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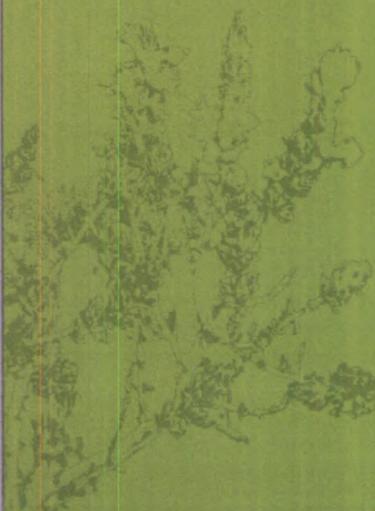
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A Guide to Medicinal Plants in North Africa



IUCN
The World Conservation Union

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A GUIDE TO MEDICINAL PLANTS IN NORTH AFRICA

INTRODUCTION

North Africa also has one of the oldest and richest traditions associated with the use of medicinal plants. These plants are important for the people of the region, especially in rural areas, as they may be the only source of medicine available in many places. Moreover, the increasing prices of modern medicines and the belief that natural products have few or no side effects has caused many people in urban areas to turn back to traditional plant remedies. In addition to remedies, medicinal and aromatic plants also find their way into cosmetics, perfumes and food, both in the local market and abroad.

Local communities in North Africa possess invaluable traditional knowledge of nature and its resources. Over the course of four years, this traditional knowledge was gathered into this regional compendium on medicinal plants. This synthesis is one of the outcomes of the last Phase of the IUCN North Africa Biodiversity Programme (NABP). This programme focused on endangered and economically useful medicinal and aromatic plants, with the aim to promote their conservation in North Africa as well as promoting indigenous knowledge and equitable participation of people in local management and conservation.

The culmination of this work is the publication of this Guide, which merges scientific information with knowledge on traditional use of medicinal and aromatic plant species in North Africa. This information is also available in a searchable database, posted on the NABP website (<http://iucn.org/places/medoffice/nabp/index.html>). The CD-ROM attached to this guide contains the NABP website, created in English, French and Arabic, as well as the database. It is hoped that these tools will help conserve and promote traditional knowledge of local communities, communicate it to future generations and increase awareness of endangered and threatened plants in the region.

Special thanks go to all the experts who made this work possible especially: Prof. Kamal Batanouny, Dr. Farag Abdul Rahman, Dr. Salima Benhouhou, Prof. Rachid Chemli, Dr. Zainab Ghrabi, Dr. Faiza Hammouda, Prof. S. I. Ismail, Dr. N. S. Abdel-Azim, Dr. K. A. Shams, Dr. Chedly Rais and Dr. Driss Lamnaouer. Prof Kamal Batanouny acted as chair of the committee of experts.



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A
B

A GUIDE TO MEDICINAL PLANTS IN NORTH AFRICA

Aaronsonia pubescens (Dasf.) K. Bremer & Humphries
Compositae (Asteraceae)



Compiled by Dr. Salima Benhouhou

Morphological description

A small annual plant, 10-20 cm. high, rarely reaching 40 cm., with numerous prostrate stems, that become erect. The thin dark green stems are only very slightly ramified.

The deeply dissected leaves, with each lobe ending in a white tip, are slightly fleshy and are between 10 and 20 mm. long.

The tubular yellow flowers are grouped in hemispherical discoid heads. The flower heads are about 5-8 mm. in diameter and are set at the ends of the stems. The fruits are achenes with a small membranous pappus to help dispersal.

The entire plant has a very agreeable scent.

Flowering takes place in spring in the northern Algerian Sahara, and any time after rain in the central Algerian Sahara.

Geographical distribution

Local: Common in the Algerian Sahara.

Regional: North Africa.

Global: This camomile is endemic to North Africa.

Ecology

Matricaria pubescens thrives in desert conditions with an average 100 mm. rainfall a year. It is always found in non-saline wadis and favours sand-loamy soils and is occasionally found on gravelly-sandy soils.

Status

According to the IUCN criteria this North-African

Aaronsonia pubescens (Dasf.) K. Bremer & Humphries

Matricaria pubescens (Desf.) Schultz.

Matricaria: from the Latin *matrice*, the uterus, corresponding to the herba *matricaria*, a plant that eases menstrual pain; *pubescens*: hairy

Arabic: ouazouaza

Targui: ainesnis

English: hairy camomile

French: amomille pubescente

endemic species falls into the "E" category.

A much appreciated herb, it is under strong pressure from over-collection. Immediate measures for its conservation should be taken (collection of seeds for nurseries). So far there is no data on its propagation and conservation.

Part used

The whole plant is collected fresh in spring, and sold in the market in several oases in the south (Béchar, Djinet, El Golea). It is prepared as an infusion or powder and used internally.

Constituents

No data has been found for the plant's active chemical constituents.

Pharmacological action and toxicity

It has antiseptic properties. It is not reported as toxic by nomads.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and oral knowledge

It is used for gastro-intestinal troubles and calculus, and is a much appreciated medicinal herb.

The crushed stems and leaves are used as a filter for goat's butter, giving a nice aroma to the butter and helping to conserve it. It is also added to the

traditional soup and gives the food a very nice smell.

In Morocco, in the Tafilalet and in Fès, a decoction

of *Matricaria pubescens* poured into the ear is recommended for otitis. A massage with the oleum helps for rheumatism, neuralgia and sciatica.

***Acacia nilotica* (L.) Del.**
Fabaceae (Leguminosae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
Small tree, 2.5-14 m tall with glabrous or tomentose branches, quite variable in many aspects; bark thin, rough, fissured, deep red brown; branchlets purple-brown, shortly or densely gray-pubescent, with lenticels; spines gray-pubescent, slightly recurved, up to 3 cm long; leaves often with 1-2 petiolar glands and other glands between all or only the uppermost pinnae; pinnae 2-11 (-17) pairs; leaflets 7-25 (-30) pairs, 1.5-7 mm long, 0.5-1.5 mm wide, glabrous or pubescent, apex obtuse; peduncles clustered at nodes of leafy and leafless branchlets; flowers bright yellow, in axillary heads 6-15 mm in diam.; involucel from near the base to about half-way up the peduncle, rarely higher; calyx 1-2 mm long, subglabrous to pubescent; corolla 2.5-3.5 mm long, glabrous or pubescent outside; pods especially variable, linear, indehiscent, 8-17 (-24) cm long, 1.3-2.2 cm broad, straight or curved, glabrous or gray-velvety, turgid, blackish, about 12-seeded; seeds deep blackish brown, smooth, subcircular, compressed, areole 6-7 mm long, 4.5-5 mm wide. Fl. Oct.-Dec.; fr. Mar.- June.

Geographical Distribution
Local: The Nile Delta, Nile Valley, Oases, Sinai and Western Desert.

***Acacia nilotica* (L.)**

Del., Descr. Egypte, Hist. Nat. 79 (1814)

Mimosa nilotica, *Acacia arabica* (Lam.) Willd,
Acacia adansonii Guill. & Perr., *Acacia adstringens* (Schumach.) Berhaut

Names

Arabic: Sant **سنط**

English: Prickly acacia, black thorn, Egyptian thorn, Nile acacia, gum arabic tree.

French: Acacia à gomme, Acacia d'Egypte.

Regional: Egypt.

Global: Egypt, Sudan and some Nile basin countries. South of Mozambique and Natal; apparently introduced to Zanzibar, Pemba and India; Arabia

Ecology

The plant grows on the banks of canals crossing the Delta and the Nile Valley. It was cultivated in the past, though cultivation has stopped. The relicts of this species are occasionally seen along the canals near the Nile River.

Status

Acacia groves growing in the Nile region in Egypt were replaced centuries ago by the date palm groves. Despite this, the tree was reputed for its value as a source for agricultural tools such as the hoe, plough, etc. With the mechanisation of agriculture, the plant was neglected. Additionally, the need of the land occupied by the trees, caused them to be removed. Nowadays, the tree is not as common as before. It could be considered as endangered, especially due to its geographical scarcity.

Part(s) Used

The fruit, the bark and the leaves.

Collection

In flowering and fruiting stages.

Preparations

Infusion, decoction and powder.

Oral.

Constituents

The fruit: contains a high percentage of phenolic constituents consisting of m-digallic acid, gallic acid, its methyl and ethyl esters, protocatechuic and ellagic acids, leucocyanidin, m-digallic dimer 3,4,5,7-tetrahydroxy flavan-3-ol, oligomer 3,4,7-trihydroxy flavan 3,4-diol and 3,4,5,7-tetrahydroxy flavan-3-ol and (-) epicatechol. Fruit also contains mucilage and saponins. **The bark:** is rich in phenolics consisting of condensed tannins and phlobetannin, gallic acid, protocatechuic acid pyrocatechol, (+) – catechin, (-) epigallocatechin-5,7-digallate.

The leaf: contains apigenin, 6-8-bis-D-glucoside, and rutin.

Pharmacological Action and Toxicity

Fruit and bark extracts showed molluscicidal activity against the two snail hosts of *Schistosoma*. Also, antihyperglycemic activity was observed. The plant extract showed stimulation of a rat's uterus at different stages of sex cycle, antimicrobial activity, blocking platelet aggregation in a dose-dependent manner using different agents mainly due to blockage of Ca²⁺ channels, and an inhibitory effect on carrageenan induced paw edema and yeast-induced pyrexia. It also produced a significant increase in the hot plate reaction time in mice. Analgesic and antipyretic activities may be attributed to the phenolic constituents present.

Phytopharmaceutical Products

Not available

Phytopharmaceutical Products

Not available

Traditional Medicine and Indigenous Knowledge

History: The pods were used by the ancient Egyptians. Young pods produce a very pale tint in leather, notably goat hides. The fruit was given to combat diarrhoea, haemorrhage, as a sedative in labour, and as a cure for sore gums and loose teeth. Egyptian Nubians believe that diabetics may eat unlimited carbohydrates as long as they also take a teaspoonful of powdered pods before breakfast. The leaves were chewed to stop nausea.

Traditional Medicinal Uses

- Anti-cancer and anti tumours
- Antiscorbutic
- Astringent
- Diuretic
- Intestinal pains and diarrhoea
- Nerve stimulant
- The plant is also known to be used for colds, congestion, coughs, dysentery, fever, gallbladders, hemorrhages, leucorrhea, ophthalmia, sclerosis, smallpox and tuberculosis.

Other uses of the plant: The plant has an economic importance due to its high content of polyphenolics. The plant is used for tanning and dying leather black, tooth brushes (chewsticks), trees tapped for arabic gum. Because of its resins, it repels insects and water.

Acacia seyal Del.
Leguminosae (Fabaceae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
Tree, 3-12 m tall, crown flat topped; white to greenish yellow or orange red; sparsely branched, the branches horizontal or ascending; young branchlets with sparse hairs or almost glabrous, with numerous reddish sessile glands; epidermid of twigs becoming reddish and shed annually; leaves often with a large gland on petiole and between the top 1-2 pairs of pinnae; stipules spinescent, up to 8 cm long, ant-galls present or absent; pinnae - usually 3-7 pairs; leaflets in 11-20 pairs, 3-8 cm long, 0.75-1 mm wide, sparingly ciliate or glabrous; lateral veins invisible beneath; flowers bright yellow, in axillary, pedunculate heads 10-13 mm across, borne on terminal or short lateral shoots of the current season; involucel in lower half of peduncle 2-4 mm long; apex of bracteoles rounded or elliptic, sometimes pointed, from near the base to about half-way up the peduncle, rarely higher; calyx 2-2.5 mm long, puberulous in upper part; corolla 3.5-4 mm long, glabrous outside; pods 7-20 cm long, 0.5-0.9 cm broad, dehiscent, falcate, constricted between seeds, glabrous except for sessile glands, 6-9-seeded; seeds elliptic, 7-9 mm long, 4.5-5 mm wide, compressed, minutely wrinkled, olive-brown to olive; areole 5-6 mm long, 2.5-3.5 mm wide.

Geographical Distribution
Local: Nile Valley, Oases, Sinai and Western Desert.
Regional: Eastern Africa and Egypt.
Global: Native to the Sahelian Zone from Senegal to Sudan, it also occurs in Egypt and eastern and

Acacia seyal Delile, Descr.

Egypte, Hist. Nat. 286, t. 52, f. 2 (1814).

Names

Arabic: سياال طلح , Tahl

English: Tahl gum, Thirsty thorn, Shittah tree

French: Mimosa epineux seyal

southern Africa, from Somalia to Mozambique and Namibia.

Ecology

The trees thrives in *Sclerocarya caffra* woodlands, wooded grasslands and especially on seasonally flooded black-cotton soils along water courses. It requires a heavy clay-alluvium, but grows well on stony ground at the base of hills. Grows at 20-2,100 m altitude. A gregarious savanna tree, ranging from Subtropical Desert to Dry through Tropical Desert to very Dry Forest Life Zones, shittim wood is reported to tolerate annual precipitation of 8.7-22.8 dm (mean of 7 cases = 15.0 dm), annual mean temperature of 18.7-27.8 °C (mean of 7 cases = 24°C) and pH of 5.0-8.0 (mean of 5 cases = 6.9).

Part(s) Used

The bark, wood and leaves.

Collection

In all stages

Preparations

Decoction and powder

Use

Oral.

Constituents

The plant contains gum of the arabic type which is made up mainly of arabin, calcium, magnesium and potassium salts of arabic acid, oxidase enzyme and tannin.

Pharmacological Action and

Toxicity

Alcoholic extract of the plant showed inhibition of

TNV which is dose dependent (antiviral activity).

Pharmacopocia

Not available

Phytopharmaceutical Products

Not available

Traditional Medicine and Indigenous Knowledge

History: According to some Biblical scholars, the Shittah tree is mentioned in the Bible only once, but its wood is referred to many times as shittum, which is the plural of shittah in Hebrew. Some even speculate that it was only natural that Moses should turn to shittum when he came to build the Ark of the Covenant and the Tabernacle and needed beams and timber. No one can really be sure which species

of Acacia was meant. Ancient Egyptians made coffins, some still intact, from the wood. Nigerians used sapling stems or roots for spear shafts.

Traditional Medicinal Uses

- Astringent for colds, diarrhoea, haemorrhage and ophththalmia
- Bronchitis and rheumatism
- Dysentery and leprosy
- Emollient
- Fumigant for rheumatic pains
- Intestinal ailments
- Stimulant

Other uses of the plant: The gum is edible, along with the leaves and the young pods. Stems and roots are used for spear shafts. The leaves are used for forage and the wood for fuel.

***Acacia tortilis* (Forsk.) Hayne**
Leguminosae (Mimosoideae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
Medium umbrella-shaped tree 4-15 m tall, often with several trunks, reduced to a small wiry shrub less than 1 m tall under extremely arid conditions. Two types of thorns: straight and white, or small, hooked and brownish. Leaves up to 2.5 cm long with 4-10 pairs of pinnae, each with ca 15 pairs of minute leaflets. Flowers white, aromatic, in small clusters. Pods flat, glabrose, coiled into a spring-like array. Flower initiation in May-June, fruit in July, but ripening from November through to February.

Geographical Distribution

Local: The Nile Delta, Nile Valley, Oases, Sinai and Western Desert.

Regional: Middle East and Egypt.

Global: Native to much of Africa and the Middle East.

Ecology

This species ranges from subtropical desert to dry through tropical desert to very dry forest life zones. The umbrella tree is reported to tolerate annual precipitation of 10-100 mm, an estimated annual temperature of 18-28 °C and pH of 6.5-8.5. This species tolerates hot, arid climates with temperatures as high as 50 °C. It is best adapted to the lowlands. It thrives where rainfall is up to 1,000 mm. It is also extremely drought resistant and can survive in climates with less than 100 mm annual rainfall with long, erratic dry seasons. The tree favours alkaline soils. It grows fairly well in shallow

Two subspecies occur in Egypt:

***Acacia tortilis* (Forssk.)**

Hayne, Getreue Darstell. Gew. 10, t. 31 (1827).
Syn. *Mimosa tortilis* Forssk., Fl. Aegypt.- Arab. 176 (1775).

***Acacia raddiana* (Savi)**

Brenan, Kew Bull. 12:87 (1957).
Syn. *Acacia raddiana* Savi, Alc. Acacie Egiz. 1 (1830).

Names

Arabic: سمايل طلح Samor Talh

English: Umbrella Thorn, Israeli Babool

soil, less than 0.25 m deep, though it develops long lateral roots. In shallow soil, the plants remain shrubby and must be widely spaced to allow for their lateral root growth.

Status

The fruit is collected upon complete ripening.
Storage: fruit is packed in large sacks of guts or cotton and ranked onto wooden tables in dry and dark places. The place should have a good ventilation system and must be away from insects and rodents.

Part(s) Used

The pods, bark and wood.

Collection

In all stages.

Preparations

Infusion, decoction and dust.

Use

Oral.

Constituents

It is reported that pods contain close to 19 % protein, 2.5 % fats, 46.5 % carbohydrates, 5.1 % minerals and 20.1 % crude fibre. Leaves contain flavonol glycosides, ellagitannin and galloyl

glucoses.

Pharmacological Action and Toxicity

The plant showed powerful molluscidal and algicidal activities.

Pharmacopoeia

Not available

Phytopharmaceutical Products

Not available

Traditional medicinal Uses

- Anthelmintic

- Antidiarrhoea
- Asthma diseases
- Pulmonary diseases
- Vermifuge and dusted onto skin ailments.

Other uses of the plant: the timber is used for fenceposts, firewood, furniture and wagonwheels. The prolific pods made good fodder for desert grazers and the foliage is also palatable. The gum, said to be edible, was used as a poor man's gum arabic. The tree has been recommended for reclaiming dunes. The thorny branches can be used to erect temporary cages and pens. The bark is a good source of tannin and used in tanning.

Achillea fragrantissima
Compositae (Asteraceae)



Fresh *Achillea fragrantissima* plant
Dry heads of *Achillea fragrantissima*



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description

It is a small perennial herb. Plants are white wooly, with erect stems up to 1 m high, old stems woody, much branched from the base; flowering branches are numerous, herbaceous, terete, rigid. Leaves are white to greyish-green, small, exstipulate, thick, sessile, ovate, oblong or oblong-lanceolate, the margins being slightly undulate, shallowly dentate and short mucronate, and the apex rounded. Flower heads are terminal discoid composed of numerous tubular florets, the ray florets are yellow and very short and the herb is hairy with a fragrant odour. Flowering period: from June to September.

Geographical Distribution

Local: The Isthmic Desert, Sinai, Red Sea Coastal Region.

Regional: North Africa, The Eastern Mediterranean Coastal Region.

Global: Native to Southern Europe and is now cultivated worldwide.

***Achillea fragrantissima* (Forssk.)**

Sch. Bip.; *Santolina fragrantissima* Forssk.

Names

Arabic : Qaysum, قيسوم

Bu'ethraan : بعثران

English: Lavender cotton, Grade robe.

French : Guarda roba, Aurone femelle, Santoline.

Ecology

The plant grows in natural habitats, in limestone wadis of the North Eastern Desert and Sinai.

Status

The plant is over exploited by collection for folk medicinal uses. It seems that the rate of exploitation exceeds that of regeneration. The plant may therefore be considered threatened.

Part(s) Used

The herb and flower heads.

Collection

The tops are collected when the plant is flowering.

Preparations

Infusion, oil.

Use

Oral, ointment.

Constituents

The herb contains essential oil (0.81%) and consists of 59 components of which α and β -thujone, α -pinene, β - pinene, limonene, 1,8-cineole, linalool, carvacrol, eugenol, artemisia ketone, palustrol, sabinene hydrate, α -terpineol and santolina alcohol are the major constituents. Its tannin content reaches 8% such as resorcin, phloroglucin, methyl phloroglucin, and pyrocatechol. Flavonoids were also reported, such as afroside, cirsimartin, chrysoplenol and cirsiliol. Also, fatty acids, lauric, myristic, palmitic, stearic, oleic, linoleic and linolenic as well as sesquiterpene lactones as achilloide A, in addition to taraxasterol and pseudotaraxasterol acetates have been identified.

Pharmacological Action and Toxicity:

The essential oil of *Achillea fragrantissima* inhibited the growth of all tested micro organisms. The aqueous extract exhibited strong cytotoxicity against cultured melanoma cell lines. The effects of the flavone, cirsiliol, have been studied in vitro in rats. It caused concentration-dependent relaxation of the phenylephrine-precontracted proximal aorta, the acetyl choline-precontracted trachea and the urinary bladder, and inhibited the phasic contractions and the tone of the uterus.

Pharmacopoeia:

Not available

Phytopharmaceutical Products:

Not available

Traditional Medicine and Indigenous Knowledge:

History: *Achillea* species have been used in folk

medicine and sold in herbal shops. An infusion of the dry or fresh flowering herb is used by the Bedouin for the treatment of coughs, aromatic bitter stomachic, and anthelmintic.

Traditional Medicinal Use:

- Anthelmintic
- Antispasmodic
- Astringents
- Carminatives
- Expectorant
- Skin irritations

Other uses of the plant: The plant is known to be used as an insect repellent and in cough mixtures. It has also been known to be used to cure stomach ache in children. *Achillea fragrantissima* is used in Egypt to treat gastrointestinal disturbances, eye infections and smallpox and also as an anthelmintic.

***Ajuga iva* (L.) Schreb.**
Labiatae (Lamiaceae)



Compiled by: Dr. Driss Lamnauer
Edited by: Prof. Kamal Batanouny

Morphological Description
Small (5-10 cm) woolly, aromatic perennial herb, woody based, leaves narrowly oblong to linear, pubescent, 14-35 mm long, flowers 2-4, 12-20 mm long, verticillate, purple, pink or yellow. Grows in rocky slopes up to 2700 m of altitude.
Flowering period: March-June.

Geographical Distribution

Local: Largely distributed in Morocco.
Regional: Morocco to Egypt.
Global: Mediterranean: South of Europe, North of Africa.

Status

Not IUCN Threatened species.

Part used

Whole plant

Constituents

The plant is said to contain tannins, few essential oil, polyhydroxylated-sterols, phytoecdysteroids. Three bioactive diglyceride compounds were isolated from *Ajuga iva* leaves. *Ajuga iva* contains large amounts of three major ecdysteroids (makisterone A, 20-hydroxyecdysone and cyasterone) together with several minor compounds including 24,28-dehydromakisterone A and two new phytoecdysteroids (22-oxocasterone and 24,25-dehydroprecasterone). In addition it

***Ajuga iva* (L.) Schreb.**

Ajuga humilis Porta & Rigo; *Ajuga pseudoiva* Robill & Castagne; *Teucrium iva* L.

Arabic: Chendgoura or Shandgoura

Berber: Touf et-toulba (best that doctors).

English: Bugle iva , Herb ivy, Musky bugle.

French: Ivette musquée, Bugle, Ajuga iva p seudoiva (DC.) Briq. : Bugle faux iva

contain 2-deoxy-20-hydroxyecdysone and polypodine B.

The occurrence of the antifeedant 14,15-dihydroajugapitin in the aerial parts of *Ajuga iva* from Algeria was also shown.

Pharmacological Action and Toxicity

Pharmacological studies have shown that *Ajuga iva* has anti-ulcerous, hypoglycemic and anti-inflammatory activities.

The anti-ulcerous activity of *Ajuga iva* was confirmed experimentally. The Hypoglycemic effect of the lyophilized aqueous extract of the plant was also shown in normal and streptozotocin diabetic rats. It was concluded that the water extract of the whole plant possess a strong hypoglycemic effect in diabetic rats, which support therefore, its traditional use in diabetes mellitus control in humans.

The sensibility of *Spodoptera littoralis* larvae to neoclerodane diterpenoids isolated from *Ajuga pseudoiva* leaves was also demonstrated.

A. iva was also reported to have antibacterial and antimarial activities.

Folk medicine and indigenous knowledge

It is one of the most used medicinal plants in Morocco. It is considered to be hot, and find many uses, which may vary with the region.

The plant is collected during spring and beginning of summer. It is sold in the market as dry herb, and may be used as fresh plant as well during its season.

In decoction or powder it used as depurative, worming, vermifuge, in diabetes.

The powder made into small balls with honey is ingested for its useful action against stomach and intestinal pains, enteritis, fever, sinusitis and headache.

Powder of dried plant or its infusion taken after meals against diabetes and hypertension.

Infusion of flowering branches is considered as antihelmintic, antidiarrheic, depurative, very effective vermicide, for feminine sterility, colds, and troubles of the digestive tract.

The plant, which contains tannins and thus is astringent, has been applied to all sorts of mouth ailments (ulcer of the mucosa, toothache...). Externally it is considered as vulnerary.

Herb ivy is considered to have all the properties of Artemisia and thyme.

Flowering branches in fumigation are said to be helpful in psychic ailments.

The plant is considered as a general preventive for all diseases and therefore added to home made bread.

Diseases:

Colds, Digestive disorders, Fever, Gastric pain, Hemorrhoids, Hypertension, Diabetes, Diarrhea, Rheumatism, Neuralgia (stress), Otis, Pain, Respiratory diseases (cough, asthma...), Sterility in women, Internal parasites.

***Alhagi graecorum* Boiss**
Fabaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
It is a deep rooted, rhizomatous, perennial shrub, with roots that can extend six to seven feet into the ground. The spiny, intricately-branched shrub reaches 1.5 to 4 feet in height. The plant, which is greyish green and hairless, has simple, entire leaves that are alternately arranged. The leaf shape is oval to lance-shaped. The small pea-like flowers are pinkish purple to maroon and are borne on short, spine-tipped branches that arise from the leaf axils. The reddish-brown to tan fruits are considered between the seeds, with a short narrow beak at the end.

Geographical Distribution

Local: Common in all the phytogeographical regions of the country.

Regional: Algeria, Egypt, Libya, Niger and Sudan.

Global: Native to North Africa, Middle East and South East Europe. It is also found in Russia, Iran, Iraq and Saudi Arabia.

Ecology

It occurs mainly in deep moist soil, but also in dry, rocky or saline soils. The plant is abundant along river banks, canals and irrigation ditches, and it sometimes spreads into cultivated fields.

Status

It is unpalatable and injurious to some animals.

***Alhagi graecorum* Boiss,**
Alhagi mannifera Jaub. & Spach, *Alhagi maurorum* sensu auct., *Alhagi tourmefortii* Helder. (Medic)

Names

Arabic: Aqool - شوك الجمال

English: Cornel thorn, Manna tree, Persian manna plant.

Part(s) Used

All plant parts including the roots

Preparations:

Decoction

Use

Oral, ointment

Constituents

The plant contains carbohydrates, flavonoides, sterols, resin, anthraquinones and saponines. All plant parts contain volatile oil except for the roots.

Pharmacological Action and

Toxicity

The plant grown in wet soil lacks the cardio tonic activity characteristic of the same plant grown in very dry sandy soil. Plant tincture increases the amplitude of beat and the cardiac output is augmented in spite of any slowing that may occur. Injection into a dog lowered the blood pressure.

Pharmacopoeia

Not available

Phytopharmaceutical Products

Not available

Traditional Medicinal Uses

- Analgesic
- Anti-tussine
- Anti haemorrhoides
- Anti-rheumatic
- Aphrodisiac
- Diuretic
- Laxative

Other uses of the plant: Not available



Allium roseum L. var. odoratissimum (Desf.) Coss.
Liliaceae

Compiled by: Dr. Zeineb Ghrabi

Morphological description

Rose garlic is a perennial with a small or medium ovoid bulb, white with greyish or yellowish integuments, with many little bulbils and a cylindrical floral scape. The leaves are fleshy, very narrow (5-15 mm. wide), linear, semi-cylindrical, deeply grooved and smooth at the edges.

The spathe is 2-5-fid, white, translucent, sometimes a purplish pink. The flowers have a smell of carnations, and are big, pink, sometimes white, and umbellate. The stamens are all alike, with a simple filament, enclosed and with little yellow anthers. The seeds are black, obovate and three-edged. The plant usually starts its vegetative cycle with the first autumn rains and reaches full flowering at the end of the winter. Pollination of the flowers is allogamous.

Allium roseum L. is a highly polymorphous species in that in North Africa it presents twelve different taxa: four varieties, four subvarieties, and four forms. In Tunisia, only three varieties are mentioned:

1. the var. *grandiflorum* Briq., which includes two subvar.: the subvar. *typicum* Regel., characterised by inflorescences that do not have bulbils, with well-developed flowers, and the subvar. *bulbiferum* Kerl.-Gawl., where the flowers are replaced by sessile bulbils
2. the var. *perrotii* Maire, with a single subvar.: *bulbillosum* Maire, where the umbel bears both flowers and bulbils
3. the var. *odoratissimum* (Desf.) Coss., whose flo-

Allium roseum L.

Sp. 296 (1753) var. *odoratissimum* (Desf.) Coss.,
B. Soc. France, 22, p. 50 (1875)

Arabic: Lazoul, gazoul, korrath

English: Rose garlic

French: Ail rosé

wers smell like carnations.

The var. *odoratissimum* is diploid, $2n=16$ and is unlike the other taxa because of its narrow, fleshy, semi-cylindrical leaves and its very highly scented white or pinkish flowers.

Geographical description

Local: Common in the J'fara plain, Gafsa, Tozeur, Gabès, on the Matmata *jbel*, at El Ouara...

Regional: Pre-saharan Tunisia, on sandy steppes.

Global: North African endemic, from Cyrenaica to Morocco.

Ecology

Allium roseum var. *odoratissimum* develops on relatively light soils, and is widespread in the arid and desert parts of Tunisia. It is a wild geophyte that behaves like the annuals.

Conservation, culture and status

In rainy years, *Allium roseum* var. *odoratissimum* is sold in the spring at roadsides. Today it is marketed very cheaply in the fruit and vegetable markets of southern Tunisia. This not yet cultivated taxon must be protected since the way it is gathered is very destructive. When it is picked, even the bulbs are torn up.

Given the growing economic interest of *Allium roseum* var. *odoratissimum*, and the risk of genetic erosion hanging over it, protecting and domesticating this species have today become an urgent necessity. The Mednine Institut des Régions Arides has recently developed a research programme to protect, conserve, improve (collection, morphological features, genetics, agronomy, chemistry, etc.) and domesti-

cate (farming, packaging production, etc. this taxon).

■ Part used

The fresh leaves and inflorescences.

■ Traditional medicine

The plant is famous for its many therapeutic values; it is basically used to cure colds. It is also edible, used by local people as a condiment, sometimes replacing the onion.

The fresh leaves are pounded with a little salt and then olive oil is added to make a *loussa* that can be eaten immediately or kept (for about a



month). The crushed leaves are also mixed with wheat or barley flour to make a kind of omelette or pancake.

Ammi majus L.
Apiaceae (Umbelliferae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description:
Glabrous annual plant with much branched stem, erect, ridged, 30-100 cm in height. Leaves are greenish-glaucous, triangular ovate or ovate-oblong with long petioles, basal leaves grow in rosette, umbels 8-50 rays with small white flowers with indented petals, involucre with numerous pinnatifid bracts very elongated towards the tip. Fruit is 105 mm, small, oblong, prominently ribbed, ovoid achenes of 1.5-2 mm, laterally compressed, forming 2 small sized mericarps surrounded by a disk shaped stylopod and 2 divergent curved styles, persisting carpophore on inflorescence after fruit fall.

Geographical Distribution:

Local: Fields of winter crops in the Nile Delta and Valley, also in the Oases and the Mediterranean region.

Regional: North Africa; all over the countries of the region.

Global: Middle East, Europe and North Africa.

Ecology

The plant grows as a weed in the fields of winter crop cereals like wheat and barley. It is considered a bad weed in these fields and affects the crop's yield.

Status

The plant is fairly common in the Delta Valley fields. The plant is an annual winter weed growing mainly

Ammi majus L.

Ammi majus L. Sp. Pl. ed. 1,246 (1753).
Apium ammi Crantz, Strip. Austr 3: 109 (1767).

Names

Arabic: Khillah خلة .

Khillah shaytani خلة شيطاني

Berber: Athrilal, Thalilen, Lattilel, Akhella

English: Bishop's weed

French: Ammi commun

in wheat and barley fields. It is considered a menace to cultivated fields due to its invasive action. However, due to its importance in the pharmaceutical industry, it has been cultivated. The companies using the drug import Ammi fruits from Morocco.

Artificial drug

The small ovoid fruit and leaves.

Collection:

The tiny fruits containing the seeds are picked in late summer before they have fully ripened.

Preparations

Infusion, decoction and powder

Use:

Oral, external and creams.

Constituents:

Coumarins and coumarin glycosides. The fruit yields not less than 0.5% of ammoidin (xanthotoxin), 0.3% ammidin (imperatorin), and 0.01% of majudin (bergapten). Furanocoumarins have also been produced by cell suspension cultures of *Ammi majus*.

Pharmacological activities and Toxicity

The drug should be used cautiously, since photo-toxic dermatitis (cellular damage) following its use for vitiligo has been reported.

■ Pharmacopoeia

Egyptian Pharmacopeia 1984.

British Pharmacopeias 1968, 1973.

