preparation. Digestive ailments are the most common in this area.

The variation in the use of medicinal plants is linked to the profile of the people surveyed. Younger people are generally unaware of the names and uses of most plant species, whereas older people have experience of therapeutic uses. Women and men share medicinal knowledge. Illiterate people know much more about the therapeutic uses of medicinal plants than the other people surveyed.

The people of these regions know how to use plants in traditional medicine. The multiplication of these ethnobotanical studies on a national scale will enable us to gain a better understanding of the potential in this field, assess the risks associated with the use of certain toxic plants, and adopt a new management approach to safeguard and preserve natural resources[11].

Harvesting must be done with caution, as high harvesting pressure leads to reduced productivity and the reduction or loss of biodiversity, this way of harvesting leads to rarefaction, and even the risk of total disappearance of certain species[10].

In the absence of cultivation, many plants are threatened with extinction. In this context, we propose the cultivation of plants in this region that have been the subject of conclusive scientific work and are used in human therapeutics in many countries, as the needs of the pharmaceutical industry for medicinal plants are multiplied[6].

The development of deprived areas through job creation and increased income; to ensure more substantial income for local populations; promote the enormous potential for growing medicinal and aromatic plants native to these regions with a view to producing herbs and essential oils.

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Conflict of interest statement

The authors declare that they have no conflicts of interest.

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Table 1. List of medicinal plants used by people in the study area

Families	Species	Parts used	Therapeutic properties	Traditional uses
Abietaceae	*Pinus halepensis* Mill.	Buds, leaves, resins, bark.	Expectorant, aphrodisiac, spermatogenesis.	A needle decoction is used as an antiseptic, balsamic and antirheumatic.
Anacardiaceae	*Pistacia lentiscus* L.	Leaves, resins, roots, bark.	Astringent, antiseptic, detersive, expectorant, hemostatic, simulant, vulnerary.	Leaves and bark are used, in decoction or powder form, to treat intestinal problems, diarrhea and diabetes.
Apicaceae	*Coriandrum sativum* L.	Leaves, fruit.	Antiseptic, antispasmodic, carminative, stomatal, stimulant.	The plant is used as an infusion of fresh leaves in boiling water for digestive and gastric disorders. Externally, it acts as a healing agent.
Apicaceae	*Petroselinum sativum* L.	Leaves, stems.	Digestive, cordial, remedial, kidney, healing, hair tonic.	A decoction of leafy stems is used against kidney stones and bladder disorders.
Apicaceae	*Thapsia garganica* L.	Roots.	Thapsia is used for rheumatism and bronchitis.	External use: an oily maceration of crushed roots is used as a compress for rheumatic pain.
Apocynaceae	*Nerium oleander* L.	Leaves.	Diuretic, antidiabetic, cardiotonic.	Local application of latex is recommended to treat scabies.
Asteraceae	*Antemisia herba- alba* Asso	Leaves, tops, roots.	Emmenagogue, stomachic, vermifuge, antispasmodic, anti-gastralgic.	A decoction of the leafy stem is highly recommended for intestinal worms, colds, gastric pain, urinary tract problems and diabetes.
Asteraceae	*Artemisia campestris* L.	Tops, flowers, roots, leaves.	Vulnerable, anti-hemorrhagic, diuretic.	The plant is used in infusion or powder form for abdominal pain, colic and menstruation.
Asteraceae	*Brocchia cinerea* Vis	Leaves	Anti-inflammatory, analgesic, antiseptic, antibacterial, antipyretic.	The plant is used to treat stomach pains, fever, headaches and migraines, coughs and joint inflammation.
Asteraceae	*Chrysanthemum coronarium* L.	The whole plant	Anti-inflammatory, analgesic.	The whole plant, in powder form, is used to treat stomach ailments.
Asteraceae	*Lactuca sativa* L.	Leaves.	Aperitif, cardiotonic, cough suppressant, pectoral, anti-ulcer.	For sunburn, massage the forehead with the infusion of leaves.
Asteraceae	*Launaea nudicaulis* L. Hook.	Leaves.	Antidiabetic, calming.	Leaf powder is recommended for diabetes and gastric ailments.
Brassicaceae	*Brassica rapa* L.	Roots, leaves.	Aperitif, bechic, anti-gout, anti-rheumatic.	Fumigation of the leaves with onion, leafy stem of white marrubus, eucalyptus leaves and cloves, and fish head is effective in cases of typhoid fever.