■ Phytopharmaceutical Products

Meladinine (Memphis)

Neo-Meladinine (Memphis)

■ Traditional Medicine and Indigenous Knowledge

History: As early as 2000 B.C. in Egypt, the juice of *Ammi majus*, which grows throughout the Nile River valley as a weed, is reported to have been rubbed on patches of vitiligo and patients encouraged to lie in the sun afterwards. Even today, Egyptian herbalists sell a yellowish brown powder made from *Ammi majus* seeds for the treatment of leukoderma. In 1946, a technician from a medicinal research laboratory developed a kidney problem and treated himself with a Middle Eastern herbal remedy, Khella. The technician also had angina, which improved dramat-

ically while he was taking the herb.

It was an Egyptian, Professor Abdel Monem El Mofty, of the Cairo University Medical School Department of Dermatology, who studied Egyptian folk medicine plants and began the development of modern photochemotherapy (PUVA) for vitiligo and psoriasis. In the 1940s, he used crystalline methoxsalen (8-MoP, xanthotoxin) followed by sunlight exposure to treat vitiligo.

■ Traditional Medicinal Uses

- Anti asthmatic.
- Anti-hypoglycemic
- Antispasmodic
- Carminative
- Digestive problems
- Diuretic
- Skin diseases (vitiligo and psoriasis)

Other uses of the plant: The plant is used as a preservative and against Snakebites.

Ammi visnaga L.
Apiaceae (Umbelliferae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
Annual, erect, glabrous herb with branched stem, ovate leaves, basal unipinnatisect, upper ones sessile to subsessile, umbels mainly terminal, rays, dense (ca 80 per umbel), with very numerous long stiff rays and white flowers, the rays spread in flower and become contracted in fruit, bracts of the involucre, long, filiform and tripartite. Fruits are ovoid-oblong brownish with violet tinge, laterally compressed with thick ribs, glabrous.

Geographical Distribution

Local: Growing mainly in the Nile region, rare in the Eastern Mediterranean region.

Regional: North Africa

Global: North America, Argentina, Chile, Mexico, Europe, Temperate, Southwestern Asia, Atlantic Islands, Ethiopia.

Ecology

Ammi visnaga L. is native to North Africa. It is a member of the mesophytic community of cultivated fields, where the plant grows among the crops on canal banks and in neglected areas close to fields. It grows wild in the Middle East and around the Mediterranean. It grows mainly in the northern part of the Delta with limited cultivation. It is naturalized in Australia and South America. The tiny fruits containing the seeds are picked before they have fully ripened.

Ammi visnaga (L.)

Lam. Fl. Fr. 3:462 (1778)

Daucus visnaga L. Sp. Pl. ed. 1,243 (1753).

Names

Arabic: خلأ - خلآل - Khillah- Khelal

Killah Baladi

جزر شيطاني

Kammoun Habashi

Berber: Tabellaout

English: Pick-tooth, Tooth pick, Bishop's weed

French: Herbe aux cure-dents

Status

The plant is easily cultivated as a winter crop in Egypt. However, cultivation is necessary to obtain enough yield for the pharmaceutical industry. Numerous studies have been undertaken as regards the effect of manure and fertilizers on the yield of the plant. The plant is safe and is not subject to threatening impacts.

Part(s) Used

The fruit.

Toothpicks

At fruiting, the rays become frutescent, curved and are used as toothpicks.

Collection

The tiny fruits containing the seeds are picked in late summer before they have fully ripened.

Preparation

Infusion, decoction

Uses

Oral

Constituents

Fruranochromones (-py-ones): 2-4% comprising khellin (0.3-1.2%), visnagin (0.05-0.3), khellol and its glucoside, khellenin, khellinol, ammiol and its glucoside, visammiol, khellinone, visnaginone.

Pyranocoumarines (visnagans): 0.2-0.5% comprising visnadin, samidin and dihydrosamidin.
Furanocomarines: traces of xanthotoxin and ammodin
Flavonoids: 0.02-0.03% comprising quercetin and isorhamnetin and their 3-sulphates as well as kaempferol.
Volatile: camphor, carvone, (-terpineol, terpinen-4-ol, linalool, cis and trans linalool oxides).
Fixed oil: 12-18%
Protein: 14%.

Pharmacological Action: and Toxicity

The drug is spasmolytic (smooth muscles), especially on the musculature of the bronchi, gasterointestinal tract, biliary tract, urinogenital system, the coronary vessels (coronary dilator), and also as a diuretic (volumetric and urinary antispasmodic). Khellin, which is now commercially available in tablets and injection, is a potent selective coronary vasodilator and bronchodilator. It is used in the treatment of coronary insufficiency, angina pectoris, bronchial asthma, vitiligo and psoriasis, and for the removal of small bladder and kidney stones.

Pharmacopoeia:
Egyptian Pharmacopoeia (1972).

Traditional Medicine and Indigenous Knowledge

History: The Arabs discovered centuries ago that the small, greyish, egg-shaped, visnaga could ease a multitude of ailments, including the stabbing pain caused by a reduction in the flow of blood to the heart. Khellin, the substance in the fruits that accomplishes this feat, is described by scientists today as a selective coronary vasodilator. However, khellin is not without side effects. Researchers have found that it has a cumulative toxicity. Its active principles build-up in the body when the drug is

taken over a period of time, and can cause nausea and vomiting. For this reason, the drug is no longer used in the United States. However, it is still employed by doctors in the regions around the Mediterranean Sea where it is originated and where it grows profusely.

It has been used for the treatment of psoriasis. The ancient Egyptians rubbed red, scaly skin patches, presumably psoriasis, with the Ammi visnaga plant, and then the patients sat in the sun. Ammi visnaga fruits have long been used in Egypt, as a diuretic for renal colic and ureteric stones, angina pectoris, the coronary vessels, cardiovascular disorders and asthma.

A new therapeutic product has been produced as a result of an Egyptian discovery (Professors of the Pharmaceutical Science Department, National Research Center, Egypt) for the treatment of vitiligo and psoriasis.

Traditional Medicinal Uses

- Kidney stones
- Asthma
- Bronchitis
- Lithontripic
- Diuretic
- Whooping cough
- Circulatory problems
- Vasodilator

Other uses of the plant: The fruiting pedicel is used as a toothpick while the seeds have been used as a tooth cleaner. Also, the raw leaves are chewed for their aromatic flavour.

Pharmaceutical Products in the Markets

- Psorvitil (Khellin), (Memphis).
Kellagon (Mepaco).
Glucolynamine (Memphis).
Khellalgin (Misr)

***Ammodaucus leucotrichus* Coss. & Dur.**
Umbelliferae (Apiaceae)



Compiled by Dr. Salima Benhouhou

Morphological description

A small annual plant, 10-12 cm. high, glabrous with erect, finely striated stems. The leaves are finely dissected and slightly fleshy. The flowers are grouped in umbels of 2 to 4 branches. The flowers are small, with 5 free petals. The fruit is a diachene, 6-10 mm. long, and is covered with dense silky white hairs. The plant has a strong smell of anise. It usually flowers in early spring (February to April).

Geographical distribution

Local: Common in the Algerian Sahara.

Regional: North Africa.

Global: Commonly distributed throughout the Sahara, where it is considered endemic. Its presence is also mentioned for the Canary Islands.

Ecology

It is an annual that grows in wadis, on sandy-gravelly soils in arid conditions where the annual rainfall does not exceed 100 mm.

Status

According to the IUCN criter a this endemic species falls into the "EN" category.

The threat to this little annual from human collection is mainly felt around settlements. In the wild, the best means of conservation is the remoteness of the sites, or a seed bank that contains the plant during drought.

The best way to conserve this annual is to collect

***Ammodaucus leucotrichus* Coss. & Dur.**

Torilis leucotrichus Coss. & Dur.

Ammodaucus: from the Greek ammos, sand, and daucus, ancient Greek for carrot; *leucotrichus*: white haired

Arabic: kammûn es-sofi, el massoufa

Targui: akâman

French: cumin velu, cumin du Sahara

the seeds and sow them in nurseries. So far there is no data on its propagation and conservation.

Part used

The leaves and seeds. The fruits are collected by the nomads for their own use, usually in spring when the fruits are ripe. It is also sold to herbalists in local markets, particularly in the southern Algerian Sahara: Béchar, Djanet, El Golea.

In Morocco and Algeria, the fruits are used either as a powder, an infusion or a decoction.

Constituents

Except for a guaianolid, the amolactone, no information is available on the constituents. They are probably close to those found in the common cumin (*Cuminum cyminum*) such as cuminic, hydrocuminique aldehyde and cuminic alcohol.

Pharmacological action and toxicity

The antibiotic activity of the hairy cumin has been tested on gastric-intestinal pathogen germs to check the traditional use. Results were not good enough to justify its renown. It is likely that the plant's activity is spasmolytic, like the common cumin and other fruits of the Apiaceae.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

The seeds are used to treat diseases related to the

digestive apparatus and to ease stomach and liver pain. The leaves are also used for chest complaints. In the Tassili, particularly the Djanet region, it is mainly used as a powder or an infusion to treat the symptoms mentioned above. It is also used in the area to recover the appetite or avoid indigestion, by crushing the seeds and mixing them with milk or millet.

The leaves are used to aromatise tea. Powdered, it is

a much appreciated spice for food in the Djanet area. In Morocco, the fruits are used either as a powder or in a decoction to treat gastric-intestinal pain, gastralgias and indigestion. It is also frequently used, as an infusion, for diverse infantile diseases of the digestive apparatus: dysentery, nausea, regurgitation, vomiting. It also has tonic properties for babies and is taken as an infusion or in the bath.

Anacyclus clavatus (Desf.) Pers.
Asters



Compiled by: Dr. Zeineb Ghrabi

Morphological description

An annual, polymorphous, green or whitish plant, 20-50 cm. high, with erect or decumbent stems and fairly divaricated branches. The leaves are simple and bipinnate; the flowers are heterogamous, gathered in rayed terminal capitula 2.5-3 cm. in diameter. The flowers in the ray are female and those in the disk hermaphrodite. The bracts of the involucre are not dilated at the tip but oval, with blunt tips. The ligules are white, reflexed after flowering, and sometimes absent. The fruits are small, tightly packed cuneiform achenes. The peripheral achenes have a wide wing tipped by a rounded lobe, and the central achenes have no wings and are merely marginated. Flowering and fruiting take place from March to July.

Geographical distribution

Local: Very widespread in Tunisia: Kroumirie,

Anacyclus clavatus (Desf.) Pers.

Anacyclus tomentosus DC; *Anacyclus pubescens* Rchb.; *Anthemis clavata* Desf.; *Anthemis tomentosa* Couan; *Chamaemelum tomentosum* All.

Arabic: krâa djaja, iqhouana

French: anacyclus, anacycle en masse

English: anacyclus

Medjerda valley, the north-east, Cap Bon, the Tunisian central ridge and central Tunisia.

Regional: Morocco, Algeria and Tunisia.

Global: The Mediterranean.

Ecology

Anacyclus clavatus has a wide ecological range but is absent from the rainiest regions; it grows in fields, waysides and fallow ground, mainly on deep or superficial silty soil and chernozem, but also on other types of soil.

Status, conservation and culture

Anacyclus clavatus is not grown in Tunisia but is picked wild. It is a species seen as a self-propagating plant that is injurious to annual and perennial crops.

Part used

The aerial part.

Traditional medicine

Gastric ulcer: every day for two weeks take by mouth 100 gr. of young *Anacyclus clavatus* stems.



Anacyclus pyrethrum L.
Compositae (Asteraceae)

Compiled by: Dr. Driss Lamnauer
Edited by: Prof. Kamal Batanouny

Morphological Description
It is a perennial, procumbent herb, resembling chamomile. Stems lie on the ground for part of their length, before rising erect. Each bears one large terminal flower, the disk being yellow and the rays white, tinged with purple beneath. The leaves are smooth, alternate, and pinnate, pale green, with deeply cut segments. Fruit obovate achene. The root is almost cylindrical, very slightly twisted and tapering and often crowned with a tuft of grey hairs. Externally it is brown and wrinkled, with bright black spots. The fracture is short; bark with 1-2 circles of resin ducts, closely adhering to yellowish radiate porous wood in which occur 1-3 rows of resin ducts; odor distinct; taste sweetish, pungent, very acrid, tingling, sialagogue effect.
Flowering period: April-June

Geographical Distribution
Local: Largely distributed in the country, found in the forests, rangeland from 400 to 3100 m.
Regional: Morocco and Algeria
Global: A native of North Africa, it has been grown on an experimental scale in Himalayan regions from seeds imported from Algeria.

Ecology
Spontaneous in Morocco and Algeria, reported to be cultivated in Mediterranean countries, Himalayas and India.

Cultivation
Planting may be done in autumn, but the best time is about the end of April.
Any ordinary good soil is suitable, but better results

Anacyclus pyrethrum L.

Anacyclus pyrethrum D.C.; *Anthemis pyrethrum*; *Anacyclus officinarum* Hayne; *Anacyclus pyrethrum* (L.) Link; *Anacyclus pyrethrum* Link; *Anacyclus depressus* Maire; *Anacyclus freynii* Porta & Rigo; *Pyrethrum radix*; *Pyrethrum officinale*; *Matricaria Pyrethrum*.

Arabic: 'Aud el-'attas, 'Akkar Karha, Aqarqarha
عود العطاس - عافر قرح

Berber: Igendass, Gendass, Ignens, Tigendaste.

English: Pyrethrum, Pellitory (Root), Spanish Pellitory, Pellitory of Spain, Bertram, Roman Pellitory.

French: Pyrethre, Pyréthre d'Afrique, Piréthre salivaire, Œil de bouc, Pariétaire d'Espagne.

are obtained when it is well-drained, and of a stiff loamy character, enriched with good manure.

Propagation is done in three ways: by seed, by division of roots and by cuttings.

Status

Not IUCN threatened species

Part Used

Root: The root of the wild plant is collected during the period from May to June depending on the stage of growth of the plant.

Constituents

The chemical analysis of the roots shows that they contain three fatty acids, one sterol and ten unsaturated amides, more specifically: pellitorine, anacycline, phenylethylamide, enetriyne alcohol, N-(2'-p-hydroxy phenylethyl)-deca-, dodeca- and tetradeca trans-2, trans-4-dienamides, inulin, polyacetylenic amides I-IV, and sesamin. The plant contains also tannins, gum and essential volatile oil. Pyrethrine, an alkaloid, yielding pyrethic acid, is stated to be one of the active principles.

Pharmacological Action and Toxicity

Polyunsaturated alkamides isolated from *Anacyclus pyrethrum*, and other species, were shown to possess inhibitory activity in vitro cyclooxygenase (sheep seminal microsomes) and 5-lipoxygenase (porcine's leukocytes) assays.

Organic extracts of the roots were shown to have

some antibacterial activities but did not have anti-fungal properties and they are active against yeast. The drug is not completely inoffensive. Mild to severe toxicological effects were reported such as inflammation of gastro-intestinal mucous membrane and skin. In fact, the root was reported as a powerful irritant to the skin.

The emanations of the plant were reported to cause headache, gastric pain, nausea, and in some cases loss of consciousness.

Dermatitis can also occur on the hands of persons who handle the plant material. The root of the plant contains sesamin, which is one of the compounds involved in sesame oil contact dermatitis.

Traditional Medicine and Indigenous Knowledge

The powder of the root is well known as sternutatory, diaphoretic, and used for many ailments. Showing the root is considered to be sialagogue (increase saliva flow), and to relieve toothache. In liver diseases: one teaspoon of powder every morning is recommended. Mixed with olive oil it is used in rheumatism, sciatic, colds, neuralgia, and paralysis. The powder trapped in a piece of cotton is scratched against gum in toothache. Roots are also used as insecticide and anti-mycosis. In mixture with cade oil, the powder is used against moth or ringworm.

The oleat prepared by mixing the powder of the root with olive oil is used to treat phthiriasis and vermin of the head and pubis.

Infusion of the roots is used for asthma. The powder of the root mixed with milk or honey is considered as aphrodisiac, and renders fertility to women.

History

The pellitory was mentioned under the name Tagendest, and Akkarkarha, by IBN ALY TAR (LECLEC, 1877-1883, n° 400, 959, 1507, 1570), La 'Aumdat At-talib (n° 286, 1601), AL WAZIR AL GHASSANI (n° 217) and Tuhfat al-abhab (n° 301). ABDEREZAQ In Ayurvedic medicine, the root is considered tonic, and is used to treat paralysis and epilepsy.

Modern treatment

Several preparations and formulations are available using the root powder or its extracts alone or in combination with other herbs or drugs.

In European herbal medicine, it is regarded as

having a restorative action on the kidneys, supporting and strengthening their function. It has been prescribed for nephritis, pyelitis, cystitis, and edema.

Its ability to promote salivation has made it of use for dry mouth and throat, and an excellent remedy for toothache.

It is also occasionally taken as a laxative. It combines well with parsley or wild carrot seed or root. It counteracts mucus and is useful for chronic coughs. The leaves may be applied as poultices.

Other indications

The roots have a slight aromatic smell and a persistent, pungent taste, exciting a remarkable flow of saliva. When chewed or taken as a decoction, they stimulate the salivary glands, promoting a flow of viscid humors and relieving toothache, headache, lethargy and palsy of the tongue.

A gargle of Pellitory infusion is prescribed for relaxed uvula and for partial paralysis of the tongue and lips. To make a gargle, two or three teaspoonsfuls of Pellitory should be mixed with a pint of cold water and sweetened with honey if desired. The decoction may also be used as a gargle to soothe sore throats.

Patients seeking relief from some rheumatic or neuralgic infections of the head and face, or for palsy of the tongue, have been advised to chew the root daily for several months.

Being a rubefacient and local irritant, when sliced and applied to the skin, it induces heat, tingling and redness.

The powdered root forms a good snuff to cure chronic catarrh of the head and nostrils and to clear the brain, by exciting a free flow of nasal mucous and tears.

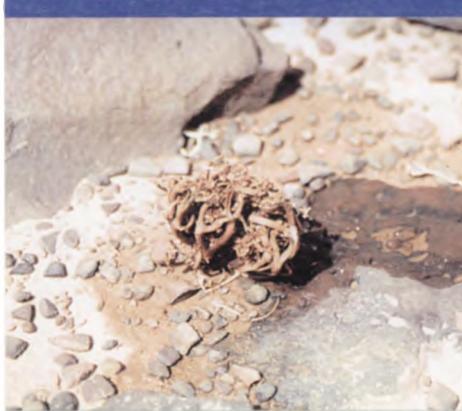
The powdered herb or root snuffed up the nostrils produces sneezing and eases headache.

Made into an ointment with hog's grease, it helps both the gout and sciatica.

Diseases

Speech disorders, respiratory edema, laryngitis, sickle cell anemia, epilepsy, depression, hearing disorders, phobias, anxiety, allergic asthma, salivation, low esteem, headache, rheumatism, neuralgia, toothache, paralysis of tongue or throat, relaxed uvula, chronic catarrh.

Anastatica hierochuntica L.



Compiled by Dr. Salima Benhouhou

Morphological description

A small annual, between 5 and 10 cm., with a rosette of branches and leaves. The plant, inconspicuous when green and flowering, is more commonly observed in the dry season after it has taken its characteristic woody globose form. The plant curls inward after maturity to form a tight woody ball during drought. The size is variable from 8 to 12 cm. across with some individuals reaching 25 to 30 cm. after a good rainy spell.

The leaves are lanceolate to obovate, covered with dense hairs, roughly toothed, 3 cm. long and 2 cm. wide, falling rapidly.

The tiny flowers are white, sessile, with four petals. The fruit is a hairy, ovoid silicula with two wings.

The fruiting plants are hygroscopic, expanding their branches easily when immersed in water.

The flowering takes place in early spring for the northern Algerian Sahara; it can flower at any time after rain in the central Algerian Sahara.

Geographical distribution

Local: Common in the Algerian Sahara.

Regional: North Africa.

Global: It is common throughout the Sahara and across Iran and Pakistan.

Ecology

A small annual plant that thrives in desert conditions with an average 100 mm. rainfall a year.

Anastatica hierochuntica shows a wide ecological

Anastatica hierochuntica L.

Anastatica: From the Greek anastasis (resurrection), referring to the plant's ability to revive on application of water

Arabic: keff Meriem, schajrat Meriem, schajrat el talk, keff lala Fatma, yedd Fatma, keff el adhra, bint Ennabi, el kemcha, kerchoud

Berber tamkelt

Targui: akaraba

English: St. Mary's flower, resurrection plant, rose of Jericho

French: main de Fatma, rose de Jéricho

soil range: found in sandy-loamy depressions, in non-saline wadi beds, on gravelly-sandy soils, it has also been observed in stony plateaux (regs).

Status

According to the IUCN criteria, this saharo-sindian species falls into the "C" category.

Although no problems are reported for the species, human collection near settlements may be a threat in the long term.

As an annual the best conservation method is collecting the seeds and sowing them in nurseries.

Part used

The whole plant dried, leaves and seeds. It is picked in the spring and prepared as an infusion, or macerated in water. It is taken internally.

Constituents

The whole plant contains flavonoids: luteolin-7-glucoside, isovitexin, kaempferol 7-glucoside, kaempferol 3-rhamnoglucoside, quercetin and lucitin. It also contains glucosinolates: glucoiberin and glucocheirolin. Sterols. The fruits contain glucose, galactose, fructose, sucrose, raffinose and stachyose.

Pharmacological action and toxicity

Anti-diabetic activity.

The plant is not reported as toxic by nomads and the Tuareg.

■ **Pharmacopeias**

Not relevant for this species.

■ **Pharmaceutical products**

Not relevant for this species.

■ **Traditional medicine and local knowledge**

It is used for colds; reduces the pain of and facilitates childbirth; acts as a pain-killer, an emmenagogue, and for epilepsy.

In Morocco, *Anasatica hierochuntica* is used to ease pain during childbirth. After maceration, the liquid is given to the woman just before giving

birth. The plant is considered as bringing good luck.

In the Dra, the plant is used for colds and is taken either as an infusion or as a powder mixed with honey and olive oil.

In Tissint, drops from the sap of the fresh leaves are given to cure various ophthalmic problems like conjunctivitis. An infusion of the plant is said to combat sterility.

In the past, the plant was used for epilepsy.

In Egypt, the dried plant crushed with sugar is taken as a violent purge for jaundice, followed by a milk diet. Use as a pain killer in childbirth is reported in Egypt.

Anvillea garcinii ssp. radiata Coss. et Dur.
Compositae (Asteraceae)



Compiled by Dr. Salima Benhouhou

Morphological description

A small woody shrub, densely branched, 20-50 cm. high. The leaves are green-grey, small, roughly triangular, with a large petiole and strongly toothed limb. The big solitary capitules have a diameter of 3-5 cm., with long ligules. The flowers are all yellow-orange, the outside ones 25 mm. long. The fruit is a non-fleshy; indehiscent prismatic cypsella ('achene' from two carpels).

It usually flowers in spring, but can flower throughout the year.

Geographical distribution

Local: Northern and central Algerian Sahara (mainly the Tassili mountains).

Regional: North Africa.

Global: Endemic of the Sahara.

Ecology

This long-lived perennial accepts a wide variety of soil conditions and grows on gravelly soils of wadis, on the surrounding regs (rocky plateaux strewn with small pebbles) and in dayas (small sandy-clayey depressions). In the Tassili N'Ajjer it is also frequently found on the sandy-clayey soils of small depressions. It thrives in severe climatic conditions with less than 100 mm. rainfall a year.

Status

According to the IUCN criteria this endemic species falls into the "EN" category.

No major threat is reported for this plant. According

Anvillea garcinii sp. radiata Coss. et Dur.
Anvillea faurei Gand.
radiata: spreading rays

Arabic: nougd, chadjeret ed dhob

Targui: akadkad

French: anvillea rayonnante

to the World Conservation Monitoring Centre, several national parks in Morocco and Egypt are contributing to the conservation of *Anvillea radiata*.

Part used

The capitules, leaves and seeds. The capitules and leaves are collected in early spring; the seeds when ripe, at a later stage.

It is prepared as an infusion taken internally (a teaspoon of dried powder in a glass of water) to treat diabetes, or, in the Djanet area, the young shoots are infused in hot or cold water to treat the same disease. The dried plant, crushed and mixed with either olive oil, honey or crushed dates (to mask the bitterness) is good for colds.

Constituents

Tannin, oxalate of calcium, saponine, pectine, lactone sesquiterpenic.

Chemical analysis of the aerial parts of *Anvillea radiata* yielded a new germacranolide, 8alpha, 9alpha-epoxyparthenolide, together with two known compounds, 9alpha-hydroxyparthenolide and parthenolid-9-one.

Pharmacological action and toxicity

No data available in the literature regarding the pharmacological action and toxicity of this plant. It is not considered toxic by nomads in the Algeria Sahara

Pharmacopeia

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

■ Traditional medicine and local knowledge

Taken for colds, diabetes, digestive problems, gastro-intestinal troubles, indigestion, pulmonary affections.

Considered as good pasture, particularly when in flower, it enhances zootechnic performance, favours growth and is regarded by shepherds as tonic and stimulating.

In Morocco, it is taken as an infusion to calm diarrhoea and gastro-intestinal troubles. It is used to

treat liver diseases and is taken as a decoction with *Zygophyllum gaetulum*, *Brocchia cinerea* and *Warionia saharea*.

The crushed seeds mixed with honey or olive oil are excellent for colds. An infusion of the leaves emulsified in olive oil is used to for rectal injection to treat colds.

Certain herbalists prepare suppositories containing the powdered seeds mixed with nigella, cress and *Maerua crassifolia*. They are good for colds but unsuitable for children and pregnant women.

***Arbutus unedo* L.**
Ericaceae



Compiled by Dr. Salima Benhouhou

Morphological description

The plant is an evergreen shrub between 1 and 5 m. high with erect branches. It grows up to 2.5 m. in 10 years. The leaves are simple, with a short stalk, alternate, glabrous, and elliptic to lanceolate, 3-10 cm. long, 1-4 cm. wide, toothed, leathery, dark glossy green above, paler beneath. The flowers are bell-shaped and form falling inflorescences of 6 to 10 cm. composed of 15-30 flowers, white to pinkish, appearing between October and January. The fruits are small 4-8 g. berries, globular, red, with a granular surface; they vary considerably in size, on average 15-20 mm. in diameter. The number of seeds varies. Since the fruit takes 12 months to ripen, the tree bears mature fruit and flowers at the same time. Flowering takes place in the autumn.

Geographical distribution

Local: Well represented in the Algerian Tell.
Regional: North Africa except Egypt.
Global: *Arbutus unedo* is native to the coastal regions of the Mediterranean, extending from southern Europe to western Asia and northern Africa, where the climate is mild and the summers dry.

Ecology

The strawberry tree is usually found in the holm and cork oak forests of the lower mountains and flat country and is characteristic of the Mediterranean landscape from sea-level to 700-1000 m. Although it grows spontaneously in different types of soil it does best in loose, sub-acid subsoil and in sunny

***Arbutus unedo* L**

Unedo edulis Hoffm; *Arbutus vulgaris* Bub.

Arbutus: from arbor, little tree; *unedo* from the Latin 'eat one only'.

Arabic: lendj

Berber: ticisnou, sisnou, bahennou

English: strawberry tree

French: arbousier, arbre aux fraises

areas not subject to frost. Its fruit is an important food source for forest animals during the winter.

Status

Arbutus unedo is a widespread shrub in the Mediterranean basin; according to the IUCN criteria it is not a threatened species. Conservation, particularly ex situ and cultivation, is possible and well documented in the literature. The best way to cultivate *Arbutus unedo* is from seed; it is best sown on compost in a greenhouse as soon as it is ripe.

Part used

The leaves, bark, roots and fruits.

The leaves and bark contain active principles of value to herbalists and have been used for tanning and medicinally.

The fruits are collected wild in the autumn by teenagers and sold along the roadside in small 500 g. baskets (prices are variable).

For internal use, a decoction of 20 g. of leaves in one litre of water is the recommended dose; two cups a day should be taken. The roots are macerated for 12 hours (20 g. per litre), and then gently heated and filtered before drinking. The recommended dose is one cup taken by mouth on an empty stomach for three days.

Constituents

According to the available literature, the active principles taken from *Arbutus unedo* are phenylglycerol glucoside, gaulterine, arbusterine.

The leaves are rich in tannin (about 37%) and contain mainly arbutoside (arbutine), unedoside, ursolic acid, arbutoflavol A and B. Other compo-

nents are: traces of free hydroquinone, saccharose, invertine, emulsine, hentriacontane, triacontanol, dotriaccontanol, unedosterol, alcohol polyterpenic-alcohol acid, arbutolic acid, carotenoïdic pigment. The bark contains 35 to 45% of tannin; the branches contain the same components as the leaves plus nonacosanol. The seeds contain 39% of oil, known for its siccative properties.

Pharmacological action and toxicity

The leaves are known for their diuretic, urinary disinfectant and antidiarrhoeic properties. They are also antiseptic and very astringent.

The flowers have well-known sudorific properties. The fruits have a narcotic effect and can stop diarrhoea; if taken in excess they are a purgative. The roots are depurative and decongestant.

Recent work by a group of Moroccan scientists showed the efficiency of *Arbutus unedo* in treating hypertension.

Pharmacopeias

Not relevant for this species.

Pharmaceutical product

Not relevant for this species.

Traditional medicine and local knowledge

The strong antibiotic properties of this species have been used to treat diarrhoea and biliousness, and to cure nephritic colic, urinary calculus and diverse renal troubles.

This is a good plant to grow in towns because it tolerates industrial pollution. It is also resistant to fire and is used in reafforestation, strengthening dunes and soil protection.

The fruit is edible, rich in sugar and vitamin C, but has never, even in ancient times, been considered as particularly good when eaten raw. Cooked, the fruits are used in recipes to make jams, sorbets and alcoholic drinks.

This medicinal plant is part of a European programme for improvement; it should be subject to market authorisation.



***Argania spinosa* (L.) Skeels**

Sapotaceae



Compiled by: Dr. Driss Lammauer
Edited by: Prof. Kamal Batanouny

Morphological Description:
A thorny, evergreen tree with small, green, lanceolate leaves. It can reach heights of up to 10 meters and lives approximately 150 – 200 years. The fruit has a green, fleshy exterior like an olive, but larger and rounder. Inside, there is a nut with an extremely hard shell, which in turn contains one two or three almond-shaped kernels. A thin, fleshy and hard to peel layer surrounds the nut. The fruits of the Argan can take up to one year to ripen. The seeds contain valuable edible oil rich in essential fatty acids.

Geographical Distribution

Local: The argan tree, *Argania spinosa*, is a species native to Morocco and the second most common tree in the country. It grows wild and profusely in the area extending from Safi to the fringes of the Sahara and bounded by the Atlantic Ocean to the west and the Atlas Mountains to the east. Its geographic distribution is limited; located 29°15' to 31°20' N; 8°10' to 10°25' W. within the area where the argan grows there are about 21 million trees which play a vital role in the food chain and the environment, though their numbers are declining.

Ecology

Argania spinosa, is native Moroccan botanical treasure from the Atlas and Anti-atlas Mountains, which adapts well to sandy, saline and marginal areas. It is extremely drought tolerant and thrives in semi-arid and arid zones where annual precipitations do not exceed 300 mm. In severe drought

***Argania spinosa* (L.) Skeels**

Sideroxylon spinosum L. (Old name given by Linné in 1737)

Arabic: Argan, Louz el-barbary (fruits); means:

Berber almonds. الوز البري - ارجان

Berber: Argan, Ardjan, Tizmint or Feyyacha (fruits),

English: Argan Tree, "the tree of iron", and "the olive tree of Morocco".

French: Arganier

conditions, the tree drops all of its leaves and becomes dormant. The dormancy period, which can last for several years, is broken when the tree senses moisture in the air. Its leaves are adept at absorbing any available moisture present in the air. Its root system can search for water 30 meters below the earth's surface. As a result of its extensive root system (up to 30 meters below the earth's surface), the argan tree is a major contributor in the fight against soil erosion and desertification. Its roots have a symbiotic relationship with microscopic mushrooms which deliver nutrients to the roots while the roots provide the moisture that enables the mushrooms to live. The process is called "mycorization".

Argan trees act as an excellent barrier against the desert. Under and around the trees, flora and fauna thrive and in turn create an eco-diversity crucial to this region.

In its place, Argan tree plays a vital role in maintaining the ecological balance and preserving biodiversity.

Propagation

Primarily and easily by seed.

Status

Vulnerable species.

Argan tree known to be a relic of the tertiary period is now endangered largely due to urban expansion and agricultural practices. Despite a strong legislative effort by the Moroccan government to control this problem, it continues to grow.

The Argan Forest now covers less than one million hectares. Unfortunately, in less than a decade, more

than a third of the argan forest has disappeared and its average density has declined from 100 to 30 trees per hectare. Researchers agree that without aggressive intervention, this national treasure will be lost over the next 20 years.

Argan tree should not be considered as a fossil, which is disappearing, but rather a tree of the future for certain arid regions. It is therefore vital to improve the argan tree's production potential, so that it can regain its key position in the agricultural systems of the region.

Currently, a handful of potential Biosphere Reserves are under consideration. Morocco is focusing on establishing Biosphere Reserves in the Souss Massa region, with special emphasis on the conservation and research in the multi-purpose tree *Argania Spinosa*.

Some relief has come also from a few international organizations and local NGOs. For example, The International Development Research Center (IDRC) sponsors a project aimed to help prevent further environmental degradation as well as to improve the economic well being of the rural populations of the Argan region in Southwestern Morocco.

Parts Used:

Fruits for oil, others for other purposes

Production

The Argan tree bears fruit according to its age, the density of the tree population, the environment, and the amount of rainfall. One hectare of argan trees can produce 800 kilos of ripe fruit, which will later yield 40 kilos of nuts. These 40 kilos of nuts produces about 18 liters of argan oil.

Harvesting

The collection of the fruits from the trees may be by hand or by goats. In the later, the trunk of the Argan tree is often twisted and gnarled, allowing goats to clamber along its branches and feed on the leaves and fruits. When goats eat the fruits, the fleshy part is digested but the nuts, because of their hard shell, are excreted during rumination. Farmers then collect the nuts.

Argan oil, extracted from the almond.

Processing

The ripe fruit is spread out to dry in the sun and then de-pulped manually. Then the core is broken with two specially shaped stones in order to retrieve the seeds, which are then roasted and then ground.

Water is added to the paste that is created from grinding the seeds, and the oil is then extracted by kneading this paste. The yield is rather small: 100 kilos of fruit yields approximately 2 liters of oil. The production of argan oil, which is still mostly done by traditional methods, is a lengthy process. It is prepared in all the homes of this region, exclusively by women, as it has been for centuries. Several years ago, homegrown and foreign entrepreneurs began to develop new, more efficient processes. Inspired by the traditional method of production, they designed and developed new equipment and adapted others to the specific needs of Argan oil. The result is a cold-pressed oil second to none in flavor and quality, enjoyed in the domestic market, and by discriminating palates all over the world.

Market

Argan oil is manufactured traditionally on a small scale.

Constituents

Argan oil is deep golden oil, often with a reddish tinge. It is lighter in weight than nut oils and olive oils, having a weight and body similar to seed oils like sesame or pumpkin, but with a memorable flavor.

Argan oil contains 56 mg/Kg of polyphenols. It is unusually rich in tocopherols: 620mg/kg (olive oil: 320mg/kg). Vitamin E, or alpha-tocopherol, makes up 69% of the total tocopherols (the others are beta-, gamma- and delta-tocopherol).

More than 80% of its fatty acids are the unsaturated acids oleic and linoleic. Argan is markedly richer in linoleic acid than olive oil.

Phytosterols represent 20% of the insaponifiable fraction of argan oil. The main sterols, spinasterol and schottenol, are rarely found in vegetable oils. The major constituents of the triterpenic fraction of argan oil are tirucallol (27.9%), beta amyrine (27.3%), butyrospermol (18%), and lupeol (7%). The meaty part of the fruit, a valuable feed for stock, containing 10% protein and 7% fibre (dry matter basis).

The greyish-green oilcake contains saponin, which does not harm ruminants and passes out with the urine, however, when given to dairy cattle, the milk will contain some saponin, which may cause dia-

rhea in children. Up to 2 kg per day can be fed to cattle without harm.

Pharmacological Action and Toxicity

Argan oil is believed to have strong anti-oxidative properties, especially those that affect the skin.

Argan oil is often used to combat the physiological aging and drying of skin; to neutralize free radicals and conjunctive tissue; to promote softer and stronger hair; and to strengthen breaking and unhealthy nails.

Argan oil is rich in naturally occurring antioxidants such as flavonoids and tocopherols. Undoubtedly it is the presence of these antioxidants, which explains the oil's reputation for skin protection and healing. They are also responsible for the oil's good storage stability and lack of aging.

Antioxidant flavonoids called polyphenols are found in the pigments of leaves, bark, seed, and flowers of plants. As a group of compounds, phenols are active germicides.

Flavonoids cannot be synthesized by the body and like essential fatty acids, must be obtained through the diet. These antioxidants are involved in many activities including: helping control the free radical nitric oxide, promoting good circulation, acting as a natural anti-inflammatory, enhancing the activity of vitamin C, and strengthening the immune system. Although alpha, beta, delta, and gamma tocopherol all have vitamin E activity, alpha tocopherol is the most biologically active of the four and is usually identified as Vitamin E. Alpha tocopherol makes up 69% of the tocopherols found in argan oil. Vitamin E, an essential component of the antioxidant network, limits tissue and cell damage caused by toxins and pollutants in the body. Vitamin E has numerous benefits such as preventing free radical damage / heart attack and stroke / lipid peroxidation / atherosclerosis, oxidation of L cholesterol LD/ growth of cancer cells, cataracts and other vision problems, increasing the body's level of immunity, and alleviating symptoms of arthritis.

Tocopherols are important because of their antioxidant actions and free radical scavenger effects.

Latest research shows a positive effect of antioxidants, e.g. Vitamin E, on the progress of Parkinson's Disease

Fatty acids are a group of organic acids classified as

either saturated or unsaturated. According to the American Heart Association, clinical studies have demonstrated that consumption of transfatty acids or saturated fat result in higher blood cholesterol levels than consumption of cis fatty acids or naturally occurring oils.

Linoleic acid (omega-6), an essential fatty acid, comprises 34% of the total FA content of argan oil. The second essential fatty acid, linolenic acid (omega-3), can also be found in trace amounts (0.1%). Essential fatty acids cannot be synthesized by the body and must be obtained through the diet. Linoleic acid deficiency symptoms can include arthritis-like conditions, heart and circulatory problems, susceptibility to infections, kidney and liver degenerations, eczema-like skin eruptions, sterility in males, and miscarriage in females. It is believed that 1-2% of total energy needs for healthy individuals must come from linoleic acid. One-tablespoon (14g) of organic Toasted argan oil can satisfy the body's daily linoleic acid needs.

However it is the phytosterol fraction of Argan oil, which is probably its most interesting feature. It is believed that the phytosterols in Argan oil are unique in their combination: there are no other vegetable oils with a comparable composition.

Argan oil contains the extremely interesting D-7-stigmasterols, which are relatively rare among the plant sterols. The common D-5-sterols are not present. The D-7-sterols are schottenol and alpha-spinasterol. Schottenol is the main sterol found in *Senita cactus* (*Pachycereus schottii* (Engelm.) D. Hunt: synonymous with *Lophocereus schottii*), whose extract is used in Mexico as an effective anticancer agent.

According to one report schottenol, in the form of glucosides, is believed to have anti-tumour effects. Alpha-spinasterol is suggested to have cell stimulation activity.

Triterpenoids found in the unsaponifiable fraction of Argan oil are also biologically active substances. The main ones are tirucallol, beta-amyrin, butyrospermol, and lupeol which are cicatrizing, skin protecting, sun protective and disinfectant respectively.

Traditional Medicine and Indigenous Knowledge

In folk medicine, Argan oil is highly regarded for its reinvigorating effects and as an aphrodisiac.

Moroccan women have been using it for centuries as a skincare product. It prevents the skin from drying out.

Argan oil is also used for the treatment of acne, skin allergies, chicken pox and burns. It is also used to treat the hair and give it strength and shine. The skin protecting properties are used in the local treatment of skin problems and in dermatological creams and medicines. Internationally, there is some interest in its possible cosmetic uses.

Argan tree has been known for ages and used by man since the ancient time. The Phoenicians used the oil they produced in their trading posts along the Atlantic coast.

In 1219, IBN ALBAYTAR, a well-known Egyptian doctor, described the tree and the process for extracting the oil in his Treatise of Simplicities (translated by LECLERC in 1877).

Other parts of the plant

Ethnobotany

The argan tree is important to the local economy. The argan tree thus provides support for some 3 million people. Every part of the tree is useable and provides a source of income or food: The wood is for construction and heating things such as the oven or water for bathing. **Charcoal** is also produced for cooking food. The wood is very hard with an approximate density of "1". Its local nickname is "the wood of iron". It is also used decora-

tively in some of the inlaid boxes, which are made in Essaouira.

The **leaves** serve as feed for goats and camels (provide forage for goats).

The **fruit** of the Argan tree is a berry formed by a fleshy outer coating and a hard core that contains the seeds/nuts resembling almonds.

The **exterior pulp** that is removed in processing the seeds is given to animals as feed. The broken shell is also used as fuel.

Most importantly, the **seeds** are pressed to produce an oil that has culinary, cosmetic and medicinal properties. The by-product of the pressing process, which is called "cake" or "tortau", is also used as feed for animals.

Culinary uses

Argan oil has a long, significant, and tasty lineage in Morocco. It can be used for cooking and as a flavoring/finishing ingredient.

Traditionally it used for cooking Tagine, couscous, and other meals. It may be served alone as a dip for bread at breakfast time or in combination with honey, or with butter or also with blended almonds to make a mixture called Amlou. Amlou is a special preparation served as a fast meal especially for guests. Its flavor is similar to that of peanut butter. Combined with oat it is considered as a good meal for babies and children.

Today, it can be found on the menus of some of the best restaurants in the world, in France, in England, in the USA and elsewhere.

Artemisia herba alba Asso Asters



Compiled by: Dr. Zeineb Ghrabi
Dr. Sand L.R. Al-Rowaily

Morphological description
The armoise blanche is a perennial, 30-40 cm., with a characteristic smell of thymol, very leafy and with tomentose young branches. The leaves are hairy, silvery, small, deeply bi-pennated, with linear strips. The flowers are all hermaphrodite, packed together in very small capitula, sessile and in bunches. The outside bracts of the involucre are orbicular, hairy and shorter than the inside bracts, which are green on the back, very scarious and glandulous. The fruits are achenes.

The vegetative growth of the armoise blanche takes place in the autumn; the flowering starts in June and basically develops at the end of the summer. Two cytotypes have been discovered in pre-Saharan Tunisia (Ferchichi, 1997): the diploid with the gametic number $n=9$ and the tetraploid with chromosomal number $n=18$. The morphological, biological and ecological features of the two cytotypes highlights differences as to the capitula, corolla and vegetative vigour.

These differences allowed Ferchichi (1997) to consider two varieties for *Artemisia herba alba* in pre-Saharan Tunisia: *Artemisia herba alba* Asso. var. *herba alba* ($n=9$) and *Artemisia herba alba* Asso. var. *desertii* Ferchichi ($N=18$).

Geographical description
Local: Known from the Tunisian dorsal ridge as far as the deep south.
Regional: North Africa.
Global: The plant is very widely distributed: from

Artemisia herba alba Asso.

Syn. Strip. Arag. 117. 1779 *Artemisia aragonensis* Lam.

Arabic: Chih

French: Armoise blanche

the Canaries and south-eastern Spain in the West as far as Asia, via the whole of North Africa and the Near East.

Ecology

The armoise blanche develops in bioclimatic stages that range from the upper semi-arid to the lower Saharan. It is found on sandy and silty steppes and on hillsides. It characterises many plant groups in southern Tunisia: the association with *Artemisia herba alba* and *Centaurea acaulis*; the association with *Artemisia herba alba* and *Helianthemum ruficomum*; the association with *Artemisia herba alba* and *Arthropodium scoparium*.

It has a seasonal dimorphism, losing its wide winter leaves at the beginning of the dry season and replacing them with smaller summer leaves whose anatomical structure is different.

It is fairly dynamic (big production of seeds, high power of regeneration) and a great coloniser (of surfaces left free after the over-exploitation of alfalfa sheets).

Conservation, culture and status

Widely distributed in Tunisia, it is much sought after for its therapeutic virtues, and is thus subject to frequent, unsupervised picking.

Part used

The flowery tips, found in herbalists'.

Constituents

An essential oil of armoise blanche (0.003 to 0.3%) contains santonin, lactones of sesquiterpenic acids, flavonoids, coumarins, pentacyclic triterpens, anthracenosids and tannins.

Traditional medicine

The armoise blanche is known for its carminative

properties. An infusion of the flowers and leaves is a vermifuge.

Prax (1850, in Le Floc'h, 1983) notes that the armoise blanche mixed with henna and diluted in water can be applied to the head for neuralgia and other pain. He also reports that the plant is used to bandage wounds and for stomach-ache.
Passager et Dorey (1958, in Le Floc'h, 1983)

mention that this species is also used for digestive disorders, abdominal pain, colic and liver failure, and to flavour tea.

Toxicity

Eating too much armoise blanche has a purgative effect, especially on sheep, and can cause young lambs to die.

Artemisia judaica ssp. *sahariensis*
(Chev.) Maire
Compositae (Asteraceae)



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial semi-shrub appearing sometimes like a herb, densely ramified, between 50 to 80 cm. high. The leaves are small, alternate, sessile and dissected, densely covered with fine whitish hairs that give the plant a silvery aspect.

The flowers are grouped in pale yellow, discoid, hemispherical heads 5-10 mm. in diameter, surrounded by woolly bracts and containing 10 to 20 florets.

The fruits are small achenes not exceeding 5 mm. in size.

The plant's foliage produces an agreeable odour when crushed and a bitter sensation if tasted. It flowers in early spring.

Geographical distribution

Local: This sub-species is present in the mountains of the central Sahara.

Regional: The sub-species is endemic in Morocco, Algeria and Libya.

Ecology

This small shrub thrives in desert conditions with an average 100 mm. rainfall a year. In the Tassili, it does not grow above 1200 m. altitude. It has a large ecological range for soils and is found on sandy wadi floors, on gravelly soils and on the vast plateaux or regs.

Status

According to the IUCN criteria this endemic species

Artemisia judaica ssp. *sahariensis*

(Chev.) Maire

Artemisia: The Latin name comes from Artemis (good health) which was the Greek name for Diana, the moon goddess; *judaica*, from Judea

Arabic: baatharan, baethran

Targui: téharagélé

English: Judean wormwood

French: armoise de Judée

falls into the "E" category.

The plant is frequently used and much appreciated by the Tuareg. High pressure is noticeable, requiring urgent conservation measures.

Part used

The stems with their leaves and flower heads, are collected in spring when in flower. It is prepared as a decoction, an infusion, dried and ground into powder.

It is used internally.

Constituents

A flavone (cirsimarin).

The essential oil of *A. judaica* contains piperitone (53.5%), chrysanthenone (9.8%) and chrysanthenyl acetate (7.4%); those constituents show good activity against *Staphylococcus* spp., *Candida* spp. and *Microsporum* spp. Other constituents are caryophyllene, bornyl acetate, borneol, p-cymene, a and b-pinenes, camphene, myrcene, thymol and nerolidol.

Pharmacological action and toxicity

Anti-microbial activity; prophylactic action.

A search on its toxicity appears negative.

The other known actions are insecticidal, antihelmintic, expectorant, anti-inflammatory, anti-pyretic and stimulant.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

■ Traditional medicine and local knowledge

An anthelmintic; for digestive problems; a tonic. In the Tassili, the Judean mugwort is commonly used. Before celebrations a spoonful of dried leaves is taken with a glass of water to prevent intestinal troubles. An infusion of the leaves is relaxing and helps bring on sleep. In the past, a flourishing trade was carried on in this plant: caravans used to take loads of bags to Agades. Nowadays it is distributed to the northern oases by lorry. In the Sahara, the plant is greatly appreciated when added to green tea.

Because of its prophylactic virtues, a branch is frequently attached to the wrists of babies and small children to ward off negative influences. In Djanet, when the grapes are ripe, several branches are hung in the vineyards to keep insects away. In Egypt, *Artemisia judaica* is also much appreciated for its antispasmodic and anthelmintic effects. An infusion of the flowering summits relieves gastro-intestinal cramps and is also stomachic. Inhalation of the leaves gives relief from cold congestion. The plant is believed to prevent skin diseases if camels eat it. It is also used as fuel and an insect repellent; snakes are kept away by smoke from the burnt branches.

***Asphodelus microcarpus* Salzm.
& Viv. Liliaceae**



Compiled by: Dr. Zeineb Ghribi

Morphological description

The asphodel is a robust perennial; its aphyllous floral scape can be 1.5 m. tall, and is generally much-branched in its upper part. The rhizome is short with fasciculated roots swollen into ellipsoidal tubers, tapered at both ends. The leaves appear in autumn at the base of the plant, where they form a fine brilliant green clump, and are flat, not fistulous, 1-4 cm. wide, and long and acuminate. The white or pinkish-white flowers are solitary, gathered in several erect, spread out bunches, springing from the axil of a membranous bract; their perigone is long (14-16 mm.), pinkish-white, with brownish-green veins and narrow, staggered divisions. Each stamen has a papillous filament up to half-way. The fruit is a small capsule, shorter than its peduncle, tawny and later greyish, ovoid and tapering towards the base. The grey-brown seeds are elongated, spindle-shaped/triquetral, and finely pitted-warty. Flowering and fruiting occur from February to May-June.

Geographical distribution

Local: The whole of Tunisia; common in the North and centre.

Regional: North Africa.

Global: The Mediterranean, the Canaries.

Ecology

The asphodel is a geophyte, extremely widespread in semi-arid regions, rarer in arid regions. It grows in open forests, and the sandy and rocky pastures of the plains and mountains in well-watered

***Asphodelus microcarpus* Salzm. & Viv. in
Viv., Fl. Cors., p. 5 (1824)**

Asphodelus infestus Parlatoire; *Asphodelus aestivus* Brot.; *Asphodelus ramosus* L.; *Asphodelus nervosus* Pomel; *Asphodelus morisianus* Parl.

Arabic: beruâg

French: asphodèle à petits fruits

English: asphodel

regions. It is also frequent in the littoral and sub-littoral part of the south.

Status, conservation and culture
It grows wild in Tunisia and is picked wild. It is toxic for livestock, and when it is abundant this is a sign of overgrazing.

Part used

The root tubers.

Constituents

The underground tubers are rich in starch and anthraquinones.

Traditional medicine

It is used in many ways. For earache, the underground part is warmed in olive oil and three drops a day are put in the ear. For abscesses, a local application of the powder and decoction of the drug. The tubers are used to prepare an ointment for vitiligo and any kind of white spots on the skin.

Pharmacological action and toxicity

The extract of methanol and a decoction of the roots act against ulcers. The extract, rich in anthraquinones, is a laxative and a purgative.



***Asphodelus tenuifolius* Cavan.**
Liliaceae



Compiled by Dr. Salima Benhouhou

Morphological description

An annual plant, with tubers at the base, from 20 to 30 cm. high. The leaves are not attached to an aerial stem but spring from the underground tuber or bulb, often 15 to 20 cm. long, slightly fleshy, cylindrical, hollow in the middle, glabrous and dark green. The leaves form a circular cluster at the base of the plant. The inflorescence is a simple, raceme, elongated, indeterminate cluster with stalked flowers. The small flowers have six white tepals. The fruits are small capsules with minute black seeds. Flowering takes place in early spring from March to May.

Geographical distribution

Local: Common in the Algerian Sahara.

Regional: North Africa.

Global: A common plant throughout the whole Sahara.

Ecology

This small annual plant thrives in desert conditions with an average 100 mm. rainfall a year. It is always found in non-saline wadi beds and has a fairly wide ecological range for soil type, occurring on sand-loamy and on gravelly soils.

Status

According to the IUCN criteria this saharo-sindian species falls into the "C" category.

No conservation problems are reported for this plant which has a high dispersal capacity due to the numerous seeds produced by each individual.

***Asphodelus tenuifolius* Cavan.**

Asphodelus fistulosus L.

Asphodelus: generic name of Asphodel indicating in Latin and Greek several species of Liliaceae, dedicated to the gods of hell and death who were supposed to eat the tubers; *tenuifolius*: narrow-leaved

Arabic: tazia, acheub el ibel, barwaq

Targui: izayan

English: narrow-leaved asphodel

French: asphodèle à petites feuilles

Part used

The leaves and fruits are collected in spring and prepared by maceration in olive oil; the seeds are crushed. The crushed seeds are taken internally, mixed with honey or olive oil; the liquid obtained from the macerated leaves is used externally as a massage.

Constituents

Beta-sitosterol, stigmasterol, 1,8-dimethoxynaphthalene, naphthalene and anthraquinone derivatives, linoleic acid.

Pharmacological action and toxicity

The plant is not reported as toxic by nomads. Eaten in big quantities, it can provoke indigestion.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

Taken for colds and haemorrhoids (seeds); a febrifuge; used for rheumatic pain.

This small asphodelus is also widely used for various culinary purposes. The leaves are either boiled or cooked in oil, the seeds are crushed and mixed with flour to make bread, and the young shoots are added raw to food to enhance the taste. This plant is little appreciated as pasture.

In Egypt, the seeds are reported to be diuretic and are eaten with yoghurt.

Similar uses as in Algeria are reported for Morocco. It is also used for healing wounds. The

seeds are mixed with cereals to make traditional bread and are also eaten as delicacies when mixed with dates. The leaves are fried or boiled and are sometimes put in the sauce for couscous.

***Balanites aegyptiaca* (L.) Del.**
Balanitaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photos by K. H. Batanouny

Morphological Description

Multibranched, spiny shrub or tree up to 10 m tall. Crown is spherical, in one or several distinct masses. Trunk is short and often branching from near the base. Branches are pubescent, with axillary spreading spines up to 4 cm. Bark is dark brown to grey, deeply fissured. Branches are armed with stout yellow or green thorns up to 8 cm long. Leaves grow with two separate leaflets; leaflets are obovate, asymmetric, 2.5-6 cm long, bright green, leathery, with fine hairs when young. Flowers grow in fascicles in the leaf axils and are fragrant, yellowish green. They are small, inconspicuous, hermaphroditic and pollinated by insects. Fruit is a rather long, narrow drupe, 2.5-7 cm long, 1.5-4 cm in diameter. Young fruits are green and tormentose, turning yellow and glabrous when mature. The pulp is bitter-sweet and edible. The seed, a pyrene stone, is 1.5-3 cm long, light brown, fibrous and extremely hard. It makes up 50-60% of the fruit. There are 500-1500 dry, clean seeds per kg.

Geographical Distribution

Local: Gebel Elba, South Eastern Desert, Oases.
Regional: Egypt, Libya, Algeria and Morocco.
Global: Tropical Africa, Arabian Peninsula, Latin America and India.

Ecology

The plant has wide ecological distribution, but is mainly found on level alluvial sites with deep sandy

***Balanites aegyptiaca* (L.)**

Del. Fl. Egypte 221, t. 28. f. 1. (1813), Descr.
Egypte, Hist. Nat.; Ill. 61, no. 427 (1814).
Ximenia aegyptiaca L.; Sp. Pl.; ed. 1, 1194 (1753).

Names

Arabic: Heglig ميجليج

English: Desert date, Soapberry tree, Thorn tree, Egyptian balsam, Simple-thorned torchwood.

French: Dattier du desert, Hagueleg, Balanite d'Egypte.

loam and free access to water. In Egypt it is confined to water-receiving sites such as wadis and river banks. Small populations of this tree are found in the wadis of the Southern part of the Eastern Desert and in Red Sea wadis and occupy the upstream part of Wadi Allaqi. It also grows in Kharga Oases. The tree is drought and fire resistant and withstands up to 2 months flooding in areas near the river.

Status

The plant is used for different purposes, for example medicinal, for fuel, as timber, and to provide shade. Proliferation of the plant is considered necessary due to its endangered status.

Part(s) Used

Stem bark, leaves, fruits and roots.

Collection

The plant is collected in the onset of fruiting stage to prevent fermentation.

Preparation

Infusion, fresh and dry fruits.

Use

Oral.

Constituents

The kernel (10%) contains 40%- 58% of lipid glyceride oil. The mesocarp contains 38% sugars, 15% organic acids and 46% other organic substances. In Uganda, the kernels of seeds yield 48.8% of golden

yellow oil for soap-making. Stem bark contains saponins. The plant contains balanitin-1,-2 and -3; balanitin-1 for example possesses a yamogenin aglycone with a branched glucose and rhamnose side chain. The plant is reported to contain 5.6% diosgenin. Seeds contain furocoumarins.

Pharmacological Action and Toxicity

Not available

Pharmacopeiae

Not available

Phytopharmaceutical Products

Not available

Traditional Medicine and Indigenous Knowledge

History: The oil extracted from the fruit of the plant is known to be used in folk medicine.

Traditional Medicinal Uses

- Anthelmintic

- Anti-diabetics
- Colic
- Emetic
- Epilepsy
- Herpes
- Laxatives
- Mental diseases
- Malaria
- Purgative
- Vermifuge
- Sore throats
- Syphilis
- Wounds and rheumatism
- Yellow fever

Other uses of the plant: The plant makes good firewood and charcoal. The fruit and seeds are edible, of a sweet-sour taste with 30-40% edible oil. Young specimens are eaten by goats, sheep and camels. Some plant parts are used as soap substitutes. Thorny branches have been used for fencing.

***Borago officinalis* L.**
Boraginaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

Borago officinalis is an annual with a branched erect stem 50 cm. high. Its leaves are simple; the lower leaves are set in a rosette, with long petiolations, while the upper leaves are clasping and sessile.

The limb is thick and wrinkled, ovoid-lanciolated; both sides and the branches are covered with stiff, almost prickly, hairs. The big flowers, grouped in abundant cymes, hang on long 5-30 mm. peduncles. The calyx has lanceolated linear divisions. The corolla is wheeled and a pure blue; the anther is dark violet. The fruit is a big nutlet, with many ridges.

Flowering is from March to September.

Geographical distribution

Local: Fairly widespread, no further south than Sousse and Feriana.

Regional: North Africa.

Global: A native of Asia Minor, widespread in central and southern Europe and in North Africa.

***Borago officinalis* L.** Sp. Pl.: 137, 1753

Arabic: Bourâache, boukhriche

French: Bourrache officinale

English: Common borage

Ecology

A tough plant growing on waste ground near dwellings.

Status, conservation and culture

Borago officinalis grows wild and has never been cultivated in Tunisia. For use, it is picked. However, it could be multiplied by being sown in the autumn or spring on the spot in sunny places. It is sensitive to nitrates and potassium. The flowers are picked when they open and the leaves after flowering is finished.

Part used

Leaves, flowers, and seeds.

Constituents

The leaves contain 30% of neutral mucilage, vitamin C, 3% of tannins, 2% of soluble silicic acid, and potassium nitrate. The flowers particularly contain pyrolizidinic alkaloids. The seeds contain oils (35%) that are rich in unsaturated fatty acids.

Traditional medicine

The flowers and flowering tips of borage are used as an emollient, particularly as a sudorific and a diuretic. The decoction is used for flu.

Use in herbal medicine

The leaves, stems and flowering tips are sudorific, laxative and diuretic. The flowers themselves are diaphoretic. The oil of the seeds is used in cosmetology.

Byronia cretica L.



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photos by K. H. Batanouny

Morphological Description

B. cretica is a herbaceous perennial plant; the stem is dioecious and 2-4 m long. It climbs with the aid of simple tendrils. The leaves are alternate, short petiolate, broad-cordate to palmate-5-lobed; leaf-lobes are entire or with few, large, subobtuse teeth, the central usually not markedly longer than the lateral; both surfaces of the leaf are covered in short bristly hairs; each leaf is positioned opposite to a tendril. The root is tuberous, up to 2.5 kg., light yellow and slimy white inside. Female flowers are in short-pedicled clusters; males in long-pedicled racemes. Flowers are radial and their structures are arranged in fives. The corolla of female flowers is up to 10 mm wide. The sepals are half the size of petals. The ovary is inferior and 3-chambered. The corolla of male flowers is up to 20 mm wide, yellowish and green veined; the 5-stamens are fused in groups (2+2+1). The fruit is a 1 to 2 seeded, globose berry, 6-10mm thick. The calyx of female flowers is usually half the length of the

Byronia cretica L.,

Sp. Pl., 1, 1013 (1753).

Names

Arabic: لعبة مرة Le`eba Murrah

English: English mandrak, Devil's Turnip, white Bryony

corolla; stigma papillose-hairy; fruit 6-10 mm in diameter, red.

Geographical Distribution

Local: Abuqir, Burg Al-Arab, Ras El-Hikma and Matruh.

Regional: Egypt, Libya only.

Global: Central and Southern Europe, northwards to Britain; formerly cultivated as a medicinal plant and often naturalized.

Ecology

The plant grows in deep sandy soils in the Mediterranean costal zone. It grows mainly in relatively moist habitats, i.e. in caves and depressions receiving runoff water. In Cyprus, it has been recorded to grow in forests, scrubs and hedges, from sea level to 1000 ft altitude.

Status

This species is now almost extinct in Egypt. A few specimens have been collected from the Western Mediterranean Coastal zone of Egypt (between Alexandria and Marsa Matruh). This plant grows mainly in the sandy habitats near the coast. The severe and drastic changes in the habitat supporting the species lead to its extermination. It is to be noted that its habitat is along the coastal zone where the new summer resort areas have sprung up, its natural habitat thereby being threatened by extinction. The collection of this plant has the potential to threaten its existance.

Part(s) Used

Roots

Collection

In summer

Preparation:
Tincture, decoction, powder

Use:
Oral

Constituents:

- Cucurbitacins B, D, E, I, J, K, L and S (present in the fresh root as aglycones of the glycosides).
- Small quantities of intact glycosides, for example bryoamarid, bryoside, bryodiosides A and C.
- Triterpene acids, including bryonolic acid, bryocoumaric acid, 3-alpha-hydroxymultiflora-8-ene-29alpha-acid.
- Fatty acids (polyhydroxyderivatives, resembling the eicosanoids) such as, 9,12,13-trihydroxy-octadeca-10 (E)-15 (Z)-dienic acid.
- Ribosome-inactivating proteins: bryodine-L and bryodine-R.
- The plant also contains starch, resin, alkaloid.

Pharmacological Action and Toxicity

The protein bryodine has cytotoxic effects in vitro.

The drug is used as a laxative and an emetic. The chief active ingredients are the cucurbitacins, which even in low doses lead to irritation of the mucous membrane of the gastrointestinal tract with subsequent increase of peristalsis. The drug is severely toxic in higher doses.

Traditional uses and folk medicine

History: the drug is mainly used in Egypt as a bitter tonic and to ameliorate the condition of diabetics. It is also used as a hydragogue cathartic and diuretic in pleurisy, dropsy, whooping cough, bronchitis and tonsillitis. It is an irritant to the skin and may cause vesication.

Traditional uses and folk medicine

- Antidiabetic
- Anti diuretic
- Antispasmodic
- Bronchial asthma
- Tonsillitis

C
D

A GUIDE TO MEDICINAL PLANTS IN NORTH AFRICA

***Calligonum comosum* L'Herit.**
Polygonaceae



Compiled by Dr. Salima Benhouhou

Morphological description

A tall woody shrub, reaching 2-3 m. in height, much branched from the base. The branches are dark green, articulate and very quickly lose their small linear leaves. The flowers are found at the base of the nodes and at the ends of the branches. Six small tepals form the perianth with conspicuous red anthers. The fruit is a single circular carpel, not exceeding 1 cm. in diameter and covered with brown-yellow hairs when ripe.

Calligonum comosum produces numerous flowers in the early spring (March, April).

Geographical distribution

Local: Well represented in sandy sites in the northern Sahara and rare in the central Algerian Sahara.

Regional: North Africa.

Global: Its general distribution goes from the North African deserts to the desert sands of the Middle East and as far east as the Rajputana desert in western India.

Ecology

This hardy shrub grows in arid, sandy ecosystems where the annual rainfall does not exceed 100 mm. A strict psammophil, *Calligonum comosum* thrives on sandy soils, often stabilising the surrounding sand in large hummocks and reaching the water-table with its long taproots.

Status

According to the IUCN criteria this saharo-sindian species falls into the "C" category.

***Calligonum comosum* L'Hér. Linn. Soc. i.
(1791) 180. *Calligonum polygonoides* L.**

Calligonum: from kallos, beauty, and gonu, a knee-joint (referring to its leafless joint); *comosum*: long-haired

Arabic: ouarach, larta

Targui: aresu

Due to its frequent use, it is threatened, with decreasing populations near settlements. Conservation and propagation measures should be considered for this species.

Part used

The young shoots and leaves are picked in spring, prepared as a powder and used externally as an ointment.

Constituents

Calligonum comosum is known to be rich in proteins. No other data has been found regarding the active principles of this plant.

Pharmacological action and toxicity

Anti-inflammatory and anti-ulcer action.

Pharmacopeias

Not relevant for this species

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for gastric problems and is frequently used to treat scabies in dromedaries.

The fresh flowers can be eaten. An analysis of its food value has shown the plant to be high in sugar and nitrogenous components. The Tuareg dry the young shoots to prepare a nourishing meal. Its branches make excellent firewood. It is also used for tanning skin.