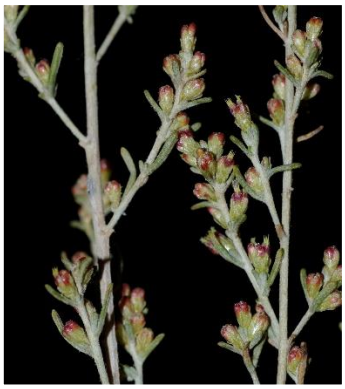
Chenopodiaceae	*Atriplex halimus* L.	Leaves, seeds.	Diuretic, emollient, laxative, vomitory.	Mixing the plant's powder with olive oil is highly effective in the treatment of fractures.
Chenopodiaceae	*Spinacia oleracea* L.	Leaves.	Laxative, hepatic, anti-inflammatory of the urinary tract, anti-ulcer, anti-anemic.	A decoction of the leaves, against inflammation of the digestive tract, liver and bladder.
Cistaceae	*Cistus albidus* L.	Leaves, flowers.	Hypoglycemic, diuretic, healing.	A decoction of the leaves is used against gastric pain and is considered a hypoglycemic. As a poultice: used to treat abscesses. External use: used as a poultice for wounds.
Cucurbitaceae	*Colocynthis vulgaris* L.	Fruits.	Purgative, emetic, scalp tonic.	Very dilute infusion of dried pruned fruit or pulp as a purgative and hypoglycemic.
Cucurbitaceae	*Cucumis citrullus* (L) Ser.	Fruits.	Diuretic, hypotensive, soothing, refreshing.	Drink a spoonful of oil extracted from the seeds every morning on an empty stomach to combat hypertension.
Cupressaceae	*Juniperus oxcycedrus* L.	Leaves, fruits, roots, wood, cones, resins.	Antiseptic, diuretic, stomach stimulant, sudorific.	Cade oil, extracted from *Juniperus oxcycedrus*, treats skin rashes.
Cupressaceae	*Juniperus turbinata* Guss.	Twigs, fruit, wood.	Antiparasitic, antiseptic, astringent.	The leaves are used in decoction as a hypoglycemic. Infusion of the leaves is used as a body bath to treat rheumatism.
Ericaceae	*Arbutus unedo* L.	Fruit leaves.	Anti-inflammatory, antiseptic, astringent, diuretic and depurative.	A decoction of the leaves is used to treat urinary calculi.
Euphorbiaceae	*Euphorbia guyoniana* Boiss. et Reut.	Stems.	Soothes pain caused by scorpion stings.	External use: Stem latex is applied to viper bite sites to relieve pain and stop the spread of venom.
Fabaceae	*Vicia faba* L.	Seeds.	Laxative, lowers blood cholesterol.	Bean seed powder mixed with chickpea seed, rice seed and egg yolk are used as a poultice on the face against abscesses.
Fabaceae	*Ononis spinosa* L.	Flowers, roots.	Antiseptic, astringent, depurative, diuretic, sudorific.	The infusion of the roots increases urine secretion and acts against gout.
Fabaceae	*Calycotome spinosa* (L.) Lamk.	Flowers, leaves and seeds.	Calycotome is recommended for external use against swelling, edema and, above all, urine retention, as its active ingredients are highly diuretic.	The infusion or decoction of calycotome flowers and leaves is diuretic. It can be used in powder form to treat new wounds.
Fabaceae	*Retama retam* webb.	Whole plant.	Healing agent for eye irritations, diarrhea, fever and tapeworms.	Mixing dried leaves with olive oil or water is effective against eczema.
Fabaceae	*Trigonella faenum-graecum* L.	Seeds.	Softening, anabolic, emollient, febrifuge, galactagogue, hypoglycemic, tonic.	Internally, a decoction of the seeds is used to soothe abdominal pain, coughs and diarrhea. It promotes weight regain and acts as an aperitif and calming agent. Externally, the seeds are used to remove dandruff from the hair.

Fagaceae	*Quercus rotundifolia* L.	Barks, leaves, stems.	Antiseptic, antidiarrheal, astringent, hemostatic febrifuge.	As a gargle: 15g per liter of water, for angina, stomatitis and pharyngitis.
Globulariaceae	*Globularia alypum* L.	Leaves.	Astringent, laxative, cholagogue, depurative, stomachic and sudorific.	An infusion of this plant is recommended for treating gastric disorders, diarrhea and menstrual pain. Powdered: used to treat eczema and burns.
Lamiaceae	*Ajiga iva* (L.) Schreb.	Whole plant.	Antiseptic, parasiticide, hypoglycemic.	Infusion of ivette is used against diabetes, hypertension, diarrhea, gastric pain and cancer.
Lamiaceae	*Marrubium vulgare* L.	Flowering tops, leaves.	Bitter tonic, cholagogue, regulates heart rhythm.	Infusion of Marrube leaves is used for colds, fevers and allergies.
Lamiaceae	*Mentha pulegium* L.	Leaves, flowering tops.	Hypotensive, bechic, pectoral, cephalic, antirheumatic, antipyretic.	A decoction of dried or fresh leaves is recommended for treating abdominal disorders.
Lamiaceae	*Mentha spicata* L.	The leaves	Analgesic, antiseptic, antispasmodic, aromatic, carminative, cholagogue, digestive, stimulant, tonic.	Among the villagers, spearmint is a popular used as a carminative and odontalgic infusion, tonic, stomachic, calming, hypotensive and cholesterol-lowering. It is used to treat dysmenorrhea, urinary incontinence and oral affections. In powder form, spearmint is used to treat wounds and burns, and to nourish hair.
Lamiaceae	*Mentha viridis* L.	Leaves, stems.	Antispasmodic, antirheumatic, anti-vomiting, antineuralgic.	The leafy stem, infused in tea, is used as a digestive and refreshing agent. In poultices, the leaves are used for headaches and wounds.
Lamiaceae	*Teucrium polium* L.	Leaves, tops, flowers.	Anti-inflammatory, astringent, detergent, febrifuge, hypoglycemic, bitter tonic.	The plant is used as an infusion for gastrointestinal pain, fever, diarrhea, liver crises and biliary retention.
Lamiaceae	*Thymus ciliatus* Desf.	Whole plant.	Vulnerary, vermifuge, tonic, stomachic, expectorant, bechic, carminative, aperitif, antiseptic.	This plant is used as an herbal tea to treat the flu.
Lamiaceae	*Rosmarinus officinalis* L.	The leaves and flowers.	Anti-inflammatory, antiseptic, antispasmodic, astringent, carminative, cholagogue, emmenagogue, febrifuge, general stimulant, stomachic, tonic, vulnerary.	Rosemary leaves are used in the form of decoction or infusion for gastric disorders, colic, menstrual and back pain It is considered a carminative and diuretic.