Calotropis procera
Asclepiadaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
The dried root, freed from its outer cork layer, is called Mudar. It is found in commerce in short quilled pieces about 1/5 to 1/10 of an inch thick and not over 1 1/2 inch wide. Deeply furrowed and reticulated, colour greyish buff, easily separated from periderm. Fracture short and mealy, taste bitter, nauseous, acrid; it has a peculiar smell and is mucilaginous; official in India and the Colonial addendum for the preparation of a tincture. Shrub or small tree with a rough corky bark. Stems producing copious latex when broken. Leaves are glaucous, ± sessile, broad. Flowers purplish pink. Fruits are inflated. Seeds with a pappus of silky hairs. Spreading shrub or small tree to 4 m, exuding copious milky sap when cut or broken; leaves opposite, grey-green, large up to 15 cm long and 10 cm broad, with a pointed tip, two rounded basal lobes and no leaf stalk; flowers waxy white, 5 petals, purple-tipped inside and with a central purplish crown, carried in stalked clusters at the ends of the branches; fruit grey-green, inflated, 8 to 12 cm long, containing numerous seeds with tufts of long silky hairs at one end. (Kleinschmidt and Johnson, 1977)
"Tall herb with sessile, obovate, glaucous leaves less than 2 times longer than broad; bud globular, flowers umbellate, violet; coronal spurs not recurved." (Nicholson, 1991)
"Shrubs, mostly less than 6 ft., but up to 15 ft.; similar to *C. gigantea*, but leaves oblong to elliptic, corolla usually about 1 in. across with

***Calotropis procera* (Aiton)**

W. T. Ait. f.; Hort. Kew. Ed.2,2:68 1811.
Asclepias procera Ait.; Hort. Kew. 1:305, 1789.

Names

Arabic: Oshar - عشر

Berber: Torcha, Touza, Ngéyi

English: French cotton, Mudar plant, calotropis, rubber bush, apple of Sodom, mudar, madar, king's crown, roostertree

French: Calotrope, Fatetone, Pomme de Sodome

German: Wahre Mudarpflanze, Gomeiner

Italian: Calotropo

Spanish: Algodón extranjero, Cazuela

Turkish: İpekag

lobes more erect, corona lobes glabrous or pubescent, and follicle 4-5 in. long." (Bailey and Bailey, 1976)

Geographical Distribution

Local: Almost all phytogeographical regions of Egypt, except the Mediterranean region.

Regional: Egypt, Libya.

Global: Tropical to dry parts of Africa, Arabia, Palestine, W. Indies, Brazil, Columbia and Venezuela.

Ecology

Mediterranean strand vegetation, glycophyte and non-succulent. The plant grows in fine sandy soils. It is widespread in the deserts of the Middle East in areas already occupied by Bedouin settlements. It grows as a secondary vegetation after the eradication of Acacia trees for fuel making.

Status

The plant is widespread as a shrub. No fear of extinction.

Part(s) Used

Bark, root-bark.

Preparations

Tincture of Calotropis, 1/2 to 1 fluid drachm.

Powder, 3 to 12 grains

Use
Oral

Constituents

A yellow bitter resin; a black acid resin; Madar-album, a crystalline colourless substance; Madarfluavil, an ambercoloured viscid substance; caoutchouc; and a peculiar principle which gelatinizes on being heated, called Mudarine. Lewin found a neutral principle, Calatropin, a very active poison of the digitalis type. In India the author's husband experimented with it for paper-making, the inner bark yielding a fibre stronger than Russian hemp. The acrid juice hardens into a substance like gutta-percha. It has long been used in India for abortive and suicidal purposes. Mudar root-bark is widely used there as a treatment for elephantiasis and leprosy, and is effective in cases of chronic eczema, as well as for diarrhoea and dysentery. In addition, Cardenolides are present – calotoxin, saponin and choline.

Pharmacological Action and Toxicity

1. Calotropis resembles ipecacuanha in its action; small doses are diaphoretic and expectorant, and large doses cause vomiting and diarrhoea..
2. The isolated compounds showed considerable cytotoxic activity.
3. The aqueous extract exhibited significant changes in the electro cardiogram pattern of adult anesthetized dogs and induced arrhythmic manifestations in doses of 2, 4, and 8 ml/kg body weight.
4. Alcoholic extract stimulates rabbits' intestines, the rectus abdominus muscle of frogs and contracts the uterus of virgin female rats.

Traditional Medicine and Indigenous Knowledge

History: a decoction is used in veterinary medicine, anti-leprosy. Powdered dried leaves are vermifuge in small doses. They are smoked for asthma. Fresh leaves are used in the form of cataplasm for sun

stroke. Leaf extracts are cardiotonic. Roots are emetic, expectorant. Root bark is used for dysentery. Latex causes serious inflammations and may lead to blindness. It is used as a drastic purgative, emmenagogue, for bites and skin diseases. It was used by ancient Indians as arrow poison due to its slow effect on the heart similar to Digitalis. Poultices made from the leaves were applied to joints to heal rheumatism.

Traditional Medicinal Uses

- Asthma
- Cold
- Cough
- Chronic eczema
- Dysentery
- Diarrhoea
- Elephantiasis
- Heart diseases
- Leprosy
- Rheumatism
- Skin diseases

Other uses of the plant: Fruit fibres and seed hairs may be used for filling cushions and for making rope. The woody parts of this plant were burned to make charcoal, which was previously an ingredient for gunpowder. It is used for scabies of camels and goats. The leaves also served as fertilizer - dug into the ground around the roots of an ailing palm tree, they helped to make the tree more vigorous.





Compiled by: Dr. Driss Lamnauer
Edited by: Prof. Kamal Batanouny

Morphological Description

Caper plants are small shrubs, and may reach about one meter upright. However, uncultivated caper plants are more often seen hanging, draped and sprawling as they scramble over soil and rocks. Caper stems have tiny thorns, are serpent-like when young, dry and brittle when old. Leaves are variable in texture, orbicular to elliptic, base rounded and apex mucronate. Flowers are born on first-year branches.

The plant flowers only bloom for 24 hours then die. Flowers are white, solitary, axially. Sepals are sub equal, petals are white, and its anther filaments are purple and are longer than the petals. The berry is ellipsoid, ovoid or obovoid and pericarp thin. The seeds are 3-4 mm in diameter, globose, smooth and brown.

Flowering period: June-December

Geographical Distribution

Local: Var. *canescens*, var. *rupestris* in the mountains of Meddle Atlas, High Atlas, and Rif.

Regional: The species cultivated in the Mediterranean region are *C. spinosa* L. and *C. ovata* Desf. The differences between the two species are mainly related to the shape and dimension of the leaves, the color of the trunk, and the shape of the flower buds. The varieties of *C. spinosa* are spinosa, inermis, parviflora, aegyptica, and pubescence. Those of *C. ovata* are ovata, sicula, herbacea, palaestina, mycrophylla, kurdica.

Capparis sinaica has all the positive attributes of its domesticated relative *Capparis spinosa*.

Global: *Capparis spinosa* is said to be native to the

Capparis spinosa L.

Capparis rupestris

Arabic: l'Kabbar, Kabbar, Âssaf, Lasaf.

الكبير أو كبر - أصف - لصاف

Berber: Tayloulut, Tailoulout, Amserlih, Ouai loulou.

English: Caper bush, Caperbush, caper, caperberry,

French: Câprier, Caprier commun, Câpres, Fabagelle, tapana

Mediterranean basin, but its range stretches from the Atlantic coasts of the Canary Islands and Morocco to the Black Sea to the Crimea and Armenia, and eastward to the Caspian Sea and into Iran. It grows in North Africa, Europe, West Asia, Afghanistan, and Australia. In India it grows from Punjab and Rajasthan to the Deccan Peninsula.

Ecology

Capparis spinosa grow spontaneously in cracks and crevices of rocks and stone walls. Plants grow well in nutrient poor sharply drained gravelly soils.

Mature plants develop large extensive root systems that penetrate deeply into the earth. Capers are salt-tolerant and flourish along shores within sea-spray zones. They are also wind-tolerant. The caper's vegetative canopy covers soil surfaces, which helps to conserve soil water reserves.

Capparis spinosa is cultivated for production of Capers. Even though slow and difficult to germinate it grows in very dry warm climate. Dry heat and intense sunlight make the preferred environment for caper plants to give the best results. Plants are productive in zones having only 200 mm annual precipitation (falling mostly in winter and spring months) and easily survive summertime temperatures higher than 40°C. However, caper is a cold tender plant and has a temperature hardiness range similar to the olive tree (- 8°C).

Status

Not IUCN Threatened species

Part(s) Used

Capers (flower buds), Caperberries (fruits), leaves, roots, seeds.

The caper plant yields two kinds of fruit - the caper itself, and the caperberry.

Capers are the small buds picked very young, even before they have bloomed. If the caper is not picked, it will soon become a flower. This flower produces a fruit called the caperberry. Caperberries are the mature fruits of the caper bush. They are the same size and color as a small green olive, with a delicate fruity flavor. The caperberry resembles a large grape with white stripes like a small water-melon.

Constituents

The crude extract of the flower buds contains 162 volatile constituents of which isothiocyanates, thiocyanates, sulphides and their oxidative products have been identified as the major components.

The root contains glucobrassicin, neoglucobrassicin and 4-methoxy-glucobrassicin. The root bark contains stachydrine, rutic acid and a volatile substance with garlic odor. The cortex and leaves contain stachydrine and 3-hydroxystachydrine. The leaves and seeds contain glucocapparin and glucocleomin. The seeds are rich in protein, oil, and fiber. The main fatty acids identified by gas chromatography were palmitic, oleic and linoleic acids.

Capparis spinosa L. was found to contain the pharmacologically active compound rutin, in all aerial parts. The average content of flavonoid glycosides (quercetin 3-rutinoside, kaempferol 3-rutinoside; and kaempferol 3-rhamnosyl-rutinoside) in commercial capers produced in different Mediterranean countries was 5.18 mg/g fresh weight. A serving of caper (10 g) will provide 65 mg of flavonoid glycosides or the equivalent 40 mg of quercetin as aglycone.

The caper is rich in capric acid. This gives a distinctive aromatic flavor enhanced by pickling.

Pharmacological Action and Toxicity

Capparis spinosa L. possesses several chemically active constituents, but one of the most important classes of compounds are the flavonoids, in particular rutin - the most abundant flavonoid in the plant. Since ancient times, caper poultices have been used to ease swellings and bruises and this led to the belief that rutin had properties affecting the permeability of the blood capillaries; such as

reducing their fragility though clinical evidence is inconclusive

However the herb was reported to have hepatoprotective and immunosuppressive effects and an anti-tumor activity against human leukemia in vitro. Caper extracts and pulps have been used in cosmetics, but there has been reported contact dermatitis and sensitivity from their use.

Traditional Medicine and Indigenous Knowledge

Roots are used as diuretic, astringent, and tonic. Bark root, which has a bitter taste, is used as appetizer, astringent, tonic, antidiarrheic and to treat hemorrhoids, and spleen disease. Bark is also used for gout and rheumatism, as expectorant, and for chest diseases.

Infusion of stems and root bark antidiarrheic, febrifuge.

Fresh fruits sciatica, and dropsy. Dried and powdered fruit combined with honey is used in colds, rheumatism, gout, sciatica and backache. In decoction it is said efficient against gastric pain. Applied on the all body this decoction is said to be good in epilepsy. Seeds are used in feminine sterility and dysmenorrhea. Crushed seeds for ulcers, scrofula, and ganglions. Seeds are used in a mixture of spices called Ras El Hanout, which means the "head of the shop". Flowers in a poultice in eczema.

In the Sahara, the steam of the plant's decoction is said to clean eyes.

Leaves crashed are and applied in a poultice on the front against headache, on the face against toothache. Leaves heated in butter are used against external parasitic disease of camel.

The flower buds (Capers) are pickled and used as condiment or legume.

Other Indications

The plant is credited with anti tubercular property. A decoction of the plant is used to treat yeast and vaginal infections such as candidiasis.

The bark is bitter, diuretic and expectorant. It is given in spleen, renal and hepatic complaints.

The root bark is purifying and stops internal bleeding. It is used to treat skin conditions, capillary weakness, and easy bruising, and is also used in cosmetic preparations.

Infusions and decoctions from caper root bark have

been traditionally used for dropsy, anemia, arthritis and gout.

The bruised leaves are applied as a poultice in gout. The unopened flower buds are laxative and, if prepared correctly with vinegar, are thought to ease stomach pain.

Capers are an appetizer and digestive. They are said to reduce flatulence and to be anti-rheumatic. They have reported uses for arteriosclerosis, as diuretics, kidney disinfectants, vermicifuges and tonics.

Mention in old books and modern treatment

An extract of the plant is one of the constituents of the Ayurvedic preparation administered to treat preliminary cases of acute viral hepatitis and cirrhosis of liver; and has shown encouraging results against viral infection in man.

The plant extract is also a constituent of another drug 'Geriforte' useful in treating senile pruritis, itching and other ailments associated with old age and anxiety neurosis.

In ayurvedic medicine capers (Capers = Himsra) are recorded as hepatic stimulants and protectors, improving liver function.

Diseases/Properties

Diseases: spleen disease, sciatica, backache, dropsy, gout, rheumatism, gastric pain, epilepsy, feminine sterility and dysmenorrhea, ulcers, scrofula,

hemorrhoids, and parasitic disease of camel

Properties: diuretic, astringent, tonic, appetizer, antidiarrheic, febrifuge, expectorant, clean eyes.

Other uses of the plant (Ethnobotany)

Roots and bark of the caper plant are used medicinally and in cosmetics.

Culinary Uses

Capers of commerce, which have been pickled in vinegar or preserved in granular salt, have a sharp piquant flavor and add pungency, a peculiar aroma and saltiness to comestibles such as pizza, fish, meats and salads. The flavor of caper may be described as being similar to that of mustard and black pepper. In fact, the caper strong flavor comes from mustard oil: methyl isothiocyanate (released from glucocapparin molecules) arising from crushed plant tissues.

Semi-mature fruit (caperberries) and young shoots with small leaves may also be pickled for use as a condiment. Caperberries are edible, piquant delicacies processed like the buds. Caperberries are sometimes picked with the stem attached, and are used as a garnish or an appetizer.

Tender young shoots including immature small leaves may also be eaten as a vegetable, or pickled.

In Morocco, given the price of the product, farmers usually prefer to sell them. Some times they are eaten like olives or used as legume in "tajines".

Centaureum pulchellum (Swartz)
Druce
Gentianaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
Erect annual, glabrous herb 5-20cm high, without a basal leaf-rosette. The stem is erect and stiff, usually branched in the lower part. 2-4 caudine internodes. Leaves are rosette, sessile, ovate, lanceolate, acute; basal leaves are obtuse. The upper leaves are ovate, lanceolate, acute and smaller. Flowers are 1-1.2 cm, pink, rarely white, forked, cymose-paniculate, usually long-pedicellate, corolla tube, 1-2 times longer than calyx segments. Lobes are oblong and obtuse. Stamens are inserted at the apex of the corolla-tube. Stigma is oval, the anthers oblong. The fruit is a two-valved many-seeded capsule. Seeds are minute and bright brown. Flowers from March to May.

Geographical Distribution
Local: Fairly common, grows mainly among cultivated crops by water sides in Fayoom area and the North coast, in Sinai
Regional: Some North African Countries
Global: Eurasia. Western Europe, Eastwards to China

Ecology
Moist soils, sheltered mountain crevices of Sinai and around fresh water springs

Centaureum pulchellum (Swartz) Druce,
Fl. Berkshire 342 (1898),
Gentiana pulchella Swartz;
Gentiana ramosissima (Vill.) Pers.;
Erythraea pulchella (Sw) Fr.;
Centaureum ramosissima (Vill.) Druce

Names

Arabic: قنطرية

English: Branching Centaury

French: Centaurea

Status

The plant grows in specific moist habitats, which are subjected to changes and drying. The plant is endangered in Egypt.

Part(s) Used

The whole flowering and fruiting herb.

Collection:

flowering and fruiting herb stage from July to September

Preparations

infusion, decoction and ointments

Use

oral and external

Constituents

Coumarins and coumarin glycosides; ammoidin (xantotoxin), ammidin and majudin (bergapten), alkaloid gentianine, a bitter principle kantaurin, oleanolic acid, erythrosterol and xanthones.

Pharmacological Action and Toxicity

Not available

Pharmacopoeia

Not available

Traditional Medicinal Uses

- Anti-diabetic

- Elimination of stones from the kidney and urethra
- Gastric and abdominal pain
- Hypertension
- Healing agent for wounds
- Renal colic
- Rheumatic pains



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial shrub with densely ramified stems at the base, rather small, not exceeding 40 cm. The leaves form a basal rosette; they are lanceolate, approximately 5 cm. long, slightly fleshy and covered with small calcareous concretions. Solitary flowers develop at the tips of the long thin stems. They have a thick reddish calyx and 5 pink petals. The fruits are small capsules. Flowering starts in early spring (end of February) and continues until late spring in May.

Geographical distribution

Local: The north-western areas of the Algerian Sahara.

Regional: Morocco and Algeria.

Global: Endemic of the Moroccan (south-east) and Algerian (north-west) Sahara.

Ecology

This hardy shrub thrives particularly on the stony grounds of the djebels. Its occurrence on gravelly-sandy wadi beds is less frequent. The rainfall range lies between 50 and 100 mm. per year and it can survive years of severe drought when the rainfall is less than 50 mm.

Ceratolimon feei

(Girard) M.B. Crespo & M.D. Lledó

Limoniastrum feei Batt.

Bubania Feei Girard

Limoniastrum: similar to the statice of the Limonium section.

Arabic: milahfet el khadem, rass el khadem, hadjaz el khadem

Status

According to the IUCN criteria this endemic species falls into the "EN" category.

The threat to this plant from human collection is mainly felt near settlement. Although no data has been reported on its conservation, measures should be taken for its propagation in nurseries.

Part used

The leaves are collected in the spring and prepared as an infusion and a decoction, taken by mouth.

Constituents

No data available in the literature regarding its constituents.

Pharmacological action and toxicity

No data available in the literature on the plant's pharmacological action and toxicity.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for diarrhoea and stomach pain.

When young, the plant provides good grazing.

In Morocco, the same use (for diarrhoea) is reported as for other species of the same genus (*Limonastrum gyuonianum* and *L. ifnensis*).

Ceratonia siliqua L.
Legumino-Caesalpinaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

The carob tree is a tall tree that can grow to 5-10 metres, with a short trunk, spreading cyme and thick foliage. It can grow to be very big: 16-20 m. high with a trunk 3 m. in circumference. It is long-lived, between 300 and 400 years. It seems dioecious but actually has hermaphrodite flowers. Its leaves are alternate, evergreen, with caducous, compound, paripinnate stipules, with 3-5 pairs of simple, tough folioles that are glistening underneath and glaucous on top, oval, whole, 6-7 cm. long and 4-5 cm. wide.

The flowers have a sweet, penetrating smell, and are reddish green, borne on the previous year's branches, in erect axillary bunches, dioecious or hermaphrodite, and very small; the calyx is a mere disc with 5 caducous lobes and the petals are non-existent. There are 5 stamens, diverging, protruding to some length and set under a glandulous disc. The pod is indehiscent, brown, flat, tough, pendant, 10-30 cm. long and with a sugary pulp containing 12-16 seeds.

The carob flowers in winter and the pods are ripe at the end of summer.

Geographical distribution

Local: Common in most of Tunisia either wild or cultivated.

Regional: In North Africa, it is widespread from Morocco to Libya.

Global: It is a Mediterranean species whose area extends from the Iberian peninsula to Turkey and North Africa.

Ceratonia siliqua L., Sp. Pl.: 1026, 1753

The carob tree's Greek name, *keration*, gave birth to the word 'carat' for a unit of weight used in the trade in gold and precious stones. Formerly, jewellers used the seeds as a unit for weighing (their weight being amazingly uniform).

Arabic: Kharroub

French: Caroubier à siliques, caroubier

English: Carob tree, locust tree

Ecology

The carob tree is indifferent to soil type but particularly likes Mediterranean soils.

It has markedly the same ecology as the olive in Tunisia. It is more sensitive to the cold and thus cannot grow in the cool variant unless there are compensatory factors (e.g. facing south). It develops in areas with an annual rainfall of 250-900 mm., but is happiest in 400-600 mm.

The carob is characteristic of the olealentic and carob groups, found from the lower humid to the lower semi-arid. These groups represent a warm to tepid variant of the oleolentisc groups, with its floral core, essentially composed of nitrophilous and humicolous plants. Its full development coincides with the upper semi-arid bioclimate level, where it is found both in the region lying between Zaghouan, Teboursouk, Jendouba, Oued Zarga and Tunis and in the foothills of Bargou, Serj and Belouata.

Status, conservation, culture

The carob tree is a species that is picked for use in Tunisia. Carobs are sold in shops that market condiments.

Research programmes aiming at mastering the technique of propagating and growing the carob are being developed within the Forestry Commission.

The carob tree is grown on light, fairly dry soil, in full sun. It dislikes cold. It is propagated by seedlings or by cuttings from harvested branches. Germination of the seeds is difficult. In nurseries, they are scalded to help them germinate.

Part used

Fruit: pericarp (pulp) and seeds.

Constituents

The pulp of the carob fruit contains various soluble sugars (40-45%), condensed tannins (20%), mucilage (2-3%), starch (3.5%) and fats. The seed with its integument removed has an albumen that provides the 'carob gum', made up of a sugary polymer (90-95%), proteins and mineral salts.

Pharmacological action

Against diarrhoea and vomiting, as a thickener.

Traditional medicine

The fruit's pulp triturated in water gives a refreshing juice that is diuretic, bechic and laxative. It is very good for diarrhoea.

Water from the carob is well-known for treating liver problems.

Carobs with fenugreek, *trigonella foenum-graecum* L., raisins, cumin, *Cuminum cyminum* L. and dried figs make a tisane taken in childbirth when it is difficult to stop haemorrhage. In southern Tunisia, a mixture of carob and figs is cooked to give a brown compote that is given to women when they rise after childbirth.

Use in herbal medicine

As a non-digestible thickener, carob gum from the

seeds is much used for infant vomiting. In diets, it is suggested as an additive to slimming diets. The fruit's pulp acts against diarrhoea for infant gastro-enteritis.

Other uses

The fruit is used in the agroalimentary industry (cream desserts, biscuits, ices, etc.) and as an additive in cosmetic products. The seeds act as a coffee substitute. The leaves and bark, rich in tannins, are used to tan skins. The pod is still used in certain traditional dishes.

Carobs are used for cattle fodder, the hard, rose-red wood for carpentry, the leaves and bark for tanning skins, and the juice to decorate traditional pottery. In industry, it is a substitute for astragant gum (emulsive), in cosmetology for gumming paper, in the textile industry, etc.



***Chenopodium ambrosioides* L.**
Chenopodiaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams

Edited by: Prof. K. H. Batanouny

Morphological Description
Aromatic annual herb 10-60 cm high, green, glandular hairy.
Flower and Fruit: The numerous small flowers are yellowish-green and form small racemes or roundish spikes in the axils of the apical leaves. The calyx is divided into 5; the lobes are ovate and pointed; there are 5 stamens. The ovary has small, ovoid, stemmed glands at the tip. The angular fruit is enclosed in the calyx. The small seeds are achaenes, smooth and black.
Leaves, Stem and Root: The plant is annual and grows to about 1m in height with a branched, reddish stem. The stem is covered in alternate-linear to lanceolate leaves.

Geographical Distribution
Local: The Nile region including the Delta, Valley and Faiyum, the oases of the Western Desert and the entire Sinai peninsula.
Regional: The Mediterranean coastal strip and North African countries.

***Chenopodium ambrosioides* L.,**
Sp. Pl., ed. 1, 219 (1753).

Names

Arabic: Netanah نتنة, Habaq El Bahr حب البحر

Fiss el-kalb فس الكلب Minteeна منتنة

English: Wormseed, Mexican tea.

Global: Native to tropical America; naturalized and cultivated worldwide.

Ecology

The plant grows along canals in the Nile as a weed, and in the mountains of Sinai in moist habitats.

Status

The plant is rare and endangered due to overcollection.

Part(s) Used

Whole plant - leaves

Collection

plants are cut in autumn for oil, or dried for liquid extracts and powder.

Leaves are picked as required and used fresh

Preparations

Decoction, infusion, essential oil

Use

Oral

Constituents

Contains variable amounts of ascaridole, limonene, myrcene, P-cymene, terpinene, saturated hydrocarbons (C21 to C31, with C29 predominant), triacetyl alcohol, spinasterol, and others. The plant smells of carbon tetrachloride.

Pharmacological Action and Toxicity

Ascaridole, the active principle of the oil, has anthelmintic properties, particularly against roundworms

(*Ascaris*). It is also effective against hookworms and dwarf tapeworms but not large tapeworms.

The oil is considered very toxic. Toxic effects include irritation of skin and mucous membranes, vomiting, headaches, vertigo, kidney and liver damage, temporary deafness, and circulatory collapse. Effects may be cumulative.

■ Traditional Medicine and Indigenous Knowledge

History: the plant was used as an anthelmintic for roundworms (*Ascaris*), hookworms and dwarf tapeworms, among others. Leaves, roots and plants of *Chenopodium ambrosioides* have been used in treating tumours. In China, the fresh root is used to treat articular rheumatism of the joints, metrorrhagia, eczema and bites.

■ Traditional Medicinal Uses

- Antasthmatic
- Anthelmintic
- Antispasmodic
- Carminative
- Diuretic
- Emmenagogue
- Digestive tonic
- Stomachic
- Stimulant
- Vermifuge

■ Other uses of the plant

The leaves and seeds of *C. ambrosioides* are used in cooking as a carminative flavouring with bean dishes. The major use is as a fragrance component in soaps, detergents, creams, lotions and perfumes.

Cistanche phelypaea (L.) Coutinho
Orobanchaceae



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial parasite, erect and not branched, 0.2 to 1 m. high. Its stem is between 3 and 5 cm. thick. The leaves are lanceolated, reduced to brownish scales. The roots are absent: the plant attaches itself to its host via small tubers. The main host plants are *Tamarix gallica*, *Calligonum comosum* and *Pulicaria sp.*

Its numerous flowers form a dense spike, with yellow petals, shaped like a tube with a 3-4 cm. opening at the top.

Since the plant appears after rain, flowering occurs soon afterwards; this can happen at any time of year in the high mountains of the central Sahara. Flowering in the more northern zones of the Algerian Sahara is usually in early spring.

Geographical distribution

Local: Common on the high plateaux and northern Algerian Sahara; rarer in the western and central Sahara.

Regional: North Africa.

Global: North Africa.

Ecology

This plant occurs in an arid climate with a low rainfall (under 100 mm. per year). *Cistanche phelypaea* favours sandy-loamy soils and is mainly found in

Cistanche phelypaea (L.) Coutinho

Cistanche tinctoria (Desf.) Beck.

Phelypaea lutea Desf.

Phelypaea tinctoria (Forssk.) Brot.

Arabic: danoun, tarathith

Targui: ahléwan

English: broomrape

French: cistanque

large wadi beds and can tolerate moderate amounts of salt.

Status

According to the IUCN criteria this saharo-mediterranean species falls into the "C" category. So far there is no data on its propagation and conservation.

Part used

The thick lower part of the stem is collected soon after rain.

It is used as a dried powder, taken by mouth. It is also used as a paste to put on abscesses.

The lower parts of the young shoots are cut in slices and dried to make poultices

Constituents

Starch and aromatic constituents.

Pharmacological action and toxicity

No information was found on the pharmacological action of this plant, while a search on its toxicity appears negative.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for diarrhoea, diabetes, intestinal troubles, infection (abscesses) and as a diuretic.

Nomads in southern Morocco and Algeria eat the lower part of the broomrape either boiled in water or cooked in ashes and mixed with cereals to make a sort of porridge or a flat bread.

It is also known for its aphrodisiac properties. The plant is also used for tanning and dyeing skins. In the Tissint region (Morocco), the powder is

applied to wounds as a haemostat.

A preparation made from the dried lower part of the broomrape, honey and leaves of the olive tree is used as a cream for haemorrhoids.

In Egypt, the dried powdered plant mixed with camel's milk is used to poultice contusions.

***Citrullus colocynthis* L.**
Cucurbitaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photos by Prof. K. H. Batanouny

Morphological Description
Coccyglochia is a perennial herbaceous vine, with angular and rough stems. Stems are 0.5-1.5m, procumbent, branched, angular and hirsute. The root is fleshy. Leaves are rough, 3-to 7-lobed, 5-10 cm long, the middle lobe sometimes ovate, sinuses open, flowers monoecious, solitary, peduncled, axillary, corollas 5-lobed; ovary villous. Fruit are nearly globular, 4-10 cm in diameter with somewhat elliptical fissures, about the size of a small orange; variegated green and yellow, becoming yellow when ripe, with hard rind, the pulp light in weight, spongy, easily broken, light yellowish-orange to pale yellow, and intensely bitter. Seeds are numerous, ovoid, compressed, smooth, dark brown to light yellowish-orange, borne on parietal placenta. Flowers in summer. The plant produces 40-60 fruits every year.

Geographical Distribution

Local: Almost all the deserts of Egypt. At the Red Sea, near Kosseir, it occurs in large quantities.
Regional: All North African countries.
Global: Semi-deserts and deserts of North Africa, Southern Europe and Asia, from the Canary Islands Eastwards to India.

Ecology

Ranging from cool temperature moist through tropical desert to west forest life zones, colocynth is reported to tolerate annual precipitation of 38 to

***Citrullus colocynthis* L.**, Schrader, Linnaea 12:414.(1838) *Cucumis colocynthis* L., *Colocynthis vulgaris* Schrad.

Names

Arabic: Handal, حنضل, Handhal, حنضل

Oorky, طاطور, Tatoor, Hadag, حاج

حنضل

Berber: Tadjellet, Alkat, Taferzitz, Tifersit, Ubruzi.

English: Colocynth, Bitter apple, Bitter gourd.

French: Coloquinte, Chicotin.

430 mm, and an annual temperature of 14.8 to 27.80C. A highly xerophytic plant, it thrives where the mean annual temperature is from 23-27 oC and annual rainfall ranges from 25-37 cm. It thrives on sandy loam, subdesert soils, and along sandy sea coasts. It appears grouped in depressions receiving runoff water.

The plant is easily cultivated from seed, as it grows rapidly, requiring no attention once fields have been sown.

Status

The plant is safe, and is common in all North African countries. However, cultivation of the plant for medical purposes has been recommended. Being a member of the Cucurbitaceae, it could be cultivated in a similar manner to water melons. However, it is more drought-resistant. The plant produces numerous fruits every year, ca 40-60 fruits per plant.

In Egypt, the plant is not cultivated but fruit yields from wild plants supply a small amount of yellow pulp.

Part(s) Used

The leaves, pulp of the peeled fruit (colocynth), the seeds and the roots.

Collection

Fruits gathered when still unripe but fully developed. Fruit is hand-picked, the thin, hard, gourd-like outer rind (pericarp) removed by peeling, and the inner white spongy pulp filled with seeds. It is dried in the sun or in ovens. Commercial colocynth occurs

in two forms: as a pulp from which most of the seeds have been removed, and as "bitter apples" or masses of pulp filled with seeds that have been rolled into balls. Both forms are usually shipped in boxes.

Preparation :

Compound Colocynth tablets, Compound Colocynth extract

Use

Oral, external.

Constituents

Pulps (colocynth) contains cucurbitacins including elaterinide and cucurbitacine E, cucurbitacine B, other glycosides liberating cucurbitacines I and L, alkanes, aliphatic alcohols, alkaloids and choline base.

Roots contain elaterin, hemtriacontane, and saponins.

Seeds contain about 16% fixed oil, phytosterols, phytosteroline and mucilage.

Pharmacological Action and Toxicity

Colocynth is an irritant and cathartic. It acts powerfully, producing copious watery evacuations. Even in moderate doses, it has caused inflammation of the mucous membrane of the intestines, vomiting, severe tormina, and bloody stools. Except in minute doses, it is never used alone but with other laxatives and anodynes such as Aloes and Henbane. The leaves exhibit antiflammatory activity and are diuretic. They are recorded as being used in the treatment of asthma and jaundice.

The plant has been used for arterial hypertension and has hypoglycemic, antihyperglycemic and insulinotropic effects. Plant extracts are carcinogenic in mice. It is useful in constipation and in painful menstrual complains. It shows anti-histaminic, anti-acetylcholine and cardiac depressant activities.

The extract of the dried pulp also has anti-bacterial activity.

Toxic effects after chronic use include hypokalemia, oliguria and oedema, similar to acute nephritis, and symptoms resembling Crohn's disease and Addison's Disease.

In case of poisoning by colocynth, the stomach should be emptied, and opium given orally or as a suppository, followed by stimulants and demulcent drinks. A considerable number of severe cases of poisoning with this substance have occurred in humans, and a few have proved fatal. It should never be taken by nursing mothers since the active constituents appear in breast milk.

Pharmacopeias

The Augustana Pharmacopoeia (1581, 1684).

Pharmacopee Francaise 1965.

Pharmacopoeia of the Massachusetts Medical Society, Boston, 1808

The German Pharmacopoeia of 1872, 1882 and 1890.

The Egyptian Pharmacopoeia (1984).

Pharmaceutical Products

No-habit, Lotion, Tri M. Medical.

Traditional Medicine and an Indigenous Knowledge

History: In Egypt, the Bedouins made a poultice of colocynth with warm cooking oils then placed it on the joints to combat rheumatic pain. The leaves have been used for painful menstruation, and the fruit, broken into small pieces, is used to protect woollen clothing from moths. The leaves are diuretic and used in the treatment of asthma. The root has been used in inflammation of the breasts, amenorrhoea and rheumatism. The fruit is pungent, a cooling purgative, anthelmintic, antipyretic and carminative. The fruit pulp is purgative, diuretic and is used against gonorrhoea.

Traditional Medicinal Uses

- Chest diseases (Bronchial Asthma)
- Constipation
- Rheumatic diseases
- Tumour diseases

Other uses of the plant: Roots are used as abortifacient. A decoction of the whole plant, made in juice with fennel, is said to help indurations of the liver.

In Morocco, the fruit, broken into small pieces, is used to protect woollen clothing from moths.

Cleome arabica subsp.
amblyocarpa (Barratte et Murb.)
Ozenda
Capparidaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

Cleome arabica is a herbaceous, sticky plant with a strong, foul smell and an unpleasant taste. It easily grows to over 50 cm. in a rainy year. Its stems are rigid, erect and branched and bear alternate trifoliate leaves.

The flowers are small, in leafy bunches. The calyx has 5 lobes. The corolla is formed of 4 unequal yellowish petals that are edged with deep purple or entirely purple-black. The androecium is made up of 6 stamens and the ovary is on a short podogynia. The fruit is dry and dehiscent, formed of long, hanging siliqua-shaped capsules that enclose hairy seeds whose hair length differentiates the two subspecies in Tunisia: the subsp. *arabica* Ozenda with its woolly long-haired seeds of equal diameter set in siliqua that taper towards the tip the subsp. *amblyocarpa* (Barr. et Murb.) Ozenda, which differs from the other by having seeds that are covered with very short hairs no more than 1/3 their diameter and siliqua that are rounded at the tip. Only the second subspecies is found in Tunisia, and it is probably synonymous with *Cleome amblyocarpa* Barr. et Murb. Indeed, Greuter et al. (1986) see *Cleome arabica* L. as a non-Tunisian species.

The species of this genus that develop in Tunisia are rather *Cleome amblyocarpa* Barratte and Murb.

Cleome arabica subsp. *amblyocarpa*
(Barratte et Murb.) Ozenda; Fl. Sahara: 247.
1958. *Cleome amblyocarpa* Barratte et Murb.; Acta
Univ. Lund. Ser. 2, 1 (4): 25. 1905

Arabic: Mnitna, oum jlajel

French: Cléome d'Arabie

(=*Cleome arabica* subsp. *amblyocarpa* (Barratte et Murb.) Ozenda and *Cleome arabica* Boc. both corresponding to a suspect name that is not accepted, *Cleome arabica*.

Moreover Boulos (1979) corrected this by stating that the true *Cleome arabica* L. is restricted in area to the Sinai and that for the rest of North Africa (thus, Tunisia) the plant is *Cleome amblyocarpa* Barr. et Murb.

Flowering takes place between January and April.

Geographical distribution

Local: Very common in the south; also found in the Kerkennah Islands and Djerba.

Regional: North Africa.

Global: From Morocco to Arabia.

Ecology

Cleome amblyocarpa is abundant in sandy environments, and the gravel and stony ground of the desert regions and arid steppes.

Status, conservation, culture

Not cultivated; picked for use.

Part used

The leaves.

Traditional medicine

Used as a bechic and a sedative. Also used mixed with *Juniperus phoenicia* to ease pain, *Hammada scoparium* for headaches, and *Artimisia herba alba* for nausea, gastralgia, vomiting and colic.

Toxicity

It is a toxic plant that causes nervous disorders in animals.

Cleome droserifolia (Forssk.) Delile
Asclepiadaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description

Perennial, low aromatic shrub, 25-60 cm, cushion-like, yellowish-green, glandular-viscid. Stems intricately branched. Leaves orbicular or broadly ovate, usually broader than they are long, 3 nerved, thick-textured, densely glandular hairy. Petiole 1-2 cm. flowers 1-1.5 cm, in the axils of upper leaves, forming a lax few-flowered raceme, bracts not differentiated from leaves, pedicels 1-1.5 cm. Sepals 4-8 X 1-2 mm, dimorphic, lanceolate. Petals 0.8-1 X 0.2-0.3 cm, greenish-yellow, appendiculate, dimorphic, 2 broad and 2 narrow. Stamens 4. Fruit 1-2 X 0.3-0.4 cm, erect. Seeds 0.5-1 mm, smooth, glabrous.

Geographical Distribution

Local: Eastern Desert, Red Sea region, Sinai, Gebel Elba

Regional: Egypt, Libya

Global: Arabia, Syria, Palestine, Ethiopia

Ecology

The plant grows in stony and sandy wadies and plains.

Status

In the last decade, the plant has been subject to severe overexploitation to be used in folk medicine for diabetes. It has been eradicated from vast areas, especially in the Sinai and the Eastern Desert.

However, in the far south of the Eastern Desert, the plant is still flourishing and is growing in many

Cleome droserifolia (Forssk.) Delile,
Descr. Egypte, Hist. Nat. 250 (1814).
Syn. *Roridula droserifolia* Forssk. Fl. Aegypt.-Arab.
LXII, 35 (1775).

Names

Arabic:

السموة، عين، ديع البرد، المشطر El-Samwa

English: Cleome herb

wadis in hot desert areas. Conservation of this species is urgent.

Part(s) Used

The air-dried herb

Collection

In the flowering stage

Preparations

Powders and paste

Use

Oral, and as a paste for treatment of wounds and dermatitis.

Constituents

Volatile oil about 0.4% which consists of 3-butenylisothiocyanate, 2-methyl butenylisothiocyanate, benzylisothiocyanate, a, b, and g-caryophyllene, 2-naphthyl-n-propyl ether. Sesquiterpenes: carotol and dihydrodihydroxy carotol. Gluconolactones with sulfur aglycones e.g. glucocapparin. Flavonoids (0.295%) which consist of kaempferol-3,7-dirhamnoside, isorhamnetin-3-glucoside, kaempferol-3-glucoside, kaempferol, quercetin-3-glucoside, kaempferol, artemitin, 5,7,4'-trihydroxy-3-methoxy flavone, 5,7,4'-trihydroxy-3,3-dimethoxy flavone, 5,7,4'-trihydroxy-6,3'-dimethoxy flavone (jaceosidin), 5,4'-dihydroxy-3,6,7 trimethoxy-flavone (penduletin), 5,7,3',4'-tetrahydroxy-3,6-dimethoxy flavone (axillarin), 5,3'-dihydroxy-3,6,4',5'-pentamethoxy flavone, 5,4'-dihydroxy-3,6,7,8,3'-pentamethoxy-flavone, 5-hydroxy-3,6,7,3',4',5'-hexamethoxy flavone. Sterols e.g. b -sitosterol and stigmasterol, triterpenes,

saponins, coumarins, alkaloids and docosanoic acid.

Pharmacological Action and Toxicity

1. Aqueous and chloroformic extracts of the herb showed a significant reduction of blood glucose in rats.
2. Aqueous extracts of the herb showed a good antimicrobial activity against *Staphylococcus aureus*, *Streptococcus faecalis*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Klebsiella pneumoniae*, *Escherichia coli* and *Candida albicans*.
3. LD₅₀ = 2175 mg per Kg. Toxicity symptoms: tremors, convulsions, arched back, sweating, rapid and shallow respiration, coma followed by death.
4. Ethanolic (70%) extract of the plant has antihistaminic effect, inhibitory effect on rabbit's duodenum, uterus, rabbit's heart; a relaxant effect on guinea pigs' trachea; a decrease in arterial blood pressure; a diuretic and mild tranquilizing effect with moderate progesteron-like action.
5. Hypoglycemic and hepatoprotective. It is safe

for oral administration.

6. It causes decrease in body weight in rats.
7. The plant is very toxic if given intraperitoneally.

Traditional Medicine and Indigenous Knowledge

History: Its name comes from the Greek 'kleio' meaning 'enclose'. This kind includes approximately 150 species of annual or persistent shrubs, originating in the tropical or subtropical zones. Paste of powder used topically for treatment of wounds and for dermatitis. Powder (5 gr.) taken before meals has been used for the treatment of hyperglycemia (diabetes).

Traditional Medicinal Uses

- Antioxidative
- Antidiuretic
- Antidiabetic
- Bronchial asthma
- Hypoglycemic effect
- Hepatoprotective
- Kidney diseases

***Coridothymus capitatus* (L.)
Reichenb. fil**
Lamiaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

This is a sweet-smelling shrub with erect spreading branches, between 20 and 40 cm. high. The leaves are simple, small, linear, and glandulous-spotted; in spring those on the flower-bearing branches are very caducous; in the dry season those on non-flowering branches are tightly packed and seem to overlap at the tips. The floral leaves are lengthily ciliated. The inflorescence is a compact, ovoid, terminal capitulum. The pink corolla is twice the calyx, which is compressed and laterally utricular. Flowering occurs from April to July.

Geographical distribution

Local: It is very widespread in the north, the Medjerda valley, the Mogods, the north-east, the Tunisian dorsal ridge (Kef, Djerissa, Zaghouan), Cap Bon, and central Tunisia (Hammam Sousse, Sidi El Hani, El Jem) but is rarer in southern Tunisia.

Regional: North Africa.

Global: The Mediterranean, except France.

Ecology

Widespread throughout almost the whole of Tunisia, usually on stony ground and arid grazing land. In the south, it is restricted to the *oueds* that run down from the mountain chain of the Matmatas.

Status, conservation, culture

The plant is greatly sought after, particularly for its

***Coridothymus capitatus* (L.) Reichenb. fil**
in Ostten. Bot. Wachenbl. 7: 161. 1857 *Satureja capitata* L., *Thymbra capitata* (L.) Cav., *Thymus capitatus* (L.) Hoffmanns et Link, *Thymus cephalotes* L.

Arabic: Zaâter

French: Thym en capitules

aromatic quality. It is frequently picked, often without supervision. Sometimes it is grown in gardens. The flowering branches and the leaves are sold fresh or dried by herbalists and by people who sell medicinal and sweet-smelling plants in the souks of the region.

Part used

The branches, leaves and inflorescences.

Constituents

The essential oil of this thyme is rich in carvacrol-thymol and contains a small quantity of tannin.

Pharmacological action and toxicity

The essential oil of this thyme is an antiseptic, bactericide and fungicide. The pharmaceutical industry mainly uses its essential oil.

Traditional medicine

It is used in an infusion for stomach coughs, in a tisane (Le Floc'h, 1983) to produce an abortion (in the El Hamma to Gabès region), and ground up in a mixture to give sexual potency (in the El Hamma to Gabès region).

It is also used to flavour food.

In north-western Tunisia (Ben Boubaker, 1997), it is also used for flu, bronchitis, diabetes, high blood pressure, chill and stomach-ache. The dried ground plant is believed to be an aphrodisiac and to cure furuncles.

Use in herbal medicine

The flowery tips and the essential oil are used as antiseptics for the respiratory and genito-urinary tracts; they are antispasmodic and antifungal.

Cornulaca monacantha Del.
Chenopodiaceae



Compiled by Dr. Salima Benhouhou

Morphological description
A vigorous shrub, strongly ramified from the base, growing to 1 m. high. Greenish, turning yellowish or whitish when dried, glabrous-glaucous, except the leaf axils. The leaves are 4-10 mm., alternate, curved, tapering from a clasping base to a rigid spine, woolly in the axils. The small greenish flowers, located at the base of the leaves (1 to 3), surrounded with a thick layer of white wool, bracts up to 4 mm., are spinescent. Perianth – segments c. 5 mm., linear, subspatulate, obtuse, more or less denticulate at the apex. The fruit is an achene. Flowering takes place in autumn.

Geographical distribution

Local: Fairly common in the northern Algerian Sahara, common in the central Sahara, absent from the high mountains.

Regional: North Africa.

Global: It is a Saharo-sindian species found in North Africa, Nubia, Arabia, Iran and Pakistan (Baluchistan).

Ecology

This hardy shrub favours sandy soil, but grows also on regis with a moderate content of gypsum and salt. The long roots help it survive in harsh climatic condition where the rainfall does not exceed 150 mm.

Status

According to the IUCN criteria this Saharo-sindian

Cornulaca monacantha Del.
monacantha: with one spine

Arabic: had, djouri

Targui: tahara

species falls into the "C" category.
The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre.

Part used

The leaves. A decoction of the leaves is taken on an empty stomach.

Constituents

Gallotannins : Monacanthin A and B; Tannins (newly identified) and penta-O-galloyl-*d*-glucose and 1,2,3,6-tetra-O-galloyl-*d*-glucose.
Flavonol glycoside : quercetin-4-*O*-*d*-galactoside.
Flavonoids : luteolin-7-O-rhamnoside, luteolin-7-O-glucoside.
Triterpenoidal saponins.

Pharmacological action and toxicity

No information was found on the pharmacological action of this plant, while a search on its toxicity appears negative.

Pharmacopeias

Not relevant for this species.

Pharmaceutical Products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for liver problems and jaundice, as a hepatic and a purgative.
It is considered excellent pasture for camels, despite the spines on the leaves; it also has a beneficial purgative effect for camels, as well as helping milk production. It is also used as a remedy for scabies. In Morocco, the plant is used for the same purpose (for icterus).



Compiled by Dr. Sallma Benhouhou

***Cotula cinerea* Del.**

Brocchia cinerea (Del) Vis.

Cotula: from the Greek kotule, small cup, referring to the cupped area at the base of the leaves;
cinerea: ash coloured, like ashes

Arabic: gartoufa, robita, chiriya

Targui: takkelt

English: Saharan camomile

French: camomille du Sahara

Morphological description

A small annual plant, usually between 10-20 cm. high, rarely reaching 40 cm. Whitish, woolly leaves dissected in their upper parts with flat lobes. The flowers are grouped in yellow discoid hemispherical heads 6-10 mm. in diameter. The fruits are small achenes no bigger than 5 mm.

It flowers in early spring in the northern Algerian Sahara, and any time after rain in the central Algerian Sahara.

Geographical distribution

Local: Very common in the Algerian Sahara.

Regional: North Africa.

Global: It is common throughout the Sahara, including the Red Sea region and Sinai.

Ecology

A small annual plant that thrives in desert conditions with an average 100 mm. rainfall a year and favours sand-loamy soils. The plant is usually found on non-saline wadi beds, on gravelly-sandy soils.

Status

According to the IUCN criteria this Saharo-sindian species falls into the "C" category.

Although no problems are reported for this species, human collection near settlement may be a threat in the long term. In the wild, the best means of conservation is the remoteness of its sites as well as the seed bank that contains the plant during drought. The best way to conserve this annual is to collect the seeds and sow them in nurseries. So far no data has been reported regarding its propagation and conservation.

Part used

The whole plant, dried; the flower heads. These are collected in the spring when in flower, and sold in the market in several places in the south (Djanet, El Golea). The plant is prepared as a decoction, a powder of the entire plant, and mixed with other plants; it is taken internally as a decoction and used externally as a poultice.

Constituents

Flavonoids.

Pharmacological action and toxicity

Antibacterial activity. A search on its toxicity appears to be negative.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for broncho-pulmonary conditions, coughs, digestive problems (including nausea, vomiting and stomach pain), sunstroke and rheumatism. It is applied as a poultice to the forehead for its febrifugal properties.

In the Sahara, it is much appreciated in green tea, and is also mixed with food to enhance the flavour. In the Dra region of Morocco, it is used as a febrifuge, either drunk as a decoction or as a poultice on the forehead and temples.

***Crataegus azarolus* L.**
Rosaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

This hawthorn is a perennial shrublet, shrub or tree whose size when adult can vary from 1.5 m. to 8 m. The young branches of the current and previous year are woolly-hairy. The robust spines can be at least 1 cm. long, but are often non-existent, especially in cultivated specimens. The tough, gleaming leaves have a short, woolly (or at least hairy) petiole even when adult and a limb divided into 3-5 lobes that are whole or slightly toothed at the tip.

The white or pinkish flowers cluster in a corymb with robust cottony or hairy pedicels. The triangular sepals are usually hairy. The ovary has 2-3 styles.

The fruit has two stones over 1 cm. in diameter and is fleshy, sugary, acid and scented.

Two varieties are mentioned in Tunisia: the var. *eu-azarolus* Maire, not very spiny, with red fruit at maturity, and the var. *aronia* (Willd.) Batt., spiny and with yellow fruit.

Flowering starts in March; fruiting ends in late August, September.

Geographical distribution

Local: It grows wild or sometimes sub-wild, in the Kroumirie, the dorsal ridge, Cap Bon and central Tunisia.

Regional: Tunisia, Algeria.

***Crataegus azarolus* L.** Sp. Pl. P. 447. 1753
Mespilus azarolus (L.) All.; *Crataegus aronia* Lindl.

Arabic: Zârour

French: Azérolier

English: Mediterranean medlar, hawthorn

Global: The Mediterranean, Europe, North Africa, South West Asia.

Ecology

This hawthorn is found in semi-arid, sub-humid and humid bioclimates on little developed soils, but does not go up into the mountains.

Status, conservation, culture

The medlar is a wild species in Tunisia. Several trees have been found in protective hedges; their size implies that they were cultivated long ago and then abandoned. Today it is picked for use, especially in places not far from the capital, like the Tunisian dorsal ridge (Zaghuan, Hammam Zriba, etc.), Jebba, Ghar El Melh, etc. and the red or yellow fruits are sold as a delicacy in the markets and by itinerant hawkers. Medlar growing should be developed, for it could be a sizeable source of income in semi-arid regions.

Part used

The branches and fruit.

Constituents

There are pro-cyanidic oligomers (2.5-4.5%), the monomeric unit being mainly formed of catechin or epicatechin; flavonoids; traces of essential oil.

Traditional medicine

The raw fruits, or a glass of decoction of leaves early in the day, are taken for sugar diabetes. A decoction of the leaves is used to treat gastric ulcers.

Use in herbal medicine

Oil from the fruit is used to treat a heart condition.

***Crataegus oxyacantha* L. subsp.
monogyna (Jacq.)
Rouy et Camus
Rosaceae**



Compiled by: Dr. Zeineb Ghrabi

■ Morphological description

The spiny hawthorn is a shrub 5-6 m. in height, very polymorphic, usually spiny and with caducous leaves. The young branches, petioles and peduncles are glabrous or slightly hairy. The leaves are simple, stipular, with a wedge-shaped oval limb divided into 3-5 lobes with toothed edges and converging nervures. The flowers are white, sometimes with a pinkish tinge, sweet scented, numerous and arranged in a corymb. The calyx has 5 triangular sepals reflected on the fruit. The ovary is inferous and usually has a single style. The fruit is a drupe usually crowned with a marcescent calyx, small (8-12 mm. in diameter), globular and red and has a single stone the size of a pea. Two varieties are found in Tunisia: the var. *hirsuta* Boiss. (=var. *pubescens* Coss.) and the var. *fallax* Maire. They differ as to hairiness of leaves, inflorescence and receptacle and the depth of cut in the limb and lobe edges, whether or not these are toothed.

■ Geographical distribution

Local: Hedges, bushes and woods in the Cap Bon, the north-east, the Mogods, Kroumirie and the dorsal ridge.

Regional: North Africa.

Global: Europe, North Africa, naturalised in the east of North America.

***Crataegus oxyacantha* L. subsp.
monogyna (Jacq.) Rouy et Camus;** Fl. Fr.7,
p. 5. 1901. *Crataegus oxyacanthus* var. *monogyna*
Loud.; *Mespilus oxyacantha* (L.) Grantz; *Mespilus*
monogyna Willd.; *Oxyacantha monogyna* J. Roem

Arabic: Zâarour

French: Zubépine épineuse

English: Hawthorn

■ Ecology

The spiny hawthorn grows especially in the Zeugitan chain, in well-watered parts of the semi-arid region, and also at higher altitude.

■ Status, conservation, culture

The spiny hawthorn is a wild species in Tunisia, picked for use. Research work is being done at INAT and INRGREF to discover how polymorphous it is (prospection, identification, morphological variability, genetics, chemistry, etc.) and develop its cultivation.

■ Part used

Leaves and fruits.

■ Constituents

The spiny hawthorn's flowery tips contain pentacyclic triterpenic acids, aromatic amines, traces of essential oil, flavonoids (2%) and proanthocyanidols (2-3%).

■ Traditional medicine

A decoction of the bark of the root is used to treat gastric ulcers. The fruits can be profitably eaten by diabetics.

■ Use in herbal medicine

Preparations based on the flowery tips of the hawthorn improve coronary circulation and the nutrition of the cardiac muscle. They are also known to be hypotensive, tonicardiac, antispasmodic and a sedative for the central nervous system. The berries are suggested for urinary and biliary lithiasis.

Cupressus sempervirens L.
Cupressaceae



Compiled by: Dr. Zineb Ghrabi

Morphological description

Cupressus sempervirens is a tall tree (usually 15-20 m. high but can reach 30-40 m.) with a well-developed trunk (may be 3 m. in circumference); it grows quickly until the age of 20 and can live to be 500. Its leaves are evergreen, dark green, either acicular (in young stages) or very small, scale-like and overlapping in four ranks. The female cones are globular (2-4 cm.), shiny, with 6-12 woody, peltate, unequal scales, opposed crosswise on a short axis. The ovuliferous scales bear many ovules. The seeds are jagged, shining brown and narrowly winged. Flowering takes place in spring; the cones mature the following spring.

The *Cupressus* genus includes, for the sake of convenience, an aggregate called *Cupressus sempervirens* aggr., formed by a group of three species that are often confused and usually very close to each other (Greuter et al., 1984). *Cupressus atlantica* Gaussen, a Moroccan endemic; *Cupressus dupreziana* A. Camus, an Algerian endemic (= *Cupressus lereddei* Gaussen); and *Cupressus sempervirens* L. (= *C. fastigiata* DC; *C. horizontalis* Miller; *C. pyramidalis* Targ.-Tozz.). For

Cupressus sempervirens L.

Sp. Pl.: 1002. 1753
Cupressus fastigiata DC

Arabic: serouel

French: cyprés toujours vert, cyprés d'Italie

English: evergreen cypress, Italian cypress

the last species, three forms differing in the direction of the branches are signalled in Tunisia (Cuenod, 1954; Nabli, 1989; Neffati et al., 1999; Gammar 1998): the *stricta* Maire = *C. pyramidalis* Targ. form with vertical branches parallel to the trunk the *horizontalis* (Mill.) Maire form with spreading, widely spaced branches the *numidica* Trab. form with a very special appearance: the branches start horizontally like those of *horizontalis* but quickly rise and grow vertically. This particular appearance gives this form a more voluminous top than the *stricta* form. The *numidica* Trab. form is exclusively Tunisian, and considered as a Tunisian endemic taxon.

Geographical distribution

Local: In Tunisia, only the *numidica* Trabut form grows wild (three small stations in the Kessara massif, the Tunisian dorsal ridge); the other *pyramidalis* and *horizontalis* forms are cultivated.

Regional: Intermittently distributed in North Africa: Tunisia, Algeria, Morocco (a 6,000-ha. massif in the High Atlas). Species also present in Cyrenaica.

Global: A wild, or very anciently naturalised, species around the entire Mediterranean. North Africa, Greece, Crete and western Asia.

Ecology

Cupressus sempervirens in its *numidica* form grows in Tunisia at an altitude of between 520 and 1,080 m., in the upper semi-arid regions of the cool variant where the average annual rainfall is between 470 and 600 mm. In Makthar it forms a tree-dotted matorral, sometimes mixed with Aleppo pine, or it is associated at a low altitude with *Olea europaea*, *Crataegus monogyna*, etc.

Status, conservation and culture

The evergreen cypress is a forest tree that was naturalised very long ago in the whole of the Mediterranean; it is used in reafforestation programmes, and grown as a wind-break or as an ornamental tree.

Part used

The leaves and cones.

Constituents

The branches of the cypress contain biflavonoids, essential oils (0.3-0.8%) rich in monoterpenic carbides, sesquiterpenics and diterpenics. The cones contain 0.5% of H. E. rich in apinene, diterpenic acids, tannins and proanthocyanidolic oligomer derivatives.

Traditional medicine

A decoction of the cones and leaves of *Cupressus sempervirens* is used in a sitz bath three times a day for one week for haemorrhoids; no beef or eggs must be taken.

Pharmacological action and toxicity

The proanthocyanidolic oligomers have an angio-protective action; they are inhibitors of the angiotensine conversion enzyme and inhibitors of elastasis and of tryptic activity. Aqueous preparations and hydroalcoholic extracts of the cones and leaves do not present toxicity; the essential oil, however, should be used with precautions.

Use in herbal medicine

The cones and leaves are used internally as an astringent. Externally, the extract of the cypress is incorporated in preparations (ointments and suppositories) used to treat haemorrhoids and varicose veins; it is excellent for venous circulation disorders.

The essential oil is an antiseptic and an antispasmodic for stubborn coughs.

Medicines with a cypress cone basis are traditionally used for subjective evidence of venous insufficiency, such as heavy legs, and in haemorrhoidal symptomatology.

Cymbopogon schoenanthus
Spreng. Graminae (Poaceae)



Compiled by Dr. Salima Benhouhou

■ Morphological description

A perennial grass, forming dense tussocks at the base and numerous erect 60-80 cm. stems. The leaves are linear, tough and strongly curved. The inflorescence is contracted at the base, becomes looser towards the end and is protected by a distinctive spathe. Each spike contains a single flower. Between the spikes, several characteristic small whitish hairs appear. The roots have a pleasant aromatic smell. Flowering takes place in the spring, usually March and April.

■ Geographical distribution

Local: Well represented in the Algerian Sahara.

Regional: North Africa.

Global: It is widely distributed from the tropical region through North Africa and Asia.

■ Ecology

It grows in arid regions with a low rainfall (around 100-150 mm. per year). This plant is found on the gravelly-sandy soils of non-saline wadi beds as well as on the gravelly-stony soils of djebels.

■ Status

According to the IUCN criteria this species falls into the "C" category.

The main threat is overgrazing with a negative impact on its regeneration near settlement.

The plant is not threatened and appears on the floristic list of several protected sites listed by

Cymbopogon schoenanthus Spreng.

Andropong laniger Desf. , *Andropogon schoenanthus* L.

***Cymbopogon*:** from kymbe, boat, and pogon, beard, referring to the flower spike's appearance; ***schoenanthus*:** from the Greek scheinos, rope, rush-like stems

Arabic: el lemad, idjhir

Berber: tébarémt

English: camel's hay, camel grass

French: schoenanthe officinale, herbe à chameau, paille de la Mecque

UNEP World Conservation Monitoring Centre and Man and Biosphere (MAB).

■ Part used

The flowers; the stems with leaves on; and the entire plant. It is collected in the spring and prepared as an infusion and a decoction, and taken by mouth.

■ Constituents

Essential citrus oil, tannins, glucoside, flavonols, piperitone, limonene.

Pharmacological action and toxicity

Molluscicidal and insecticidal activity.

A search on its toxicity appears negative.

■ Pharmacopeias

Not relevant for this species.

■ Pharmaceutical products

It is one ingredient of a cream that helps prevent skin problems and protect against environmental damage. The brand is HydraFluid Cream and is sold in the USA.

Oil extract from this plant is an ingredient of Epsom Lemongrass Bath Salts, and Grapefruit Calendula Botanical Bath Salts. These are products of a brand of Botanical Bath Salts by the Splah company.

■ Traditional medicine and local knowledge

It is used for anorexia; it is astringent, carminative,

diuretic, emmenagogic, febrifugal, gastralgic, rheumatismal and sudorific. It is also used as a poultice to cure dromedary wounds. In the Djanet area, the plant is particularly appreciated for its medicinal values and is well known to bring back the appetite. It is taken as a diuretic (infusion); it cures intestinal troubles and food poisoning (decoction) and helps digestion. The young leaves are eaten with a salad or cooked

with meat. It is also drunk instead of tea. It is a much appreciated pasture. *Cymbopogon schoenanthus* straw was used in the Sahara to fill mattresses. In the Haouz region of Morocco, an infusion of the flowers and the whole plant is febrifugal, diuretic, antirheumatismal and antigastralgic. In Egypt, similar uses are reported: febrifuge, antirheumatic, poultices for camel wounds. It is also thought to be emmenagogic, astringent, carminative and sudorific.

Cynara cardunculus L. var. sylvestris (Lamk.) Fiori
Aster



Compiled by: Dr. Zeineb Ghrabi

Morphological description

The wild artichoke corresponds to the *sylvestris* variety of *Cynara cardunculus* L. It is a perennial, with a stem 20-60 cm. high, winged, spiny, furrowed, tomentose, simple or branched in the upper part.

The leaves are big and feathery, ashy green above and tomentose white below. The segments are linear and lanceolated, ending in a short spine. The lower leaves form a rosette, and are petiolate and 30-60 cm. long. The culinary leaves are sessile, decreasing in size.

The terminal capitula are big, 4-5 cm. in diameter, and ovoid-globulous. The bracts of the involucre are fleshy at the base, tough, almost glabrous, triangular, long and tapering into spines; the middle ones are spreading. The receptacle is fleshy and thickly covered with silky hairs.

The flowers are blue with prominent stamens. The achenes are tetragonal, with winged angles, and the pappi have very long feathery silk hairs. Flowering takes place from June to July.

Geographical distribution

Local: The Kroumirie, the Medjerda valley, the dorsal ridge; rare in central and south Tunisia.

Regional: Tunisia, Algeria and Morocco.

Global: North Africa and the northern Mediterranean.

Ecology

The wild artichoke grows in grassy places and clayey depressions.

Cynara cardunculus L. Sp. Pl. 827. 1753
Cynara cardunculus L. var. *sylvestris* (Lamk.) Fiori

Arabic: Khorchef

French: Artichaut sauvage

English: Wild artichoke

Status, conservation, culture

In Tunisia, Pottier Alapetite only mentions the variety *sylvestris* (Lamk.) Fiori, which is basically used as a food. Essentially, the ribs of the leaves and the young floral capitula are eaten. The wild artichoke (*khorchef*) is eaten after being cooked in a *shekshouka*, *couscous* or as a stew or in soups. This variety is grown in certain parts of the country. The ribs of the leaves are picked and sold in the vegetable markets. However, the artichokes used in medicine are gathered from wild plants and sold fresh along the roadsides, especially in the Kairouan region.

Part used

Stems, leaves and roots.

Constituents

The whole plant, though especially the leaves and roots, contains cynarin, flavonoids – cynarosid, scolymosid, an oxydase (orthodiphenolase) and inulin.

Pharmacological action

Protects the liver; choleretic, cholagogic, diuretic, febrifuge, hypocholesterolemic: these properties are confirmed in *Cynara scolymus*, the result of selecting and improving *Cynara cardunculus*.

Traditional medicine

Hepatitis: a decoction of the stems of *Cynara cardunculus* L.; three glasses a day taken by mouth before meals until a cure results

Sugar diabetes: a decoction of equal amounts of the leaves of *Citrus aurantium* L. and the roots of *Cynara cardunculus* L.; three glasses a day taken by mouth before meals

The stems and ribs of the leaves are used as a vegetable.

Use in herbal medicine

Extracts of *Cynara cardunculus* L. are currently used in the galenical way as an addition to food to protect the liver.





Compiled by: Dr. Zeineb Ghribi

Morphological description

Cynomorium coccineum is a perennial, giving off a strong odour of putrefaction, deep red when young and blackish purple when flowering. It has a very distinctive appearance, much of it being underground, and is a parasite, using suckers to attach itself to *Chenopodiaceous* roots. Its rhizome is branched, scaly, with big fleshy 10-20-cm. stems, not branched, with several scales, ending in a club-shaped inflorescence made up of little rudimentary contracted cymes. The flowers are either male, with a rudimentary ovary, or hermaphrodite, but all have a single stamen and 1-5 perianths over the ovary. The fruits are tiny black achenes with a tough pericarp in a persistent perigone.

The plant flowers from March to May.

Geographical distribution

Local: The north-east, Cap Bon, central Tunisia, southern Tunisia.

Regional: North Africa.

Global: North Africa, the Sinai, Lebanon and Syria, the Balearics, Spain, Portugal, southern Italy,

***Cynomorium coccineum* L.** Sp. Pl.: 970.
1753

Arabic: tarthouth, zib el Turki

French: cynomorium écarlate

English: cynomorium

Sardinia, Sicily, Malta, Crete, Palestine, Iran and the Canaries.

Ecology

Cynomorium coccineum is a geophyte, living parasitically on *Chenopodiaceae* in Mediterranean countries; it is found on the edges of salty soils and on sands that have been left slightly waste.

Status, conservation and culture

Cynomorium coccineum is a wild species in Tunisia; it is picked wild.

Part used

The aerial part.

Constituents

Anthocyanins, cyanidin 3-glucoside.

Traditional medicine

There are two known traditional uses of *Cynomorium coccineum*: for haemorrhoids, a decoction of the aerial part; three cups are taken before meals every day. For diarrhoea, a decoction of the aerial part in a litre of water; three glasses are taken before meals every day.

Pharmacological action and toxicity

The hydroalcoholic extract of the plant is oestrogenic, an antioxidant and stimulates spermatogenesis. The plant has fertilising, aphrodisiac, tonic, astringent, antiulcerous, antihaemorrhoidal and antivomitive properties and is a regulator of menstrual disorders.

Use in herbal medicine

Hypotensive.

Cyperus rotundus L.
Cyperaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photos by: K. H. Batanouny

Morphological Description

Perennial herb with long rhizomes in ellipsoid form; sometimes tuberous; black coloured, with characteristic aromatic odour and taste, up to 60 cm high; leaves are 2-6 mm wide; spikes ovate, on rays to 6 cm long; spikelets linear 1-2 cm long, 12-30 flowered, the rachilla winged; scales are purplish, carinate, obtuse; achene sub-obovoid, trigonal, 1.5 mm long, black, minutely papillate.