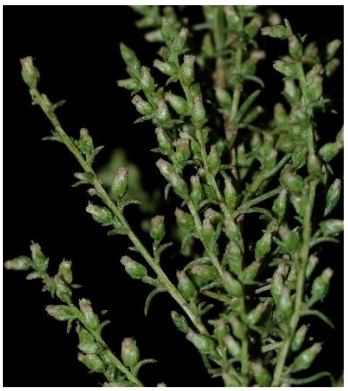
Lauraceae	*Laurus nobilis* L.	Leaves, fruit.	Stomachic, carminative.	Laurel leaves in compresses, used against rheumatism.
Liliaceae	*Allium cepa* L.	Bulbs.	Treatment: infected wounds, otalgia, thorax, otitis, eyes, constipation, headaches, rheumatism, otitis, respiratory, hair loss.	The onion bulb is used as a poultice for dermatological disorders, and orally for gallbladder disorders.
Liliaceae	*Allium sativum* L.	Bulbs.	Garlic is effective against corns, warts, earaches, arthritis pain and rheumatism.	It is considered a hypotensive agent.
Liliaceae	*Asphodelus microcarpus* Salzm et Vivo	Tubers.	Detersive, resolving, antirheumatic, analgesic, antispasmodic.	An oily maceration of the tubers is applied to treat earache, rheumatism and toothache.
Lythraceae	*Lawsonia inermis* L.	Leaves.	Antiulcer, fungicide, antidiarrheal, dewormer.	The leaves are used as an infusion to treat diarrhea and kidney stones.
Malvaceae	*Malva sylvestris* L.	Leaves, flowers, roots.	Mallow has a calming and diuretic effect.	Infused leaves and flowers are used for chronic constipation, coughs and bronchitis.
Moraceae	*Ficus carica* L.	Fruits.	Laxative, anti-animal, bechic, pectoral, wart remedy.	Infused, the fruit is used to treat coughs, while the latex is used externally to treat warts.
Oleaceae	*Chrysojasminum fruticans* (L.) Banfi	Flowers.	Calming and sedative.	Jasmine is generally used as a herbal tea made from the flowers. Jasmine essential oil is used on facial skin for its antioxidant and anti-wrinkle properties, as well as its antibacterial action in cases of acne.
Oleaceae	*Olea europea* L.	Leaves, bark, fruit.	Leaves and bark: astringent, diuretic, febrifuge, tonic, hypotensive, hypoglycemic. Oil and fruit: cholagogue, laxative, emollient, sedative.	Olive oil is used as a laxative for chronic constipation.
Oleaceae	*Phillyrea media* L.	Barks.	Antiulcer, analgesic.	A decoction of the bark is used to treat fever.
Papaveraceae	*Papaver rhoeas* L.	The flowers	Antispasmodic, soothing, calming, emollient, pectoral, sedative, slightly hypnotic.	Infusion of the flowers is used as a sedative, and Cough suppressant.
Plantaginaceae	*Plantago albicans* L.	Leaves, roots and seeds.	Softening, astringent, emollient, diuretic and laxative.	Combine with coloquinte root to make poultices for wound care. Against diarrhea.