Geographical Distribution

Local: In all phytogeographical regions of the country among cultivated crops and in gardens
Regional: North African countries and South India
Global: Cosmopolitan

Ecology

It is a major weed near cultivated crops and in gardens. It is encouraged by frequent cultivation and grows best in moist fertile soils. It doesn't grow well in the shade. Prevalent in disturbed areas and lawns. Very persistent once established.

Status

The plant grows in specific moist habitats, subject to changes and drying. It is therefore considered an endangered plant in Egypt and very common weed in cultivated fields. The species is extremely variable and comprises numerous forms and subspecies.

Cyperus rotundus L.

C. purpuro-variegatus Boeckeler, *C. stoloniferum pallidus* Boeckeler, *C. tetrastachyos* Desf., *C. tuberosus* Roxb, *Chlorocyperus rotundus* (L.) Palla

Names

Arabic: Al-So'ad السعد

English: nut grass, nutsedge, purple nutsedge, cocograss

French: souchet rond, souchet à tubercules, herbe à oignon

Part(s) Used

Rhizomes, tubers and bulb roots.

Collection

At fruiting stage.

Preparations

Decoction and powder

Use

Oral

Constituents

1,8- cineole, 4alpha,5alpha-oxidoecdysm-11-en-3alpha-ol, Alkaloids, Alpha-cyperone, Alpha-rotunol, Beta-cyperone, Beta-pinene, Beta-rotunol, Beta-selinene, Camphene, Copaene, Cyperene, Cyperenone, Cyperol, Cyperolone, Cyperotundone, Rotundenol, Linolenic acid, Linoleic acid, Myristic acid, Oleanolic acid, Oleanolic acid-3-O-neohesperidoside, Oleic-acid, D-fructose, D-glucose, Flavonoids and saponins.

Pharmacological Action and Toxicity

The petroleum ether extract of the roots showed anti-inflammatory activity against carrageenin-induced oedema in albino rats. The active fraction was identified as a triterpenoid. A fraction tested on aconitine-induced writhing in mice showed mild analgesic activity. Antihistaminic and antiemetic activities were shown in experimental studies on dogs. Smooth muscle relaxant activity was demon-

strated on rabbit ileum. Extracts of rhizomes were inhibitory to the growth of fungi depending on species. Antibacterial activity of oil and its fractions have been demonstrated against a number of organisms.

Pharmacopoeia

Not available

Phytopharmaceutical Products

Not available

Traditional Medicine and Indigenous Knowledge

History: The genus name Cyperus is from Cypeiros which was the ancient Greek name for the genus. Rotundus is Latin for round and refers to the tuber.

Traditional Medicinal Uses

- Bloody stools, urine, and vomiting blood
- Breast tumours
- Candida
- Colds and flu
- Colic
- Convulsions
- Diarrhoea
- Dysentery
- Dysmenorrhoea

- Fevers
- Gastritis
- Hypotension
- Indigestion
- Malabsorption
- Mental health
- Menopause
- Menstrual disorders
- Parasites
- Palpitation

Other uses of the plant: Tubers are aromatic, used to increase body weight. Fresh tubers are diaphoretic, astringent and have been used to combat scorpion stings.



Datura metel L.
Solanaceae



Compiled by: Dr. Zeineb Ghrabi

■ Morphological description

Datura metel is an annual, ash-green, hairy species 0.40-1 m. high. Its leaves are simple, uncut or sometimes with slightly indented sinuate margins. The flowers are strongly scented, with short peduncles, erect and big (15-20 cm.). The corolla is twice as long as the calyx. The fruit is a globular pendulous capsule, with little thorns that are not dilated at the base. Flowering occurs from August to September.

■ Geographical distribution

Local: Rarely grows wild in Tunisia; central and north-eastern Tunisia.

Regional: Tunisia, Algeria and Morocco.

Global: *Datura metel* comes from India originally; it has been naturalised and become a cosmopolitan: Spain, France, Italy and tropical Africa.

■ Ecology

It grows on sandy soils, but rarely grows wild.

■ Status, conservation and culture

It is not cultivated in Tunisia; it is picked wild.

■ Part used

The flowers.

Datura metel L.

Arabic: hhichet el fedda

French: stramoine

English: datura

■ Constituents

The leaves contain about 0.5% of alkaloids, the main one being scopolamine, accompanied with a little norscopolamine, hyoscyamine and meteloidine. A new tropanic alkaloid, datumetine, was isolated on the leaves. These are also rich in withanolides (steroidal elements: datumeteline, daturibine, etc.) The seeds contain 0.2-0.5% of alkaloids and the roots 0.1-0.2%. The flowers particularly contain scopolamine (0.26%) and hyoscyamine.

■ Traditional medicine

Datura is antiasthmatic; its flowers are smoked during an attack.

■ Pharmacological action and toxicity

Atropine and scopolamine are the two alkaloids responsible for the plant's toxicity: dryness of the mouth, visual disorders and muscular weakness.

■ Use in herbal medicine

Bromohydrate of scopolamine has been used in the treatment of Parkinson's disease. The main use of scopolamine is to prevent the symptoms of travel sickness. Atropine is available as eye drops (for uveitis, to prepare for certain eye tests).

■ Pharmaceutical products

Bromohydrate of scopolamine is used in making speciality analgesics: association with morphine and sparteine, association with opium extract and procaine.

Datura stramonium L.
Solanaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited and photos by: Prof. K. H. Batanouny

Morphological Description

The *Datura stramonium* plant is a large and coarse annual herb, branching freely, of up to one metre high, or even two in rich soil. The root is very long, thick and whitish, giving off many fibres. The stem is stout, erect, leafy and smooth, a pale yellowish green in colour. Leaves are large and angular, uneven at the base, with a wavy and coarsely-toothed margin, and branching veins very plainly developed. Flowers are large and 8-10cm long, white or violet, growing singly on short stems springing from the axis of the leaves or at the forking of branches. The corolla, folded and only half-opened, is funnel-shaped, of a pure white, with six prominent ribs. Flowers are succeeded by large, eggshaped seed capsules of a green colour, and covered with numerous sharp spines. When ripe, this seed-vessel opens at the top, throwing back four valve-like forms, leaving a long, central structure upon which numerous rough, dark-brown seeds can be found.

Geographical Distribution

The origin of the plant is unknown. Several European botanists refer it to North America or Asia, and it is possible that it is native to an Eastern country.

Local: The Nile Delta, including Cairo but not further south.

Regional and Global: Throughout the world, except the colder regions.

Ecology

Datura stramonium is generally found growing in

Datura stramonium L.,

Sp. Pl. ed.1, 179. 1753.

Datura tatula L.

Names

Arabic: Datura ، نفیر ،

Taturah طاطورة

Berber: Tabourzigt, Tidilla.

English: Thornapple, Devil's apple, Jimson Weed

French: Datura, Stramoine, Pomme epineuse, Herbe aux sorcieres, Pomme Epineuse, Dature, Endormie, Herbe du diable, Pomme du diable

full sun on grazing land, roadsides or waste ground. It prefers disturbed sites with fertile soils, such as stock camps or riverbanks where it can become abundant. *Datura stramonium* is easily cultivated, growing well in an open, sunny environment. It will flourish in most moderately good soils, optimally in rich calcareous soil, or in sandy loam, with leaf mould added.

Status

Cultivation of the plant for medical purposes has been recommended. *Datura stramonium* seeds were cultivated in Egypt in two different locations: the experimental farm of the Faculty of Pharmacy, Cairo University, Giza, Egypt, which represents clay-loamy soil; and the 6th October Farm (Noubaria), which belongs to the National Serve Sector of Egyptian Armed Forces, Cairo-Alexandria Desert Road, where the texture was found to be sandy. The plant has been successfully cultivated and could be extended to wider areas according to market demands.

Part(s) Used

All parts possess medicinal value, though leaves and seeds are most widely used.

Collection

Leaves should be gathered when the flowers have fully blossomed and carefully dried in the shade. The seed should be gathered when ripe.

Preparations

Powdered leaves, fluid extract from leaves, fluid extract from seeds, tincture from leaves, powdered extract.

■ Use

Oral, ointment.

■ Constituents

Tropine alkaloids, about 0.2-0.45%; mainly hyoscyamine, hyoscine and to a lesser extent, atropine. Seeds contain about 0.2% alkaloids with 15-30% fixed oil.

■ Pharmacological Actions and Toxicity

Anticholinergic, antiasthmatic and antispasmodic effects of the drug are mainly due to the presence of the alkaloids, hyoscyamine and scopolamine. Stramonium has been employed in all the conditions for which belladonna has been commonly used, but acts much more strongly on respiratory organs, and has acquired a special reputation as one of the chief remedies for spasmodic asthma, being more often used as the main ingredient in asthma powders and cigarettes than internally. The beneficial effect is attributed to the presence of atropine, which paralyses the endings of the pulmonary branches, thus relieving the bronchial spasm. Seeds are recorded to relieve asthma in the same manner as leaves, and are employed as a narcotic and anodyne. Atropine is used to treat nerve gas poisoning, Parkinson's disease, peptic ulcers, diarrhoea and bronchial asthma. Scopolamine is used as preanaesthetic medication for treating motion sickness. Applied locally, in ointment, plasters or fermentation, Stramonium is documented to palliate the pain caused by muscular rheumatism, neuralgia, haemorrhoids, fistula, abscesses and similar inflammations. Careful consideration of the toxicity of the plant is required before its use. Its ingestion can induce characteristic symptoms with over dosage, whether inadvertent or intentional. The mouth becomes dry, an intense thirst develops, vision blurs with prominent mydriasis and the heart rate increases. This is followed by hallucinations, delirium, loss of motor coordination, which may lead to coma and ultimately death by respiratory failure.

■ Pharmacopoeia

British Herbal Pharmacopoeia, 1976.

Egyptian Pharmacopoeia, 1984.

European Pharmacopoeia, 1997.

■ Pharmaceutical Products

Nospa (EPICO)

Buscopan; Buscopan Compositum; Buscopan plus (CID), (Boehringer Ingelheim)

Butacid (CID)

Farcorelaxin (Pharco)

Spasmoein (Memphis)

■ Traditional Medicine and Indigenous Knowledge

History: Stramonium is a well known poisonous weed. Its native country is unknown. The Arabs of Central Africa are known to dry the leaves, flowers, and rind of the rootlet, which is considered the strongest preparation, and to smoke them in a common bowl or water pipe.

■ Traditional Medicinal Uses

- Chest disease
- Gastrointestinal diseases (peptic ulcer).
- Pertussis disease
- Rheumatic disease
- Sialorrhoea in parkinsonism.

■ Other uses of the plant

The leaves are being used in cigarettes or smoked in a pipe, either alone, or with a mixture of tobacco, or with cubeb, sage, belladonna and other drugs. More commonly, however, the coarsely-ground leaves are mixed into cones with some aromatic and with equal parts of potassium nitrate, in order to increase combustion and are burned in a saucer, the smoke being inhaled into the lungs. Great relief is afforded, the effect being more immediate when the powdered leaves are burnt and the smoke inhaled than when smoked by the patient in the form of cigars or cigarettes. Like most drugs, if used regularly, relief is not so apparent and the treatment is only palliative, the cause of the attack not being affected. Accidents have also occasionally happened from the injudicious use of the plant in this manner. Stramonium was used as a sedative in epilepsy. The seeds can be smoked with tobacco to relieve asthma.

In Egypt, dried leaves and flowers have been smoked as tobacco to alleviate difficult breathing, influenza; leaves have been used as poultices (with some oil) for rheumatic pain.

***Deverra chloranthus* Coss. & Dur.**
Umbelliferae (Apiaceae)



Compiled by Dr. Salima Benhouhou

■ Morphological description

A perennial herb, with several erect yellow-green stems reaching 80 cm, but with an average height of 50 cm. The basal leaves are tiny and fall rapidly. The stem leaves are absent. The small flowers have 5 free greenish petals and are grouped in umbels with long peduncles at the ends of the stems. The fruit is a small diachene and completely covered with small brownish hairs.

It flowers in early spring, between March and April.

■ Geographical distribution

Local: Common in the western and northern Algerian Sahara.

Regional: Morocco to Tunisia.

Global: Morocco to Tunisia.

■ Ecology

Deverra chloranthus grows in desert habitats with a rainfall not exceeding 120 mm. per year. The plant thrives on the gravelly soils of non-saline wadis.

■ Status

According to the IUCN criteria this western and northern Saharan species falls into the "C" category.

The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre and Man and Biosphere (MAB).

***Deverra chloranthus* Coss. & Dur**

Pituranthus chloranthus Benth & Hook.

Deverra: goddess of childbirth; *Chloranthus*: green-flowered

Arabic: gouzah

Berber: tattayt

■ Part used

The stems and flowers, collected in the early spring, are prepared as a poultice and used externally.

■ Constituents

A probable mannitol component and alkaloids, coumarin components ; no other information is available on the constituents.

■ Pharmacological action and toxicity

No data is available in the literature on the plant's pharmacological action. Regarding its toxicity, nomads are well aware of its strong allergic effect on animals (particularly the dromedary) when in flower. The pollen has a blinding effect for several days; it is cured by dropping tobacco juice into the eyes.

■ Pharmacopeias

Not relevant for this species

■ Pharmaceutical products

Not relevant for this species.

■ Traditional medicine and local knowledge

It is used for cephalgia.

The Tuareg eat the young shoots and the insides of the roots raw. The flowers are put in water to extract the sweet component.

In Morocco, the aerial parts are mixed with ashes to aromatise meat.





Compiled by: Dr. Zeineb Ghrabi

Morphological description

Diplotaxis harra is a annual or perennial species, hispid at the base at least, rarely glabrescent or glabrous. Its 20-60 cm. stems are erect and branched. The flower-bearing stems have leaves, at the base at least. The flowers are yellow, with a spindly pedicel that is longer than they are. The petals are twice as long as the sepals, which are downy. The fruit is a pendulous siliqua at the tip of a 2-4 mm.-long capillary gynophore. Two sub-species are signalled in Tunisia: the subsp. *eu-harra* Emb. & Maire and the subsp. *crassifolia* (Rafin.) Maire (= *Diplotaxis crassifolia* Rafin.) DC; = *Sinapis crassifolia* (Rafin.), which is especially distinctive for the number of teeth on the leaf and the length of the gynophore.

Geographical distribution

Local: The subsp. *eu-harra* Emb. & Maire is common in Tunisia: dorsal ridge, central and southern Tunisia, Medjerda valley; the subsp. *crassifolia* (Rafin.) Maire is only signalled in central and southern Tunisia.

Regional: North Africa.

Diplotaxis harra (Forsk.) Boiss.

Flore Orient. 1: 388. 1867

Pendulina fontanesii Willk.; *Pendulina harra* (Forsk.) Willk.; *Pendulina hispica* Willk.; *Sinapis harra* (Forsk.)

Arabic: harra

French: diplotaxis

English: wall rocket

Global: The subsp. *eu-harra* Emb. & Maire has a distribution area that spreads over North Africa and western Asia; the subsp. *crassifolia* (Rafin.) Maire is a Mediterranean endemic but restricted to Morocco, Algeria, Tunisia and Sicily.

Ecology

Diplotaxis harra is common in pre-Saharan Tunisia, where it occupies gypseous soils and is a feature of various plant groups, such as the *Artemisia herba alba*, *Eruca vesicaria* and *Diplotaxis harra* group.

Status, conservation and culture

It is one of the *Cruciferae* that is not cultivated in Tunisia; it is picked wild.

Part used

The aerial part.

Constituents

The various *Diplotaxis* contain: a heterosid, sinigrinose, which hydrolyses under the action of myrosine, liberating a sulphurated essential oil containing allyl sulfonylate and allyl sulphide. Glucosinolates (α -thioglucoside-N-hydroxysulphates) precursors of the isothiocyanates. Arachidonic acid, palmitic acid, cholesterol, stigmasterol, B-sitosterol and non-methylated fatty acids.

Traditional medicine

For constipation: a decoction of the aerial part of the plant; three cups a day before meals. Sugar diabetes without complications: 50 gr. of the aerial part of *Diplotaxis harra* decocted in a litre of water for 30 minutes; one glass a day taken by mouth on an empty stomach. Sunstroke: crush 50 gr. of *Diplotaxis harra* leaves and 50 gr. of *Astragalus*

armatus roots, then mix with olive oil and apply locally to the crown of the head at night for 3 days. *Diplotaxis* seeds are prescribed internally to warm up the body and externally as a rubefacient. A decoction of the seeds or leaves of *Diplotaxis harra* and *Diplotaxis pitardiana* is used as a rub for scab in animals.

Pharmacological action and toxicity

The glucosinolates and their derivatives are bactericidal, fungicidal and nematocidal. The non-methylated fatty acids are bactericidal and fungicidal and kill yeasts. An irritating, reddening action has been noticed on the mucous membrane.

A GUIDE TO MEDICINAL PLANTS IN NORTH AFRICA

B
M



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial herb growing to 1 m. and more, with erect brownish to reddish stems.

A few long leaves, from 10 to 15 cm., hairy, arachnoid and with very long spines. The long skinny stems support round prickly heads. The inflorescence is often a single hemispherical globe up to 5 cm. in diameter during the flowering period. It is surrounded with numerous long spines. The small hermaphrodite flowers that compose the dense head are tubular, turning from green to white and yellowish when in full bloom. The fruits are small achenes topped by membranous scales to ease dispersion.

Flowering takes place in early spring.

Geographical distribution

Local: Very common in the Algerian Sahara.

Regional: North Africa.

***Echinops spinosus* Turra.**
Compositae (Asteraceae)

***Echinops spinosus* Turra.**

Echinops spinosus ssp. *bovei* (Boiss.) Maire.

Echinop: from the Greek echinos, hedgehog;
spinosis: with spines, spiniest

Arabic: teskra, chouk el hmir, chouk el djamal, sorr

Targui: tefaryast

English: thorny-headed globe thistle

French: chardon à fleurs globuleuses

Global: It is common throughout the Sahara, including the Red Sea region and Sinai.

Ecology

The plant thrives in desert conditions with an annual rainfall varying of 20-100 mm. and has a wide ecological range for soil. It is found on coastal calcareous dunes, on sandy wadi beds and on gravelly to rocky surfaces where the plant shows an ecological optimum.

Status

According to the IUCN criteria this saharo-sindian species falls into the "C" category.

Although no problems are reported for the species, human collection near settlement may be a threat in the long term.

Part used

The roots, and to a lesser extent the stems, leaves and flower heads. The roots are collected in the autumn; the flower heads are picked in the summer. Prepared as a decoction, and as a powder, they are taken internally.

Constituents

Sesquiterpene lactones, acetylenic elements belonging to the Thiophen type.

Pharmacological action and toxicity

Efficient action on muscular fibres; antiinflammatory activity; hypoglycaemic properties.

The plant is not reported as toxic by nomads and Tuareg.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used as an abortifacient and a diuretic, and for blood circulation, diabetes, dysmenorrhoea, gastric pain, haemorrhoids, indigestion, spasmolytic and varicose problems.

The tender part of the flowers is eaten like an artichoke. The plant used to be taken for tinder. It is much appreciated pasture for dromedaries and goats.

In Egypt, the plant is taken to cure diseases related to the circulatory system (a haemostat, a

vasoconstrictor for hypertension, varices, varicocele). The stems, leaves and roots are also considered abortive, diuretic and depurative and are taken for liver disease, dysmenorrhoea, metrorrhagia and prostatic problems.

In Morocco, it is mainly used to ease childbirth. A decoction of the roots in either water or olive oil is given to help the woman evacuate the placenta. It is also given before the birth to stimulate contractions.

In Marrakech and Salé, a decoction of the roots is used for stomach pain, indigestion and lack of appetite as well as diabetes. In Casablanca, the entire plant, in a powder or decoction, is used as a diuretic or depurative and to cure liver diseases. Everywhere in Morocco, the plant is used as an abortifacient.

The aerial part of the plant is edible and sold in small bundles in traditional markets.

Erica arborea L.
Ericaceae



Compiled by: Dr. Zeineb Ghribi

Morphological description

Erica arborea is a densely branched perennial, a small tree or shrub 40-120 cm. high but possibly 4 m. tall. The branches are slender, downy and covered with long whitish hairs. The small leaves are in whorls of three, very narrow, no more than 5 mm. long, dark green, shiny, hairless and grooved on the underside. The flowers are greenish or greenish-yellow, rarely slightly tinged with red, arranged in 1-4s in the axil of the leaves, and form a long, very narrow bunch on each branch. The peduncle is longer than the bell-shaped corolla. The calyx is hairless and half the size of the corolla. The anthers are enclosed, with two horns at the base, and the style is not very prominent. The fruit is a glabrous capsule and the seeds are tiny. Flowering occurs from February until June.

Geographical distribution

Local: Kroumirie, the Medjerda valley, Cap Bon and the Tunisian dorsal ridge.

Erica arborea L. Sp.

Pl.: 353. 1753

Arabic: bou haddad

French: bruyère arborescente, bruyère à balais

English: tree heather, tree-heath

Regional: Morocco, Algeria and Tunisia.

Global: The Mediterranean: Morocco, Algeria, Tunisia, Yugoslavia, Italy, Sicily, Sardinia, Corsica, France, the Balearics, Spain and Portugal.

Ecology

Erica arborea is a species that grows especially in cork oak and zen oak forests and maquis. It prefers siliceous soils and will not grow above 650 m. altitude.

Status, conservation and culture

It is considered to be one of the forest by-products that is used by the local rural people. The branches are used in the traditional way to make household implements (spoons, bowls, plates, etc.) or brooms. The use of *Erica arborea* to make and sell these traditional products is subject to acquiring a permit and is taxed.

Part used

The flowering tips.

Constituents

The flowers contain tannins (proanthocyanidols) and a number of flavonoids. The leaves contain α -D-glucoside.

Traditional medicine

A decoction of the flowering tips of *Erica arborea* is suggested for renal lithiasis; three cups a day should be taken before meals. The flowers are used in a decoction as a diuretic and a urinary antiseptic.

Pharmacological action and toxicity

The tannins are astringent and antiseptic for the urinary passages.

***Erica multiflora* L.**
Ericaceae



Compiled by: Dr. Zeineb Ghrabi

■ Morphological description

Erica multiflora is a hairless perennial, a shrub 20-80 cm. tall, with erect branches that seem to be covered with a fine powder. The leaves, in whorls of 4-6, are dark green, glabrous, shiny, very narrow (8-10 mm. long), acicular and grooved on the underside. The flowers are packed into short, compact bunches at the tips of the branches. The peduncle is twice or three times as long as the corolla. The corolla is bright pink, small (3-5 mm.), persistent and bell-shaped, ending in wide lobes only superficially separate from each other. The stamens have prominent black anthers without horns, shorter than the style. The fruit is a glabrous capsule. Flowering occurs between April and June.

■ Geographical distribution

Local: Widespread in Tunisia: Kroumirie, Mogods, the north-east, Cap Bon, the Tunisian central ridge and central Tunisia.

***Erica multiflora* L.** Sp. Pl.: 355. 1753

Arabic: khlenj

French: bruyère multiflore, bruyère à fleurs nombreux

English: heather

Regional: Morocco, Algeria, Tunisia and Libya.

Global: The Mediterranean: North Africa, Yugoslavia, Italy, Sicily, Malta, Sardinia, Corsica, France, the Balearics and Spain.

■ Ecology

Erica multiflora grows mainly in pine-woods, the garigues, on calcareous soil, and does not grow in the mountains.

■ Status, conservation and culture

Erica multiflora is widespread in areas of maquis and garrigue and is constantly subject to overuse either by the local rural people or by private companies. Wood from its stump is much sought after, and is used as firewood. In the northern maquis, *Erica multiflora* produces some 700 tons of stump wood every year. The flower-buds, bark and leaves are also used as fodder. Today, picking and using it is subject to regulation and taxing. It is propagated by buds borne on the underground stem.

■ Part used

The flowers and leaves.

■ Constituents

The flowers contain proanthocyanidols and a number of flavonoids. The plant mainly contains tannins, a concrete oil and cyanogenetic glucosides.

■ Traditional medicine

For arterial hypertension: 30 gr. of the flowering tips of *Erica multiflora* decocted in a litre of water for 20 minutes; three cups a day taken before meals for a week.

Abdominal bloating: 30 gr. of the flowering tips of *Erica multiflora* decocted in a litre of water for 20 minutes; three glasses a day taken before meals under a cure results.

Urethritis: a decoction of seeds of *Linum usitatissimum* and leaves of *Erica multiflora*; one cup taken on an empty stomach.

■ Pharmacological action and toxicity

The glycolic acid is astringent, diuretic and a urinary

antiseptic. The cream prepared from the aqueous extract containing 2% of glucolic acid, tested for irritability, showed no hypersensitivity.

■ Use in herbal medicine

The plant is known for its urinary antiseptic, diuretic and astringent properties.



Compiled by Dr. Salima Benhouhou

Morphological description

A low shrub, not exceeding 40 cm. and densely ramified from the base. The stems at the top are very thin and the whole plant is covered with tiny whitish hairs. The leaves are linear, alternate, 4-5 cm. long and also covered with white hairs. The numerous flowers each have 4 white free petals. The fruit is a small siliqua 1 cm. wide. The flowering period is usually between February and April.

Geographical distribution

Local: Common throughout the Algerian Sahara.

Regional: North Africa.

Global: A Saharo-sindian species common in desert areas of North Africa and Asia.

Ecology

This long-lived perennial grows on the gravelly soils of wadis, on the stony ground of djebels and in dayas. It grows in severe climatic conditions with under 100 mm. rainfall per year.

Status

According to the IUCN criteria this Saharo-sindian

Farsetia aegyptiaca Turra

Farsetia: from Farseti, a Venetian botanist;
aegyptiaca: Egyptian

Arabic: el aoud el abiyad

Targui: timzar

species falls into the "C" category. The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre and Man and Biosphere reserves (MAB).

Part used

The stems and leaves are collected in the spring and prepared as a decoction, to be taken by mouth.

Constituents

No data found on the constituents of this plant.

Pharmacological action and toxicity

No data available in the literature on the pharmacological action and toxicity of this plant.

Pharmacopeias

Not relevant for this species.

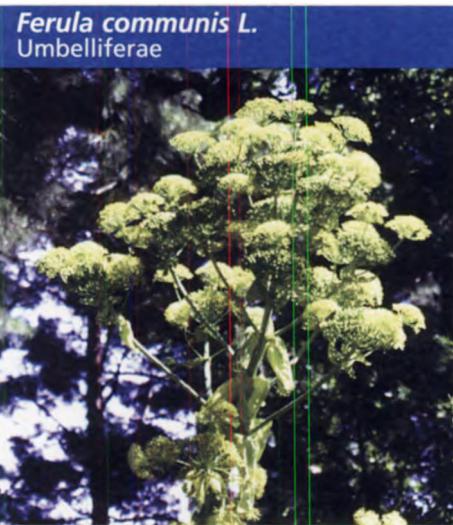
Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for toothache and gingivitis, and for sore eyes.

In the Tissint region (Morocco), a decoction of the plant mixed with alum is used as a mouth rinse and for disinfecting.



Compiled by: Dr. Driss Lamnauer
Edited by: Prof. Kamal Batanouny

Morphological description

Ferula communis or giant fennel: giant is not an exaggeration since this spectacular architectural plant is known to grow to 3 metres. The lower leaves are 3 to 4 pinnates, triangular, varied in size, soft, glabrous, green on both sides and usually have a conspicuous sheathing base. The lamina is finely divided into linear and filiform lobes. The latter have no distinct revolute margin and are up to 50 mm. long, but no more than 1 mm. wide. The upper fertile leaves of the inflorescence are progressively reduced to a conspicuous sheathing base. The bracts are absent and the bracteoles are few or absent.

The stem is very robust, wide (3-7 cm. in diameter), full, finely striated and can grow to 2 to 3 metres high.

The terminal fertile umbel is large and composed of 20 to 40 rays.

The flower is bright yellow. The fruit (mericap) is elliptical or oblong-elliptical, strongly compressed dorsally; the length is varied between 7 and 15 mm.

Ferula communis has a well-developed, strong root system.

Slight differences exist between the two varieties reported in Morocco. The leaves of the *brevifolia* variety are light green and markedly smaller than

Ferula communis L.

Ferula brevifolia Hoff. & Link ; *Ferula nodiflora* L.;
Ferula linkii Webb & Berthel.

Arabic: Kelkh, kelkha, keshbour, besbas harami.
الكلخ او كلخ - كشبور - بسبس - حربى

Berber: Aboubal, aouli, ouffal.

English: Giant fennel, african ammoniacum

French: Grande férule, férule commune, faux fenouil.

the leaf-lobes of the *genuina* variety.
It flowers from May to July.

Geographical distribution

Local: In Morocco, the two varieties identified are distributed differently; the *brevifolia* variety is found mostly along the Atlantic coasts (from Larache to Ifni), whereas the *genuina* variety is located inside the country and up until the Mediterranean coast.

Regional: *Ferula communis* is wide spread in North Africa, mostly in Morocco and Algeria, but not found in Egypt.

Global: *Ferula communis* is an umbelliferous plant of the Mediterranean, where it has always marked the landscape.

Ecology

Ferula communis grows in forest glades and in the pasture of plains and mountains up to an altitude of 200 m. It has an enormous root system and is drought-resistant.

The perennial seeds germinate very irregularly over a long period. Temperatures of less than +5°C are very effective. Seed trays should not be discarded prematurely. Constant moisture must be maintained. Do not leave in direct sunlight. Germination to transplanting takes 4 to 8 weeks. Reproduction is by root and seeds.

Status

Not an IUCN threatened species.

Part used

The resin gum or *fessoukh*, unopened inflorescence and the root.

Ferula communis L. is a source of resin gum, obtained by incision of the root, and used in traditional medicine for a variety of ailments. It was also reported to be toxic in man and especially in livestock.

The *fessoukh* or the resin gum of *Ferula communis* is a specifically Moroccan product, known in Arabic countries and up to India under this name.

Moroccan *fessoukh* is appreciated for certain uses in countries where *Ferula communis* apparently grows. The demand for the *fessoukh* is the main cause of the intense exploitation of the plant. In addition the pre-blossom inflorescences of *Ferula communis* have culinary uses.

Constituents

Coumarins and daucane sesquiterpenes were identified in solvent extracts of the different parts of *Ferula communis*. The chemical composition of the essential oil was also investigated.

The most important characteristic of *Ferula communis* is its capacity to synthesize 4-hydroxycoumarins. At this time, no other plant is known to be able to do so. Among these compounds are: ferulenol, 20-hydroxyferulenol, omega-hydroxyferulenol, (ferulenoxy-20')-13 ferulenol, and other derivatives identified in the genuina variety of Morocco. 4-hydroxycoumarins were also identified in the *Ferula communis* in Italy.

The *Brevifolia* variety in Morocco contains only ferulenol, in addition to daucane sesquiterpenes, as a 4-hydroxycoumarin and ombelliferone (7-hydroxycoumarin) derivatives, which are absent in the genuina variety.

The 4-hydroxycoumarins are the major constituents of *fessoukh*.

A non-poisonous chemotype of *Ferula communis* in Sardinia (no 4-hydroxycoumarins) is also described. Despite the lack of morphological difference, a broad chemical diversity exists within the giant fennel, underlying the contrasting data on its poisonous properties.

Analysis of the inflorescence oil of the giant funnel growing wild in Corsica identified 46 components representing 96.3 % of the amount of the inflorescence oil. The main constituents were myrcene (53.5 %), limonene (6.9 %) and a-pinene (6.6 %). Several sesquiterpenes were present at appreciable level: aristolene (8.5 %), (E,E)-farnesol (4.3 %), gurjunene (1.4 %). The oil obtained from the spike

has a similar qualitative composition, however differs quantitatively: aristolene (70.0 %) and myrcene (9.3 %) being the major components. The occurrence of sesquiterpenes and the lack of monoterpenes characterized the root oil.

Pharmacological action and toxicity

Chemical composition studies of *Ferula communis* showed that it contains 4-hydroxycoumarin derivatives, some of which were demonstrated to have hypothrombotic action. 4-hydroxycoumarin anticoagulants are known, on the other hand, to be used for the treatment and management of thromboembolic disease in humans.

Man and all animal species are sensitive to *F. communis* toxicity. Poisoning depends on the amount of the plant material ingested and the duration of the ingestion.

Ferula communis toxicosis in animals was shown to be dominated by an hemorrhagic syndrome associated with hypothrombinemia. The hypothrombinic action is related to a decrease in vitamin-K dependent factors, which is due to the presence of 4-hydroxycoumarin derivatives in the plant.

In fact, ferulenol and other of its derivatives were shown to produce an increase in prothrombin time and hemorrhage in experimental animals. This effect is inverted by the injection of vitamin K1 (an antagonist of coumarin anticoagulants).

Like coumarin anticoagulants, *fessoukh* and ferulenol were shown to be effective as rodenticides. 4-hydroxycoumarins were shown to have some antibacterial activity.

Traditional medicine and local knowledge

• Method of collection:

In Morocco, only *Ferula communis* L. var. *genuina* is used to extract the resin gum. For this, the leaves are cut down at ground level, and then the top of the root is sliced off. The latex secretion oozes out and is collected every 7 to 10 days, several times. Each time, the upper part of the root is cut again. The collection is done in summer on hot days since it seems that hot weather increases the secretion of the latex. The latex that is milky and white at the beginning becomes progressively solid and may turn brown with time.