Poaceae	*Ampelodesma mauritanica* (Poir.) Dur. & Schinz	The leaves	The tender, succulent base of its flower stalks is often eaten in the countryside, and its sweet juice is refreshing.	This plant is used as an infusion to treat kidney stones and gallstones.
Poaceae	*Hordeum vulgare* L.	Seeds.	Diuretic, cough suppressant, anti-inflammatory and detoxifying.	Barley is used to treat stomach, tuberculosis, colon, diarrhea, jaundice and leanness. Boiled barley cures coughs.
Poaceae	*Macrochloa tenacissima* (L.) Kunth	Leaves.	Alpha is used to treat chronic scalp ulcers.	The infusion of crushed esparto leaves in boiling water is highly effective in treating kidney stones.
Poaceae	*Triticum durum* L.	Seeds.	Bechic, laxative, astringent, skin and boil treatment, pectoral.	Wheat is used in a variety of forms, such as cakes, semolina or soup, to treat gastric pain, anemia and fractures.
Punicaceae	*Punica granatum* L.	Bark, fruit, flowers.	Deworming, healing, hemostatic, anti-diarrheal, relieves painful periods.	A decoction of the husks or fruit powder is used against diarrhea and gastrointestinal diseases.
Renonculaceae	*Nigella sativa* L.	The seeds	Analgesic, antiseptic, antispasmodic, aperitive, carminative, digestive, diuretic, expectorant, febrifuge, galactagogue, vermifuge.	Black cumin is very effective against influenza, when the crushed seeds are inhaled.
Rhamnaceae	*Rhamnus alaternus* L.	Leaves, stems, twig bark.	Astringent, laxative, purgative, effective against jaundice, hepatic.	Alterne is used as an infusion to treat jaundice and abdominal pain.
Rhamnaceae	*Ziziphus lotus* L. (Desf.)	Leaves, fruit.	Anti-inflammatory, diuretic, sedative, emollient, tonic.	Dried leaf powder, moistened with water, is applied as a poultice against boils and abscesses. Jujubes, combined with rush fruit, corn style, couch grass and prickly pear flowers, are used to treat kidney stones.
Rosaceae	*Prunus dulcis* (Mill.) D.A.Webb	Fruits.	Aperitif, anti-dandruff	Fruit powder mixed with milk as a poultice to improve facial skin.
Rosaceae	*Prunus armeniaca* L.	Fruits, barks, seeds.	Antiasthenic, antianemic, aperitif, tonic, nutritive, astringent, laxative.	The ripe fruit is eaten to treat constipation, anemia and weakness.
Rosaceae	*Prunus domestica* L.	Leaves, fruit.	Softening, antianemic, depurative, digestive, laxative, emollient, diuretic, astringent.	Stewed prunes (dried fruit) are an excellent remedy for constipation, especially if eaten on an empty stomach in the morning.
Rosaceae	*Pyrus communis* L.	Fruits.	Antianemic, astringent, depurative, tonic, anti-inflammatory, nutritive.	The fruit is used to treat kidney ailments.

Rutaceae	*Ruta chalepensis* L.	Leaves, roots.	Antispasmodic, anti-inflammatory, diuretic, emmenagogue, sedative, sudorific, vermifuge.	A decoction of the root is used to treat stomach upsets, respiratory ailments and liver disease.
Salicaceae	*Populus alba* L.	Buds.	Disinfectant, treatment of kidney and bladder disorders.	Poplar wood is used for heating (rural areas).
Solanaceae	*Capsicum annuum* L.	Fruits.	Antiasthenic, aperitif, carminative, tonic, rubefacient.	Infusing the seeds in boiling water for 24 hours is used to strengthen hair and eliminate dandruff.
Thymelaceae	*Thymelaea hirsuta* Endl.	Leaves.	Purgative, vermifuge.	A decoction of the leaves is used to treat urinary tract problems and kidney stones. External use is limited to mixing crushed leaves with olive oil to treat burns and scabies.
Vitaceae	*Vitis vinifera* L.	Leaves, fruit.	The leaves are considered a remedy for menopause and uterine hemorrhage.	Gargle with leaf infusion for throat inflammation and stomatitis.
Zygophyliaceae	*Peganum harmala* L.	Seeds, leaves.	Rue is used as an antirheumatic agent.	The seeds are used in powder form to treat rheumatic pain, back pain and hemorrhoids.
Zygophyliaceae	*Zygophylum album* L.	Aerial part.	The plant is used as an analgesic and healing agent.	White water milfoil is a disinfectant used for infant body care.



Artemisia herba alba



Artemisia campestris

Cistus albidus

Ajuga iva

Phillyrea media

Teucrium polium

Quercus rotundifolia

Globularia alypum

Juniperus oxycedrus. var *badia*

Marrubium vulgare

Ziziphus lotus

Peganum harmala

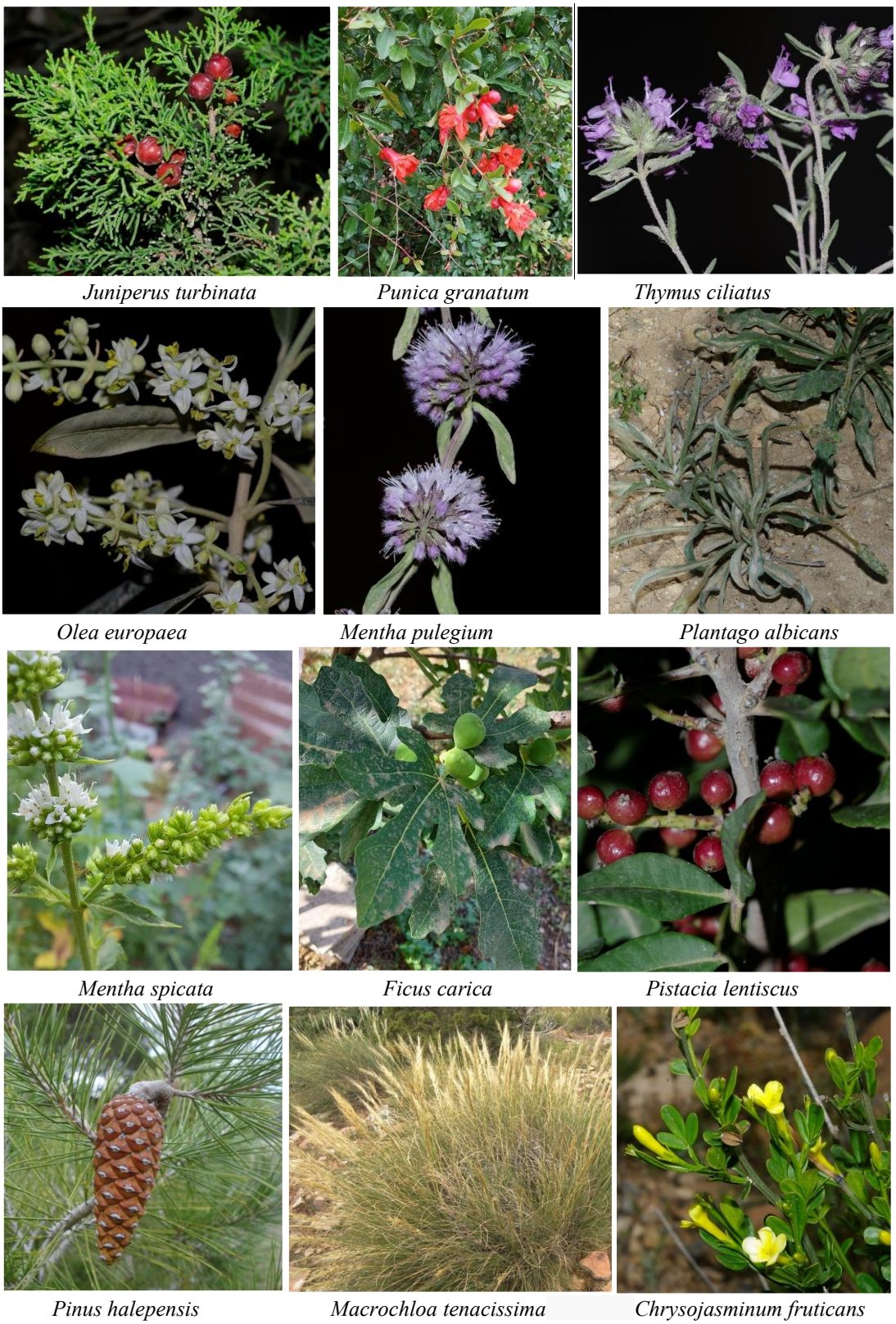


Figure 2. Illustration of some medicinal plants of the study area
(Photos K. Rebbas)