Uses

In Morocco, the uses of *fessoukh* are about the same every where.

Mixed with olive oil, it is recommended by practitioners for external use for a variety of skin diseases. In friction it is used against moths or ringworm, rheumatism, and to heal in the feet cracks. Gum resin is also added to some depilatory preparations.

Orally it is prescribed by practitioners as an anti-helminthic, diuretic, vermifuge, and analgesic, and for pains in the joints, female sterility, and rheumatism, as well as as an emetic.

The roasted flower buds are absorbed as a vermifuge, an anti-hysteria, for dysentery, and as an aphrodisiac. The whole plant is said to possess antispasmodic properties.

Fessoukh seems to be famous because of its use in magic and sorcery. *Fessoukh* means that "which undoes spells (magical)". *Fessoukh* is frequently used in ritual or magic fumigation and in sorcery and counter-sorcery. Fumigation is believed to ward off the "evil spirits" and the "evil".

The roots are also used, especially in a preparation used for hair care.

History

Ferula communis, a typical plant of the Mediterranean region, was well known in classical times and was said by Dioskorides, Gale, Pliny and other ancient authors to be a medicinal herb.

The resinous gum of the plant was reported to be one of the oldest gums of the umbelliferae known to be used in traditional medicine. Moreover, the maritime trade to Gibraltar, Alexandria and India exported *fessoukh*, the gum from Morocco. Its toxicity was long realised. A veterinarian in Algeria in 1887 (Bremond) gave the first detailed description, describing the clinical signs and lesions: he called the disease Férule. A severe haemorrhagic syndrome characterizes the poisoning known as ferulosis or férule. Lanfranchi and Altara reproduced this disorder experimentally, for the first time in 1923, in sheep in Sardinia, with the giant fennel collected from North Africa, where the disease is said to be common.

Toxicity

Ferula communis poisoning in animals is well

known and documented. In humans, several case studies exist and underline the toxicity of the plant for man and animals. *Ferula communis* poisoning in man is reported as therapeutic accidents, mainly by oral use of *fessoukh* or after the overuse or continuous ingestion of the unopened inflorescence as a legume for several days (more than 5 to 6 days). Women during menstruation or pregnant women are the most affected, with exaggerated haemorrhage and abundant bleeding childbirth or abortion. Persons under therapeutic use of drugs with some anticoagulant activity should avoid consumption of the pre-blossom inflorescence or *fessoukh*.

Diseases treated and medicinal properties

It is used for skin diseases, rheumatism, cracks in the feet, helminthic disease, pains in the joints, female sterility, rheumatism, hysteria, and dysentery. It is antispasmodic, vermifugal, aphrodisiac, and can be used against moths or ringworm, as a depilatory, an emetic, a diuretic and an analgesic.

Other uses of the plant (Ethnobotany)

The pithy, dried to stalks have been used to kindle fires. They are also used to build hives and sheep barns.

Culinary uses

Consumption of the plant is not recent but goes back to classical times. In Roman times, Pliny noted that the stems of the plant were consumed and much appreciated. It was also reported that even the "cotes" of the leaves were consumed in North Africa during periods of food shortage.

In Morocco, nowadays, the young stems or pre-blossom inflorescence called *'boubal* are sold in the medina as a legume. Some delicious dishes are prepared from it. The most common way of preparation is to cook the unopened inflorescence with steam like couscous and add olive oil, vinegar, and other spices as desired.

The young stems are also eaten as fresh vegetables, but this is a new practice, seen in modern and European families.

The consumption of the plant is not totally harmless; several reports stress the toxicity of such use.

***Fredolia aretioides* Coss. & Dur. ex Bunge.** Chenopodiaceae



Compiled by Dr. Salima Benhouhou

■ **Morphological description**

A vigorous cylindrical shrub, up to 1 m. high, it looks like a huge cauliflower. The branches are very compact with sand in the interstices.

The small fleshy leaves, not exceeding 5 mm., are opposite, very tightly attached to the stems, and blue-green. Each leaf ends in a small spine. There are 2 to 3 small flowers located at the tips of the stems. The fruit is a small achene surrounded by transparent wings of the evergreen perianth. Flowering occurs in autumn.

■ **Geographical distribution**

Local: Common in the north-western Sahara from the Tafilalet, Tinghir in Morocco to Béni-Abbès in Algeria across the eastern Moroccan desert, Béni-Ounif, Ain Sefra and Béchar.

Regional: South-east Morocco and south-west Algeria.

Global Endemic of Morocco and Algeria.

■ **Ecology**

Fredolia aretioides is found on rocky and stony plateaux (reg and hamada). It rarely grows in wadi beds or clayey depressions. Its particular round shape, the small fleshy leaves and the long roots that creep through vertical crevices enable the plant to thrive in severe climatic conditions where the annual rainfall does not exceed 100 mm. per year.

***Fredolia aretioides* Coss. & Dur. ex Bunge**

Anabasis aretioides Coss. & Moq.

Noea aretioides

Arabic: degâa, el selig

French: choux-fleur de bouâmama

■ **Status**

According to the IUCN criteria this endemic species falls into the "E" category for the western Sahara. Its use by the nomads for several purposes is detrimental to its survival in the long term. Urgent conservation means are needed to maintain this unique plant community in the western Sahara. So far no data has been reported regarding its propagation and conservation.

■ **Part used**

The leaves are prepared as an infusion or decoction.

■ **Constituents**

Alkaloids, saponine (hederagenine).

■ **Pharmacological action and toxicity**

It is antirheumatal, diuretic, and an antidote to poison.

■ **Pharmacopeias**

Not relevant for this species.

■ **Pharmaceutical products**

Not relevant for this species.

■ **Traditional medicine and local knowledge**

It is used for rheumatism, as a diuretic, and as an antidote to poison.

Its wood is used as firewood.

In the Tafilalet (Morocco), *Fredolia aretioides* is used for rheumatism, as a diuretic and as an antidote to all sorts of poisons.

***Globularia alypum* L.**
Globulariaceae



Compiled by: Dr. Zeineb Ghrabi

■ Morphological description

This is a perennial under-shrub with erect bushy branches, about 30 to 60 cm. high. The leaves have a bitter aromatic scent and are sparse, evergreen, simple, alternate, without stipules, with a short petiole, tough, and with a glabrous limb that is entire or tridented at the tip. The flowers are sweet-scented, irregular, packed together in a dense capitulum enclosed by an involucle of oval, overlapping bracts. The corolla is a purplish blue; it is bilabiate, but the upper lip is almost non-existent and the lower lip very long. There are four didynamous stamens. The ovary is free with a single loculus and a single ovule. The fruit is dry and enclosed in the calyx. Flowering and fructification take place from March to July. In Tunisia's flora, two sub-species are mentioned: the sub-species eu-alypum L. is characterised by 15 mm.-wide capitula, bracts and only slightly hairy calyxes, and the sub-species arabica (Jaub. et Spach.) Maire = *Globularia eriocephala* Pomel = *G. vesceritensis* Batt. is characterised by terminal capitula that can be 20 mm. in diameter, and very downy, woolly, whitish bracts and calyxes.

A revision of the naming of Mediterranean species

***Globularia alypum* L.** Sp. Pl. 95. 1753

Arabic: Zriga

French: Globulaire, séné arabe, turbith, séné de Provence

of the *Globularia* genus (Greuter et al., 1986) mentions an aggregate that bears the name *Globularia alypum* aggr. and includes only two species:

- *Globularia alypum* L. Sp. Pl.: 95. 1753
- *Globularia arabica* Jaub. et Spach. III: Pl. Orient. 3: 76. 1848 = *Globularia alypum* subsp. *arabica* (Jaub. et Spach.) Quezel et Santa, Nouv. Fl. Algérie: 860. 1963; = *Globularia eriocephala* Pomel in Bull. Soc. Sc. Phys. Algérie 11: 111. 1874.

■ Geographical distribution

Local: Very common in the whole of Tunisia.

Regional: All of Tunisia, North Africa.

Global: *Globularia alypum* L. is found in southern Europe and in North Africa from Morocco to Fezzan, in altitude in north Tibesti, in the Saharan Atlas and in the Hoggar. The sub-species eu-alypum L. is mentioned in the Mediterranean, whereas the sub-species *arabica* (Jaub. et Spach.) is only mentioned in Algeria, Morocco and the Hoggar.

■ Ecology

Globularia alypum L. is known almost throughout Tunisia, from the sub-humid to the arid, but is rare in the Saharan area. It characterises the forest degradation stages and develops on stony soils.

■ Status, conservation, culture

The plant is widely distributed around Tunisia. It is much sought after for its therapeutic virtues and is thus subject to frequent, unsupervised picking. Its stems and leaves are dried and sold by herbalists and sellers of medicinal plants in the local souks of the region.

■ Part used

The leaves.

Constituents

A resin, iridoids (aucubosid) and sterols.

Pharmacological action

It is thought to be a gentle astringent purgative. The plant is said to be anti-leukaemic and anti-carcinogenic as regards the tongue.

Traditional medicine

It is basically used for its purgative and diuretic virtues. Indeed, in the Sahara (Doreau, 1961 in Le Floc'h 1983) it is used as a purgative for fever, headache, rheumatism and urinary incontinence.

Nomads in the Tunisian south use it (Louis 1979, in Le Floc'h 1983) as a concentrated decoction (leaves and branches) to help cure ulcers, as an infusion for colic, and as a poultice (with honey) to bring abscesses to a head quickly. The poultice is applied to the swelling (Prax 1850, in Le Floc'h 1983). In the El Hamma region near Gabès, the leaves are ground to a powder (Louis 1979, in Le Floc'h 1983), or chewed and then sprinkled or smeared onto a wound to heal it.

The writings of Ben Ali and Louis (1945, in Le Floc'h 1983) mention that it is recommended in the treatment of gout.

Glycyrrhiza glabra L.
Leguminosae (Fabaceae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photo by Prof. K. H. Batanouny

Morphological Description
Leaves, stem and root: The plant is a herbaceous perennial. It is 1 to 2 m high and has a long sturdy primary taproot. The taproot is 15 cm long and subdivides into 3 to 5 subsidiary roots, 1.25 m in length. There are several horizontal woody stolons which may reach 8 m. New stems are produced every year. They are sturdy, erect, branched either from the base or from further up, and are generally rough at the top. The foliage leaves are alternate, odd pinnate and 10 to 20 cm long. The leaflets are in 3 to 8 pairs. The stipules are very small and drooping.
Flower and fruit: The axillary inflorescences are upright, spike-like and 10 to 15 cm long. The individual flowers are 1 to 1.5 cm long, bluish to pale violet and short-pedicled. The calyx is short, bell-shaped and glandular-haired. The tips of the calyx are longer than the tube, and are pointed lanceolate. Petals are narrow, the carina petals are not fused, and they are pointed but not beaked. The fruit is a pod, 1.5 to 2.5 cm long, and 4 to 6 mm wide. It is erect and splayed, flat with thick sutures, glabrous, somewhat reticulate-pitted, and usually has 3 to 5 brown, reniform seeds.

Geographical Distribution

Local: Bahariyah and Siwa oases
Regional: Mediterranean region and Middle East countries.
Global: Native to the Mediterranean region and parts of Asia. It is cultivated worldwide.

Glycyrrhiza glabra L., Sp. Pl. ed 742. 1753
Radix Glycyrrhizae, Rad. Glycrrh., Glycyrrhiza,
Liquiritiae Radix, Rhizoma Glycyrrhiza nativum,
Liquiritiae

Names

Arabic: Shagaret es-sus

عرق سوس Ersqsus

Berber: Azrar azidane

English: Liquorice, sweet root

French: Reglisso, Reglisso glabre, Reglisso Officinale

Ecology

Liquorice enjoys fertile, sandy or clay soil near a river or stream where enough water is available for the plant to flourish in the wild, or under cultivation where it can be irrigated.

Status

The plant is naturalized in the oases. However, it is not well used for its therapeutic value. Waste land and slightly saline areas could be used to cultivate this plant and avoid importation.

Part(s) Used

Roots, underground stem or stolon.

Collection

Harvesting takes place in autumn after the foliage has dried.

Preparation

Decoction, powder, liquorice extract.

Use

Oral, external, local

Constituents

Triterpenoid saponins: glycyrrhizin is the major active ingredient and is responsible for the sweet taste, being 50 times sweeter than sugar. Other saponins are also present. The concentration of glycyrrhizin in the root depends on the source and

the method of assay and is typically 2-6%. Glycyrrhetic acid and the aglycone of glycyrrhizin are also present in the root. A wide range of flavonoids (1-1.5%), impart a yellow colour to the root: flavonones, mainly liquiritin, chalcones and isoflavonoids, also sterols and volatile oils are present.

Pharmacological Action and Toxicity

The major active ingredient is glycyrrhizin. It is the main expectorant ingredient, and an 18-B derivative of glycyrrhetic acid has an antitussive activity comparable to that of codeine. Both glycyrrhizin and glycyrrhetic acid are anti-inflammatory and antiallergic, helping to explain their efficacy in asthma. They have been shown to be hepatoprotective, mediating their activity through an antioxidative rather than a corticosteroid-like mechanism. Liquorice is used clinically in China for liver diseases and has produced an improvement in liver function tests in hepatitis, clearing jaundice and alleviating abdominal distension, nausea and vomiting. It has an antiulcer activity and a derivative of glycyrrhetic acid, carbenoxolone, is used clinically for ulcers, including aphthous ulcers. Liquorice has an oestrogenic activity in animals probably due to the isoflavonoids present. The polysaccharide fraction has immunostimulating activity.

The Commission E advises that liquorice is contraindicated in pregnancy but doses up to 3 g per day are likely to be safe.

Liquorice and its extracts are safe for normal use in moderate amounts - up to about three cups of tea a day-long term use (more than six weeks).

It has a well known pseudoaldosterone effect when large doses are ingested. The symptoms of pseudoaldosterone syndrome include hypertension, hypokalaemia, sodium and water retention, low plasma renin activity, and suppressed urine and serum aldosterone levels.

However, glycyrrhizin and glycyrrhetic acid have mineralocorticoid activity which may result in hypokalaemia, hypertension and oedema when large doses are taken over a long period.

Glycyrrhizin has recently been recorded to have an anticariogenic activity by inhibiting bacterial growth and plaque formation.

Glycyrrhiza should be prescribed in neutral or alka-

line solution. It is more effective when taken before food. The potassium intake should be increased.

Pharmacopoeia

Egyptian Pharmacopoeia, 1972

German Rote Liste, 1987

French Dictionnaire Vidal, 1986

European Pharmacopoeia, 1997

British Pharmacopoeia, 1998

British Herbal Pharmacopoeia, 1983, 1990.

Chinese Pharmacopoeia, English edition 1997

Japanese Pharmacopoeia, English edition 1996

Indian Pharmacopoeia, 1996

Liquorice is covered by a positive Commission E monograph and can be used for:

- i) Catarrh of the upper respiratory tract.
- ii) Gastric and duodenal ulcers.

Liquorice is on the UK General sale list.

Liquorice natural extractive and ammoniated glycyrrhizin have GRAS status. Liquorice is also freely available as a "dietary supplement" in the USA under DSHEA legislation (1994 Dietary

Supplement Health and Education Act). It has been present in the following OTC drug products and as an ingredient in products offered for use as an aphrodisiac and as a smoking deterrent. The FDA, however, advises that: "based on evidence currently available, there is inadequate data to establish general recognition of the safety and effectiveness of these ingredients for the specified uses".

Pharmaceutical Products

Broncho "Cough Syrup" (Mepaco)

Shefa tone "effervescent" (Nile Co.)

Sekem Renal Herbs (Sekem)

Sekem Laxative Herbs (Sekem)

Sekem Slimming Herbs (Sekem)

Sekem Anticough Herbs (Sekem)

Sekem Hepatic Herbs (Sekem)

Baby Calm (Sekem)

Compound Powder of Liquorice: 15 g / 100 g
(Kahira)

Glucafene syrup Extract Glycyrrhizae 5 g/180 ml
(Memphis)

7 Herbs, 20 mg liquorice/400mg capsule (Misr Co.)
Sweets sold in the market are called Rub sous.

Biogastrone, Duogastrone (Biorex)

Cavid-S (Cidona, Holand)

Traditional Medicine and Indigenous Knowledge

History: Archaeological evidence reveals that liquorice roots were mentioned in some ancient Assyrian tablets dating from the third millennium before the present. In old Egyptian pyramids, tombs of the pharaohs yielded liquorice roots; large amounts were found among the valuables in the tomb of King Tut (1345 BC).

Paul Twitchell, in his book, "Herbs: The Magic Healers" (1971), states that liquorice root was introduced into Egypt as medicine by one of Eckankar's ancient masters, Gopal Das. Eckankar is the ancient science of soul travel. Almost all ancient civilizations knew and used liquorice root, including the ancient Hindus of India, Greece, Rome, Babylon, and older civilizations of Europe and Asia. The therapeutic value of the herb varied from expectorant to restorer of sexual vigor.

Dioscorides, a herbal physician and writer on the medicinal value of over 500 plants who travelled with the army of Alexander the Great, advised the troops to carry and chew liquorice root in order to allay their thirst when water was scarce on long marching campaigns.

Liquorice is mentioned by the Roman writers Oribasius and Marcellus in the fourth century BC.

Hippocrates, during the 5th century BC, writes about the uses of liquorice for prevention of thirst in dropsy and diabetes. Theophratus, known as "The Father of Botany" for his work on plants, says that "the sweet Scythian root is good for asthma, dry cough, and all pectoral diseases". The Scythians were an ancient nomadic people who travelled on horseback in the steeps of Central Asia.

Theophratus, a student of Plato and Aristotle,

reported that the Scythians were able to go as long as 12 days without water because they chewed liquorice root and ate mare's cheese.

Liquorice root was essential to the Arabic alchemists of the Middle Ages.

The sweet root has been cultivated for centuries in England near Pontefract Castle beginning with the reign of Henry III.

Both Chaucer and Shakespeare mentioned liquorice in their works. Later English herbalists refer to liquorice quite often, including the well known herbalist of the 16th century, M. Gerard, and another of the 17th century, Nicolas Culpeper. Gerard states that liquorice grew plentifully in the famous "Physic Garden" in London.

Nineteenth century botanic physicians, both European and American, knew the virtues of the liquorice root, and used it extensively in their practices. Liquorice as a medicine was included in the early U.S. pharmacopoeias and Materia Medicas, and still is today. It is very commonly used in Egypt for its several curative properties.

Traditional Medicinal Uses

- Bowel and urinary tract complaints.
- Chest diseases and bronchial diseases.
- Constipation
- Inflammatory diseases.
- Rheumatic diseases.
- Tumours.
- Ulcer

Other uses of the plant: for food poisoning mixed with black or mung beans. It is also used as a flavouring food and as a refreshing drink. It is added to beer to increase foaminess.



Compiled by: Dr. Zeineb Ghribi

Morphological description

Hammada scoparia is a perennial, with succulent, spindly, segmented branches, that grows no higher than 1 m. The leaves are opposed, atrophied into scales and fused onto the segment that bears them. The flowers have no petals, and are dense, arranged in a terminal spike. Their style is long and bifid. The fruitbearing perigone has a membranous, brilliant crown. Flowering starts in autumn and fructification ends in December.

Geographical distribution

Local: From Sousse to the far south of Tunisia.
Regional: Tunisia, Algeria and Morocco.
Global: North Africa and the Middle East.

Ecology

Hammada scoparia is a Saharo-Mediterranean species, developing in bioclimates that range from

***Hammada scoparia* (Pomel) Il'jin** in Bot. Zurn. (Moscow et Leningrad) 33: 583. 1048.
Arthrophytum scoparium (Pom.) Il'jin; *Haloxylon articulatum* subsp. *scoparium* (Pomel) Batt.;
Haloxylon scoparium Pomel

Arabic: Remth

French: Saligne à balai

the upper arid to the lower Saharan, variants with mild, fresh winters, on the silty or slightly gypseous brown soils of the steppes.

It is among the gypseous steppe associations of the arid, especially with *Artemisia herba alba*, or forms a degradation facies. In the Saharan bioclimate it is found in association with *Arthrophytum schmitianum*.

Status, conservation, culture

Hammada scoparia is used via unsupervised picking to prepare a snuff powder (*neffa*), to which it owes its degradation. It is not seen as a pastoral species.

Part used

The fruit and branches.

Constituents

The chemical make-up is very similar to that of *Anabasis aphylla* L.: 2 to 4.5% of alkaloids, especially anabasin accompanied by aphyllidin and lupinin. Plus an alkaloid whose structure resembles that of salsolin.

The presence of anabasin explains the plant's toxicity.

Traditional medicine

The fruit's pericarp and the stem, chopped and mixed with grease, are used as a poultice for mould.

Toxicity

Poisoning in animals is shown by nervous disorders, trembling of the legs, and great general weakness.



***Hyoscyamus muticus* L.**
Solanaceae

Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photos by Prof. K. H. Batanouny

Morphological Description
Herbaceous plant, 30-60 cm high, perennial, stout, green and fleshy, stem thick, richly branched from the neck, leaves succulent, alternate, long petioled below, sessile above with an acute apex and angled or toothed-lobed margin. The leaf blade is broad, the floral leaf arising on the peduncle oblong lenticular-shaped. Inflorescence in one-sided spike or raceme-like with dense flowers. Flowers are bisexual, homogeneous and slightly zygomorphic, calyx is tubular, corolla funnell-shaped, white or green or purple. Fruits are relatively small, brownish, unarmed capsules with a longitudinal opening and containing numerous seeds. It is included in the persistent calyx.

Geographical Distribution

Local: Almost all the phytogeographical regions of the country. It occurs in the desert, Mediterranean Sea, Sinai, Red Sea, Oases, and in certain parts of the Gebel Elba region.

Regional: In the deserts of the Middle East.

Global: In the deserts of the Middle East, Africa, Europe, Asia and South America.

Ecology

The soil texture supporting *Hyoscyamus muticus* ranges between gravelly sand, sandy limestone and loam and to sandy clay. Thus, *Hyoscyamus muticus* has a wide range of amplitude in the desert, the most suitable habitat being sandy soil (considerable fine sand fraction) with a low medium carbonate

***Hyoscyamus muticus* L.**,
Mant., 45 (1767).

Names

Arabic: Sakaraan, Sekran

سم الفار ,

Shagaret-sakraan

English: Egyptian Henbane

French: Jusquiame d'Egypt

content. The soil reaction must be weakly alkaline (PH 7.4-8.0) or alkaline (PH 8.0-9.0) and low salinity of the magnitude of 0.28%.

Hyoscyamus muticus belongs to the xerophytic plant community, which is characterized by a limited water supply.

Status

The economic importance of *H. muticus* is widely increasing since the plant has been spotlighted and an increasing interest is directed towards its cultivation as a source for alkaloid production in pharmaceutical industrialization. Trials to cultivate *H. muticus* in two different locations have been carried out to determine the total alkaloidal contents in addition to other plant growth criteria. The first location was the experimental farm of the Faculty of Pharmacy which represented a clay-loamy soil, and the second one was the 6th October farm in Noubaria (Egypt) which represented sandy soil lands, the latter giving better results.

Part(s) Used

Total herb, leaves and flowering tops.

Collection

The flowering tops are collected at the mid flowering stage.

Preparations

Infusion, decoction and powder.

Use

Oral, external and ointment.

Constituents

Total tropane alkaloids ranging from 1.38-1.58% during flowering stage. Hyoscyamine represents 90% of the total alkaloids in addition to small amounts of hyoscine. *H. muticus* is 25 times richer in alkaloid than *H. niger*.

Pharmacological Action and Toxicity

Antispasmodic, anodyne, sedative, mydriatic. Principally employed in irritable conditions and nervous affections. It has also been recorded to be used in asthma, whooping cough, as a sedative and as a substitute for opium, where this is inadmissible, such as for children's complaints. The alkaloid hyoscine is used very widely, as a pre-operative medication, to prevent travel sickness. *Hyoscyamus* is used mainly for its antispasmodic effect on the digestive and urinary tracts, and to counteract griping due to purgatives.

The plant is toxic due to its high content of tropane alkaloids.

Pharmacopoeia

1. Egyptian Pharmacopeias 1984.
2. British Pharmacopeias 1809, 1968, 1973.

Phytopharmaceutical Products

Hyoscyamus muticus fluid extracts.

Herba Hyoscyamus muticus.

Standardized powder of *Hyoscyamus muticus*.

Tincture of Egyptian *Hyoscyamus*.

Avicenne powder; Kahira, 20g *Hyoscyamus* leaves, 75g.

Buchu and *Hyoscyamus* mixture.

Buscopan;; Buscopan Compositum; Buscopan plus (CID), (Boehringer Ingelheim)

Traditional Medicine and Indigenous Knowledge

History: "Hyoscyamus" originated from Greek literature, "Hoys" meaning a Hog and "Kyamos" meaning a bean. It was Dioscorides who, long before the Christian era, gave the plant its name of *Hyoscyamus*, because although poisonous to man and many animals, pigs could apparently eat it

without any harm. He used henbane to produce sleep and allay pain. In the 10th century, it is recorded under the name of *Jusquiasmus*. It fell into disuse until it was again adopted in medicine in 1809 after the recommendation of Baron Storch, who gave it in the extract form in cases of epilepsy and other nervous convulsive diseases.

Greeks and Romans knew it as a painkiller; Babylonians and Egyptians were acquainted with both its good and bad qualities. Brewers in earlier times made use of henbane in beer, probably in order to make it more intoxicating.

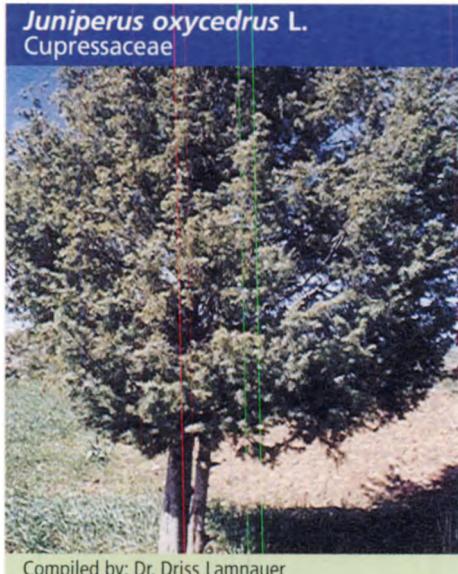
The plant is said to relieve painful spasmodic conditions, of the digestive and urinary tracts, and lead colic. It has been used for toothache and whooping cough. The boiled herb has been used as a pain killer during labour. Sakaraan cigarettes have been used to treat asthma.

Traditional Medicinal Uses

- Acute mania and delirium, in the treatment of withdrawal symptoms in morphine dependence
- Chronic dementia
- Convulsions
- Epileptic mania
- Functional palpitations
- Gastro-intestinal tract and the gastric or duodenal ulcer
- Mental and maniacal excitement
- Neurogia
- Paralysis agitans
- Spasmodic cough and asthma

Other uses of the plant: In some parts of the world, it is used as a poison.





Compiled by: Dr. Driss Lamnauer

Edited by: Prof. Kamal Batanouny

Morphological description

An evergreen tree, 1-8 m, branches spreading, drooping. The leaves are of medium size, awl-shaped, sharp pointed, with 2 bands on the upper surface. Flowers are inconspicuous. Fruits are 2 mm. thick, yellow to red/brown at maturity after 2 years, shining, with 2 white lines on apex.

Geographical distribution

Local: Middle Atlas, High Atlas.

Regional: Morocco, Algeria and Tunisia.

Global: South Europe, Mediterranean basin.

Ecology

Grows in full sun, in all climate zones and most soils, garrigue, maquis, forest, up to 2500 m.

Status

Not an IUCN threatened species.

Part used

The wood, fruits (berries) and oil.

Oleum Cadinum. Oil of Cade: An empyreumatic volatile oil obtained from the wood. It is a dark brown, clear, thick liquid, with a tarry odor, warm, faintly aromatic, with a bitter taste. It is slightly soluble in water, imparting to it an acid reaction,

Juniperus oxycedrus L.

Juniperus rufescens Link ; *Juniperus tenella* Antoine; *Oxycedrus* Clus

Arabic: aaraar, taga. تقدّر

Berber: taqqa, taka, tiqqi, teki,

English: prickly cedar, medlar tree, juniper bush, juniper bark, juniper berry, sharp cedar.

French: cade, générvier oxycèdre, oxycédré, cadier.

partially soluble in alcohol, petroleum, benzene and completely soluble in ether, amyl alcohol, chloroform and glacial acetic acid.

Constituents

The constituents of the plant are flavonoids, flavones, terpenoids, monoterpenoids, sesquiterpenoids, volatile oil, resin, tannin and extractive (acetic acid, pyroligneous acid, acetone, methyl alcohol, etc.).

Cade oil contains phenols -17 to 26% phenols-(mainly guaiacol about 12%), cadinene (sesquiterpenoid), carburs and alcohol (cardinol). The principle component of *Juniperus Oxycedrus* Tar is cadinene, a sesquiterpene, but cresol and guaiacol are also found.

The leaves contain terpenoids, monoterpenoids, and fatty acid: sabinic. The leaf oils were mainly composed of alpha-pinene (40-57%) and manoyl oxide (5-10%).

The infructescence and fruits contain: terpenoids, sesquiterpenoids, monoterpenoids and diterpenoids. The (unripe) berry oils were dominated by alpha-pinene (65%) with moderate amounts of myrcene, limonene, germacrene D or gamma-murolene. They were reported to also contain canfene, junene, terpinole and cadinene.

The chemical composition of the plant as given in the Phytochemical Database, USDA / ARS / NGRL, Beltsville Agricultural Research Center, Beltsville, Maryland, is as follows:

Plant: 11 beta-hydroxymanooy-oxide; cedrene; methyl-trans-communate; methyl-cis-communate; methylimbricalate; methylimbricatolate; myrecomunic-acid; ylangene.

Wood: guaiacol, L-beta-caryophyllene 3,500 ppm;

L-cadinene 4,000 ppm; L-cadinol 6,000 ppm; pseudocedrol 375 - 750 ppm; viridiflorol. Fruit: myrecommunic-acid-methyl-ether; p-Cresol 45 ppm; pinene.

Pharmacological action and toxicity

Cade oil is a well known anti-parasitic, antimicrobial, antiseptic and vulnerary. It is said to be very effective for skin complaints, dermatitis, eczema, and haemorrhoids.

Extracts of *Juniperus oxycedrus* leaves and stems were tested on animals and found to have significant anti-inflammatory effects on rats. Some analgesic effects were also noted. Spasmolytic properties and effects on arterial blood pressure were also reported.

The juniper berry contains essential oils, flavone glycosides, organic acids and terpenes, which are reported to stimulate the kidneys and bladder. It should be noted that with prolonged usage of the berries, or in excessive amounts, this herb could cause irritation to the kidneys and the urinary tract. It is not recommended for those with kidney problems or for pregnant women. The oil is an irritant and can cause inflammation and blisters. People with gastric inflammation should avoid this herb. Prickly juniper is said to be an irritant, and allergic dermatitis can probably result from the application of oil of cade. Acneiform eruptions can also result from the use of oil of cade.

Juniperus oxycedrus tar was reported to be genotoxic in several tests.

Juniperus oxycedrus represents a newly characterized pollen species of the Cupressaceae that cross-reacts with other members of the same family. Subjects with cypress allergy have in vivo and in vitro positive test responses for *Juniperus oxycedrus* and can show symptoms when exposed to its pollen.

ABORTIFACIENT. Not to be used if pregnant.

Traditional medicine and local knowledge

• Method of collection:

Cade oil is produced by the destructive distillation of the wood of *Juniperus oxycedrus*.

It should be dry (downward) distilled from the heartwood, as far tar. Pieces of wood are laid care-

fully on one another and covered with earth, except for an opening at the top, thus permitting slow combustion. Inverted iron pots are filled with billets, surrounded with serap wood and set on fire, producing sufficient heat for distillation; product is caught in receptacles and, set aside 15-20 days for the separation of the tarry and aqueous layers, the upper oily one constituting the product.

• Uses:

Juniper tar produced by the destructive distillation of dry wood is used as an antiseptic for skin diseases, for curing wounds and sores, and as an antiparasitic.

The fruits are used as a diuretic, stimulant, vermifuge and for asthma.

Skin disorders: scalp care, eczema, scale affections, alopecia, loss of hair, psoriasis. Skin injuries: wounds, ulcers.

Cade oil is mostly used in the treatment of animal's skin diseases. It is also used to heal wounds, and as an insect repellent to keep insects away from wounds in equines, applying it directly.

The oil is also sprayed on water jars and cups as an antiseptic and to flavour drinking water. The fruits are consumed and said to be good for asthma and other ailments.

History

Oil of cade has been used from remote times to treat animal's skin diseases, and more recently in medicines for psoriasis, chronic eczema, etc.

Prickly cedar is mentioned by Ibn Al-Baytar (Leclerc, 1877-1883, n° 1317) as a variety of sarbin (the big variety being the cedrus). Al-Wazir Al-Ghassani (n° 228) and Abderezak (Leclerc, 1984, n° 16328) describe it under the name taqqa and Umdat at-tabib (n° 1646) under the name aaraar. It was also mentioned in *Tuhfat al-ahbab* (n° 352458).

Modern uses

Cade oil is also used in men's scents and as a food flavouring, giving a smoky taste.

The essential oil is for external use only and should always be diluted with suitable carrier oil such as sweet almond oil, before being applied to the skin. Keep it away from children and pets. It is reported to be non-toxic and non-irritant but with possible sensitization in some individuals.

Rectified cade oil is a clear orange-brown to dark-

brown oily liquid with an intense tar-like, smoky phenolic odour. Its use in perfumery is limited to situations where a smoky, leathery, woody phenolic, dry and warm note is required (e.g. scented notepaper, leather products, pine for men's scent, etc.).

Cade oil is reported to have certain disinfectant properties that allow it to be used in soap perfuming.

It is occasionally used to impart a smoky flavor to meat and seafood.

In a recent report on the safety assessment of *Juniperus oxycedrus* and other *Juniperus* extracts, it was underlined that the available toxicological data on the oils cannot be extrapolated and more data is needed using National Toxicology Program (NTP) methods. The conclusion drawn was that the available data was insufficient to propose that these ingredients were safe in cosmetic formula.

Diseases/Properties

It is used for skin disorders, scalp care, eczema, scale affections, alopecia, loss of hair, psoriasis, wounds, and ulcers. It is reported to be antiparasitic, diuretic, stimulant and vermifugal.

Other uses of the plant

(Ethnobotany)

The wood is used for heating fuel, charcoal.

In other Mediterranean countries the mature fruits are used as condiments to flavour roasted meat and in other savoury preparations, as condiments and pickles.

Cade oil is also used in men's perfume and gives a smoky taste to food.

Records from the countries of the region about this species

In some Mediterranean countries the fruits are used:

- as a decoction, to pass kidney stones
- boiled (until the seeds are dissolved), for haemorrhoids
- pounded and mixed with flour, boiled and applied to the abdomen, for bloating
- to treat abdominal pain and loss of appetite; pounded fruits are roasted in a pan for a short time and mixed with grated onion and pine tar, then spread on a cloth and applied to the abdomen.
- to treat common colds and coughs; the fruit and the tar are put in boiling water and the patient inhales the vapour under a blanket.
- as an expectorant to treat catarrh; pounded red fruits are boiled and concentrated, then filtered through a muslin and cooled overnight. The extract thus obtained is drunk every morning and evening.
- to treat calcinosis in joints; pounded decocted fruits are drunk 3 times daily

The root is used to treat stomach disorders; powders are externally used for ulcers and abscesses; fresh stems and leaves are burned to control house pests.

***Juniperus phoenicia* L.**
Cupressaceae



Compiled by: Dr. Zeineb Ghrabi

■ Morphological description

This is a monoical shrub or tree that can live up to 300 years and can be 8 m. high. The trunk is short, sometimes 2 m. in circumference, and the bark peels off in strips. The young leaves are aciculate and become scaly. They are small, in 4-6 overlapping ranks, like those of the cypress, with on their back a small longitudinal resiniferous depression. Pollination results in the forming of a berry-like fruit the size of a chick-pea, tawny brown with bluish tints, borne on a non-reflected peduncle. Flowering takes place in winter-spring; the seeds will be ripe the following year, in summer.

■ Geographical distribution

Local: Cap Bon, the Tunisian dorsal ridge, the Kroumirie, central and southern Tunisia.

Regional: In North Africa, the species covered 450,000 ha., including 290,000 ha. in Algeria, 152,000 ha. in Morocco, and 8,000 ha. in Tunisia. It also develops in Cyrenaica.

Global: A typically Mediterranean and steppe plant, it is found from the Madeira Isles to Arabia.

***Juniperus phoenicia* L.** Sp. Pl. 1040. 1753

Arabic: araâr

French: Genévrier de Phénicie

English: Phoenician juniper

■ Ecology

The *Phoenician juniper* is a polymorphous species appearing in two areas, one littoral and another continental: along the North Africa coast, it goes from the upper arid to the humid in the hot and mild variants. On sea dunes being stabilised, the Phoenician juniper forms an unbroken line in association with *Juniperus oxycedrus* subsp. *Macrocarpa* in the interior, it goes from the lower arid to the upper semi-arid in the mild to fresh variants, where it is in association with several climax essences (holm oak, cork oak, kermes oak, Barbary thuya, Aleppo pine) that belong to different climax variants.

The minimal annual rainfall must be about 150 mm. In Tunisia, the distribution area of the Phoenician juniper goes no further than the 600 mm. isohyet. In Morocco, it goes up to 2,400 m. high. It develops on calcareous soils or marl or sandstone or gypsum.

■ Status, conservation, culture

The plant is not grown in Tunisia, but used in the wild state for medicinal, food or craft purposes. Climax formations based on the kermes oak developing in the Tunisian coastal regions (Nefza-Zouarâa) on sea dunes being stabilised are protected. In these formations, nice specimens of Phoenician juniper are found.

Germination of the seeds is inhibited by the resinous, fleshy part of the berry-like fruit, but is facilitated by the seeds passing through the digestive tubes of jackals and goats. Growth is slow.

■ Part used

The leaves and berry-like fruits.

■ Constituents

An essential oil (0.5-2%; min. 0.75%) whose qualitative and quantitative make-up depends on where

the plant comes from and how ripe the berries are; a resin; oligosaccharides (about 30%); catechic tannins (3-5%); biflavonoids; leucanthocyanes, alcohol acids and a terpenic alcohol (sabinol).

Pharmacological action and toxicity

The essential oil of the Phoenician juniper has antimicrobial and antifungal properties. The lignins of the plant act against cancer. Additionally, the bibliography mentions hypoglycaemic, diuretic and antiseptic activities for the urinary tract.

The sabinol present in the plant is a strong irritant and can cause digestive, neurological, cardiorespiratory and hepato-renal disorders.

Traditional medicine

Diarrhoea: mix equal amounts of the powdered leaves of *Juniperus phoenicia* L. and bark of roots of *Rhus tripartita* (Ucria) Grande; a soup-spoonful to be taken by mouth three times a day before meals for a week.

Mix the powdered leaves of *Juniperus phoenicia* L., date paste and olive oil; a coffee-spoonful to be taken by mouth early every morning until a cure is obtained.

Mix equal amounts of the powdered leaves of *Juniperus phoenicia* L. and seeds of *Trigonella foenum-graecum* L. with honey; take two soup-spoonfuls early in the morning.

Rheumatism: bathe in a decoction of the leaves.

Bloated stomach: a soup-spoonful of the powdered leaves of *Juniperus phoenicia* L. mixed with water to be taken by mouth early in the morning.

Acute gonococcal infection (lower part of the genito-urinary system): an infusion of 30 grammes

of leaves of *Juniperus phoenicia* L. in a litre of water for 15 mn.; two glasses a day to be taken by mouth before meals.

Eczema: for two weeks, daub with tar of *Juniperus phoenicia* L. three times a day.

Dysmenorrhoea: bathe with a decoction of the leaves of *Juniperus phoenicia* L., *Teucrium polium* L. and *Mandragora autumnalis* Bertol.

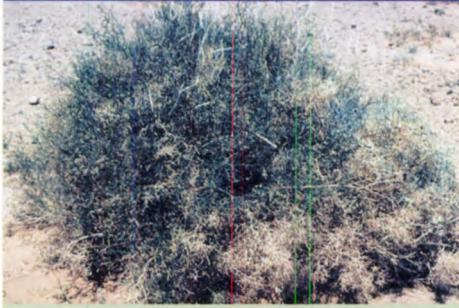
Gastriculcer: a powder made from the bark of the stem of *Rhus pentaphylla* (Jacq.) Desf., the leaves of *Juniperus phoenicia* L., and the bark of the fruits of *Punica granatum* L. is mixed with honey; to be taken early in the morning until a cure is obtained.

Sunstroke: equal amounts of the powdered leaves of *Lawsonia inermis* L., *Juniperus phoenicia* L., *Artemisia herba alba* Asso., and *Origanum vulgare* subsp. *glandulosum* are mixed with olive oil and applied to the crown of the head.

Prostatitis: boil 5 kilogrammes of equal amounts of leaves of *Rosmarinus officinalis* L., *Artemisia herba alba* Asso., *Marrubium alysson* L., *Juniperus phoenicia* L., *Stipa tenacissima* L., *Ampelodesma mauritanica* (Poir.) T. Dur. Sch., *Globularia alypum* L., and the bark of the trunk of *Pinus halepensis* Mill. in ten litres of water until it boils down to one litre; take a tea glass full early every day.



***Launaea arborescens* (Batt.) Maire**
Compositae (Asteraceae)



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial spiny shrub, 40-120 cm. high, with typical zig-zag shaped stems. The young stems are green, glabrous and erect. The older ones become tough spines. The leaves are narrow and dissected in small lobes, evergreen at the base but shed after flowering from the stems. The leaves and stems have a white latex. A small involucre of 1-2 cm., with bright yellow ligules. The fruits are small achenes (4 x 1 mm.). It flowers from March to May.

Geographical distribution

Local: The northern and western Algerian Sahara.
Regional: Morocco and Algeria.
Global: Ibero-Mauretanian (reaching Almeria in south-eastern Spain) and the western Sahara.

Ecology

A common xerophytic shrub growing on gravelly-sandy soils in non-saline wadi beds. It can be found in areas where the rainfall is under 300 mm. (south-eastern Spain) and in truly desert climates with an annual rainfall of no more than 100 mm. per year.

Status

According to the IUCN criteria this Saharo-Mediterranean species falls into the "C" category. It is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre.

***Launaea arborescens* (Batt.) Maire**

Zollikoferia arborescens Murb.
arborescens: tree-like

Arabic: moulbina, bou chlaba

Berber: iferskel

English: arborescent launaea

French: launaea arborée

Part used

The latex; the stems and leaves, and the roots (diabetes). These are collected in the spring and prepared as an infusion, taken by mouth, an ointment, or mixed with other plants.

Constituent

No data found on the constituents of this plant.

Pharmacological action and toxicity

No data is available in the literature regarding its pharmacological action. The plant is considered by nomads as slightly toxic (due to its latex) to humans as well as animals. When eaten in great quantities by nomads' herds, these have serious gastro-intestinal troubles due to inflammation of the mucus.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for diabetes and nausea (particularly in young children).

Honey from bees that have been on the flowers is considered fortifying.

In Tissint (Morocco) the latex is applied locally to cure sore throats and is also applied to furuncles and to the skin to extract spines. A light infusion of this plant is given to children as a vermifuge. In the region of Marrakech, the powdered root mixed with *Artemisia herba-alba* is taken for diabetes.



Compiled by: Dr. Zeineb Ghribi

Morphological description

The sweet bay is a tree 3-7 m. high that is aromatic, glabrous, green, very bushy and with erect branches. The leaves are dark green, evergreen, alternate, simple, elliptical-lanceolated, tapering to a short petiole, entire and with slightly wavy edges. The flowers are dioecious, in groups of 4-6 in little axillary umbels. The perigone is yellowish, petaloid, caducous, with 4 obovate divisions. The male flowers have 8-12 stamens set in two ranks, anthers that open by valves and filaments with 2 glands. The female flowers have 4 tripartite staminodes and a carpel with a short style and a capitate stigma. The fruit is an elliptical blackish drupe, the size of a small olive, and contains a single seed.

Geographical distribution

Local: In the wild state it is found in the Kroumirie (Ain Draham), Le Kef and Cap Bon. *Laurus nobilis* L. is also planted in gardens as a culinary plant.

Regional: North Africa.

Global: The Mediterranean (Corsica, Italy, Greece, Turkey, North Africa and probably naturalised in France and Spain).

Ecology

The sweet bay is a tree that grows wild in Tunisia at

Laurus nobilis L., Sp. Pl. : 369. 1753

Arabic: Rand

French: Laurier sauce, laurier noble, laurier d'Apollon

English: Laurel, sweet bay

the sides of *oueds* and mountain streams and among damp rocks. It can tolerate cold up to 10°C. It adapts to different types of soil, except soil that is too acid.

Status, conservation, culture

The sweet bay is much used in Tunisia to flavour dishes in both town and countryside. The dried, conserved leaves are used. They are well marketed in the big towns.

Multiplication is easily done from cuttings or suckers taken from around the mother plant, or sowing. Cuttings are available in nurseries and some companies that sell ornamental plants.

A research programme on the sweet bay is under way. It is being developed by the Forestry Commission; its aim is to master the technique of propagating and growing the sweet bay. This project will enable farmers' demand for the plant to be satisfied; it can then be used not only as a culinary plant but by extracting its essential oil.

Part used

Leaves and berries.

Constituents

The leaves contain an essential oil (1-3%) that is rich in cineol, linalol and eugenol; sesquiterpenic lactones, especially costunolid and desacetyl-laurenobiolid; isoquinoleic alkaloids whose structure resembles that of aporphinoids. The fruit, a berry, contains an oil which solidifies at ordinary temperature (laurel paste) and represents 24-55% of the fruit.

Pharmacological action and toxicity

The sesquiterpenic lactones of the laurel leaves

provoke allergic reactions and dermatitis. The leaves have digestive properties (for epigastric bloating, slow digestion, eructation, flatulence). They are not poisonous. The leaves are a greatly appreciated spice for cooking. The fruit, a blackish berry, contains a fixed oil that is solid at ambient temperature (laurel paste).

Use in herbal medicine

The essential oil of the leaves is one element in Fioravanti's balm, used for neuralgia and rheumatic pain.

The berries' fixed oil is no longer used in therapeutics because of the allergic reactions it provokes. Other uses: the aroma of the leaves is used in the industrial manufacture of liqueurs.

Pharmaceutical production

Dried leaves and essential oil.

Traditional medicine

History: The sweet bay was called Apollo's laurel because it was dedicated to the god Apollo, or poets' laurel, since they (and generals or emperors) were crowned with laurel wreaths. The custom continued down the ages, from classical Rome to

the Middle Ages, when scholars were given wreaths; young doctors would receive a crown garnished with laurel berries (*bacca laurea*) from which we get the word *baccalaureate*. The sweet bay should not be confused with the oleander (*Nerium oleander* L.), which has long leaves arranged in 2s and 3s, or with the cherry laurel (*Prunus laurocerasus* L.) with brilliant green toothed leaves which give off a smell of bitter almonds when crushed. Both these are extremely poisonous.



Lavandula antineae Maire



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial herb, frequently found as a small densely ramified shrub 80-100 cm. high. In wet periods the leaves are present along almost the entire square stem. In times of drought, the stems become woody with very few leaves. The leaves are finely dissected and covered with fine hairs check on the field.

Located at the tops of the stems, delicate blue/pale lavender flowers are either solitary or grouped in densely clustered spikes 5-6 cm. long. The flowers are no longer than 1 cm. The fruits are four separate one-seeded nutlets.

The whole plant has a very agreeable smell. Flowering takes place in the spring.

Geographical distribution

Local: Endemic of the Hoggar and Tassili mountains in the central Algerian Sahara.

Regional: Algeria and Libya.

Global: Algeria and Libya.

Ecology

The plant favours rocky sites and is either found in gravelly wadis or growing between the crevices of cliffs. The ecological range for altitude varies from 800 to 2200 m.; it thrives in extremely dry conditions with an average rainfall of 100 mm. a year but can live where the yearly rainfall is as low as 20 mm.

Status

According to the IUCN criteria this endemic species falls into the "E" category.

Lavandula antineae Maire

Lavandula from the Latin lavare, to wash or purify; *antineae*: referring to a beautiful queen of Atlantis

Targui: egayah

French: lavande du désert

Human collection poses a real threat to the conservation of this much appreciated medicinal plant in the central Sahara. Urgent measures for its protection and conservation should be taken. So far no data has been reported on its propagation and conservation.

Part used

The stems, leaves and flowers are collected in the spring and used as an infusion, taken internally.

Constituents

So far no research has been done on the constituents of this medicinal plant. These are probably similar to those in other lavender species (1.8 – cineole, camphor, linalool, linalyl acetate).

Pharmacological action and toxicity

So far no research has been done to check on the pharmacological action of this medicinal plant. The plant is not reported as toxic by the Tuareg.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used as an antiseptic, a bacteriostatic, a sedative, and a vulnerary and for colds and rheumatism. Its aromatic virtues make it a much appreciated herb when added to tea.

Lavandula stoechas L.
Labiatae



Compiled by: Dr. Driss Lamnauer
Edited by: Prof. Kamal Batanouny

Morphological description

An evergreen shrub from 1/2-1 m. tall (depends upon subspecies or cultivar). The narrow, linear, stalkless leaves are untoothed, with (rolled) margins, covered with a fine grey down, usually giving a grey-green overall appearance. The habit is stiffly branched and more open than other species of *Lavandula*. The flower stalk (peduncle) is usually shorter than the flower spike (in *L. stoechas* subsp. *stoechas*) but is often longer as in *L. stoechas atlantica* and *L. stoechas pedunculata* and cultivars derived from these. The *squarish* flower spike is composed of closely set fertile bracts that house the corollas (actual flowers) and is topped by a tuft of large, showy, sterile bracts, which are the more conspicuous part of the inflorescence.

L. stoechas Otto Quast is a usual cultivar.

L. stoechas pedunculata Atlas: From the Atlas Mountains in Morocco, this lavender grows to about 3ft, x 3ft; it is similar to *L. stoechas* Otto Quast, but is taller, more upright and with narrower leaves and longer and thinner flower spikes of smaller plum-purple bracts, which appear between spring and autumn.

L. stoechas atlantica: A Marrocan endemic, closely related to *L. stoechas pedunculata*, is usually found growing at high altitudes on calcareous soils. Compact in form, with long peduncles and comas (tuft of sterile bracts), this is quite a spectacular plant.

Geographical distribution

Global: Southwest Europe, the Near East and North Africa.

***Lavandula stoechas* L.**

Lavandula is derived from the Latin *lavare*, to wash, and was probably the lavender so extensively used in classical times by the Romans and the Libyans, as perfume for the bath. '*Stoechas*' is the ancient Greek name for some islands off the Marseilles coast, where this species is abundant.

Arabic: Halhal, moqif rwah, astuhudus, meharga.
حل حل - موقف - الروح - محرك

Berber: Amezzir, timerza, imezzir.

English: Spanish lavender (in America), French lavender (in Europe), Italian lavender, top lavender

French: lavande stoechade, lavande papillon, lavande stéchas, lavande à toupet

Ecology

L. stoechas is native to dry hills, garrigue, maquis, or open woodlands, on limestone or granite soils, often among rockroses. This almost year-round bloomer has a long history of cultivation. Heat tolerance: good. Sun exposure: full sun. Watering needs: little water when established. Propagation: seeds, stem cuttings in summer of half ripened shoots with heels.

Status

Not an IUCN threatened species.

Part used

The flowering tips, dried flowers gathered just before fully unfolding, leaves.

Constituents

L. stoechas collected in Morocco was studied for its essential oil content. The yields were from 0.9 to 1.4 depending on the region of collection. Fenchone and camphor represent 47 to 84.3 %; one or the other compound may be dominant depending on the sample's origin. The other constituents are alpha-pinene, beta-pinene, camphene, eucalyptol, para-cymene, linalol, borneol, borneol acetate, carvacrol, iso-eugenol, iso-eugenol-methylether. The sample from Idni (High Atlas) gave a good yield after distillation (1.4 %) and have high levels of camphor (72.8 %). They may be used as a source of

natural camphor. The essential oil composition is qualitatively similar to that found in other Mediterranean countries.

The roots of *L. stoechas* ssp. *stoechas* from Turkey were investigated and afforded triterpenes: 18-hydroxy-27-norolean-12,14-dien-30-al-28-oic acid, 3 β -hydroxy-1-oxo-olean-12-ene-30-al-28-oic acid, 16 β -hydroxylupeol-3-O-palmitate, 16 beta-hydroxylupeol-3-O-myristate, 11-oxo-beta-amyrin, monogynol A cis-coumaryl ester, monogynol A trans coumaryl ester, 18-hydroxy-27-norolean-12,14-dien-30-al-28-oic acid and 3 beta-hydroxy-1-oxo-olean-12-ene-30-al-28-oic acid, aromatics : cis-4-O-methyl caffeic acid octanol ester and trans-4-O-methyl caffeic acid octanol ester, and two steroids.

Pharmacological action and toxicity

Lavender's popularity in aromatherapy means that most people are aware of its relaxing and sedative effects. Results of several studies support its efficacy as a relaxant. Researchers tested the sedative properties of lavender essential oil and its main constituents, linalool and linalyl acetate, on mice. After inhaling lavender essential oil, the activity levels of the mice, previously injected with caffeine to induce hyperactivity, returned to near-normal levels. Also it was shown that aqueous-methanolic extract of *L. stoechas* flowers (600-mg./kg. dose) exhibited anti-convulsant and anti-spasmodic activities in laboratory mice. Another study reported results of a test of lavender essential oil's local anaesthetic activity. A lesser-known application for lavender essential oil is pain relief. It has traditionally been used on bee stings and burns. There have been several studies evaluating lavender's anti-septic, healing and pain-relieving properties.

The insecticidal activities of essential oil extracts from leaves and flowers of *L. stoechas* and other aromatic plants against fourth-instar mosquito larvae were determined. Pure components (1,8-cineole, menthone, linalool, terpineol, carvacrol, thymol, (1S)-(-)-alpha-pinene and (1R)-(+)-alpha-pinene) were tested on the larvae. Thymol, carvacrol, (1R)-(+)-alpha-pinene and (1S)-(-)-alpha-pinene were the most toxic (LC50 = 36-49 mg. litre⁻¹), while menthone, 1,8-cineole, linalool and terpineol (LC50 = 156-194 mg litre⁻¹) were less toxic.

Actions: It is reported to be analgesic, antibacterial (*in vitro*), anticonvulsant, antidepressant, antiflatulent, antihyperglycaemic (oil), antihypertensive (animal studies), antirheumatic, antiseptic, antispasmodic, carminative, cholagogic, diuretic, emmenagogic, a flavoring agent, an insect repellent, a mild sedative, a perfume, rubefacient (oil), sedative, spasmyolytic, stimulant, stomachic, sudorific, tonic, uterine stimulant and vermifuge.

Toxicity: Large doses of the essential oil are considered to be a narcotic poison. Contrary to common belief, any essential oil including lavender must not be used neat (undiluted). Oil can cause dermatitis. *L. stoechas* oil is said to be more toxic than other lavenders-so use cautiously. Use oil under supervision only. *L. stoechas* oil should be contraindicated in babies, children, and pregnant women.

Drug interactions: Due to the diuretic action of this herb the following drug interactions are possible: may potentiate other diuretics and increase the risk of hypokalemia. When taken with corticosteroids there is a risk of hypokalemia; if hypokalemia occurs, there is possible antagonism with antiarrhythmics and potentiation of muscle relaxants; there is increased risk of toxicity with anti-inflammatory analgesics; it antagonises antidiabetic (hypoglycaemic) drugs; and it may potentiate and/or interfere with antihypertensives.

Due to the antihypertensive (hypotensive) action of this herb the following interactions are possible: When taken with anesthetics, an increased hypotensive effect can occur, as it potentiates antihypertensives; when taken with diuretic drugs, difficulty with diuresis and hypertension may result (antagonism of sympathomimetics).

Traditional medicine and local knowledge

The main uses all around Morocco of *L. stoechas* in a decoction are for : catarrh of the upper respiratory tract, sneezing, cough, asthma, bronchitis, and all colds (rheumatism, lumbago, etc.). A decoction may also be used for abdominal pain. A decoction of the flowering tips (two tablespoons in about 0.5 litres of water) is drunk hot once a day. The flowers may also be smoked alone or with Tobacco.

In Marrakech, the mixture of one teaspoon of the powder of: *L. stoechas*, *Rosmarinus officinalis*,

thymus ciliatus, *Artemisia herba alba*, *Mentha pulegium*, *Corrigolia telephifolia* is macerated in a glass of water for about 5 minutes and filtered. The filtrate is then given orally to babies suffering from gastro-intestinal disorders.

The plant may be applied to wounds and contusions as a vulnerary. In the Middle Atlas *L. stoechas* is used to aromatize the *Lben* (skim milk).

An infusion of flowering tips is used as a tonic, resolvent, stomachic, vulnerary, for headache, for cases of irritability, epilepsy, blenorrahagia, and as diaphoretic, pectoral, diuretic, antispasmodic and antirhumatic.

History: Used for its aromatic qualities by Greeks and Romans, lavender has scented washing water and baths ever since the Romans named it after *lavare*, to wash. *Lavandula vera* is known as "el *khzama*" in Morocco, where the dried flowers are an important ingredient in a herb and spice mixture known as "top of the shop." Ancient Egyptians created mummification casts that would last indefinitely by soaking linen in oil of lavender containing asphalt, wrapping the bodies with this and drying

them in the sun until the casts were hard.

Diseases: It is used for catarrh of the upper respiratory tract, sneezing, coughs, asthma, bronchitis, rheumatism, lumbago, abdominal pain, gastro-intestinal affections headache, irritability, epilepsy blenorrahagia;

Used as resolvent, stomachic, vulnerary, diaphoretic, pectoral, diuretic, antispasmodic and antirhumatic.

Other indications: Abdominal distension, anxiety, colic, common cold, cough, depression, depressive headache, exhaustion, flatulent indigestion, gastritis, hyperglycemia, hypertension, inappetence, insomnia, migraine, nausea, neuralgia, restlessness, stress, toothache, vomiting. Topical Oil: Acne, burns, rheumatic pain, sores, stings.

Other uses of the plant

(Ethnobotany)

All the forms of lavender are much visited by bees and are a good source of honey.

French oil, used for air fresheners, deodorants, disinfectants, and insecticides is extracted from this lavender.

Malva sylvestris L.
(Malvaceae)



Compiled by: Dr. Zeineb Ghrabi

Edited by: Prof. Kamal H. Batanouny

Morphological description

The common mallow is a biennial or perennial, fairly much covered with simple or star-shaped hairs, with erect or supple branched stems 10-60 cm. long. The leaves are simple, lengthwise petiolated, suborbicular-twisted. The upper leaves have 5-7 lobes with rounded-toothed margins. The flowers are single or in axillary fascicles, on unequal peduncles, shorter than the leaves. The calicula has oval-lanceolated divisions that are shorter than the calyx. The calyx is slightly accrescent, with roughly triangular divisions that do not hide the carpels. The corolla is a beautiful rose-purple, veined with darker red and strongly indented, 3 to 4 times as long as the calyx. The carpels are reticulated-wrinkled on the back, with an acute non-toothed margin. The fruits are formed of 12 reniform achenes which remain fused at maturity.

The common mallow flowers and bears fruit from March to June.

Three varieties are mentioned in Tunisia. They have different degrees of hairiness, especially of the carpels. The var. *typica* Fiori is fairly downy-hairy with simple, spreading hairs, and the carpels are glabrous; the var. *tomentella* Presl. has star-shaped hairs, especially on the upper parts, and its carpels are glabrous; the var. *ambigua* (Guss.) Rouy f. *microphylla* Rouy is different from the others, having small leaves, 1-3 cm. wide, covered, as are the petioles, stems and inflorescence, with star-shaped hairs. Its flowers are no longer than 2 cm. and its carpels are often downy.

Malva sylvestris L., Sp. Pl. : 689. 1753

Malva ambigua Guss., *Malva erecta* C. Presl., *Malva hirsuta* C. Presl., *Malva mauritanica* L., *Malva sylvestris* subsp. *ambigua* (Guss.) P. Fourn., *Malva sylvestris* subsp. *vivianiana* (Rouy) P. Fourn.

Arabic: Khobbiza خبزة

French: Mauve des bois, grande mauve, fromageon, fausse guimauve, fouassier

English: Common mallow

Geographical distribution

Local: It is found almost throughout Tunisia: the Medjerda valley, the Tunisian dorsal ridge, the north-east, central and south Tunisia.

Regional: North Africa.

Global: The Mediterranean and Europe.

Ecology

The common mallow is a nitrophilous species; it is found in pastures, fallow ground, paths, cropland, etc.

Status, conservation, culture

The common mallow grows wild in most of Tunisia. It is the basic plant in a traditional Tunisian dish. It is picked and sold (in winter and spring) in bundles of fresh plants in the markets and at the sides of the roads. But this taxon can be planted in fairly new soil in full sun. Multiplication is by sowing out or in seedbeds in spring. The germinative power of the seeds only lasts a maximum three years. It is sensitive to the attacks of rust caused by *Puccinia malvacearum* on the leaves.

Part used

Leafy stems, leaves and flowery tips.

To harvest the leaves, they are cut while the vegetation is developing; this can be done twice a year. The flowers are harvested before they are fully open; they must be dried out of the sun, at a temperature of below 35°C.

The dried flowers and leaves will be conserved in a dry place away from damp and light.

The pathology dictates whether an infusion, decoction, poultice or extract is used.

Constituents

The leaves contain a mucilage (8%) mostly composed of acid polysaccharids, flavonoids and tannins in small amounts. The flowers also contain a mucilage (10%), anthocyanosids and anthocyanidines and tannins in small amounts.

Pharmacological action and toxicity

No toxicity is mentioned in the bibliography. The flowers are reported by practitioners as acting against coughs and buccal-pharyngital inflammation. The leaves are reported as reducing inflammations of the respiratory tracts and of the pharynx. Because of their tannins, leaves and flowers are considered to be mild astringents for gastroenteritis.

Pharmaceutical production

For the purposes of the pharmaceutical industry, the flowers, leaves and extracts from common mallow are picked wild and marketed.

Traditional medicine

The fresh flowers and leaves are crushed and applied to wounds because of their softening, antipruriginous action and because they are said to help scars to form. In tisanes, the flowers and

leaves are used to help internal wounds, lesions of the mucous membranes and stomach ulcers heal. A decoction of the aerial part of the common mallow is used for constipation and renal lithiasis, and the juice of this part is used externally for insect bites.

In Tunisia, leaves of the common mallow are appreciated as a vegetable that encourages the passage of food through the intestines and avoids digestive disorders of a functional origin.

Use in herbal medicine

The flowers and leaves are used for irritations of the buccal-pharyngal mucous membranes and for all dry irritating coughs associated.

Because of their anthocyanes, the flowers are used as a natural colourant in foodstuffs.



***Mandragora autumnalis* Spreng.**
Solanaceae



Compiled by: Dr. Zeineb Ghrabi
Edited by: Prof. Kamal H. Batanouny

Morphological description

Mandragora autumnalis is a stemless perennial, with a big, black, fleshy root, often divided into two equal parts. The leaves are all arranged in a rosette, radical, entire, glaucous and brilliant. The flowers are arranged on a long peduncle and have a bell-shaped violet corolla two or three times as big as the calyx. The fruit is a globular reddish berry. Flowering and fruit-bearing take place in autumn.

Geographical distribution

Local: The Medjerda valley, the north-east, Cap Bon, the Tunisian dorsal ridge and central Tunisia.

Regional: North Africa.

Global: The Mediterranean, except France.

Ecology

Mandragora autumnalis develops in pastures and fields in clayey terrain.

Status, conservation, culture

Mandragora autumnalis is picked for use.

Part used

Roots and leaves.

***Mandragora autumnalis* Spreng.,**
Mandragora autumnalis Bertol

Arabic: Tiffah el ghoul, bidh el ghoul, tiffah ejnún تفاح الجن – تفاح الغولة

French: Mandragore, mandragore femelle

English: Mandragora

Constituents

Alkaloids with a tropane core like those of belladonna: atropine, hyoscyamine and scopolamine, in all 0.4% of alkaloids. Also, cuscohygrine and various physiologically active hydroxypropane esters have been identified.

Traditional medicine

The roots are considered good against haemorrhoids, the leaves against rheumatism.

Use in herbal medicine

The mandragora is used for its antispasmodic and analgesic effects.

Toxicity

Poisoning has occurred; such cases result from taking the leaves and roots for therapeutic or criminal purposes.



***Marrubium deserti* Noe ex Coss.**
Labiatae (Lamiaceae)



Compiled by Dr. Salima Benhouhou

■ Morphological description

A small perennial shrub, up to 20-30 cm. high. Numerous erect stems covered with white hairs give the plant a woolly look. The basal leaves are big, sessile and finely dissected. The leaves of the stems are small, opposite, with obvious nervures and spoon-shaped. The flowers are laid in glomerules at the base of the leaves. Petals are small (1 cm.) and pale violet. The calyx is bright green and evergreen around the fruit, which is a tetra-achene typical of the Labiateae. It flowers in spring (March-April).

■ Geographical distribution

Local: Common in the northern and central Sahara.
Regional: Morocco and Algeria.
Global: Endemic of the Moroccan and Algerian Sahara.

■ Ecology

The plant grows in an arid climate, with an annual rainfall of 100 mm. It is usually found in non-saline wadis on gravelly-sandy soils.

■ Status

According to the IUCN criteria this endemic species falls into the "EN" category. No major threat is reported for this plant. The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre and the Man and Biosphere (MAB).

***Marrubium deserti* Noe ex Coss.**

Marrubium: from the Hebrew mar rob, bitter sap; *deserti:* of the desert

Arabic: al-jaâda, mahzouma

Targui: telheret, aberkekou

English: desert horehound

French: marrube du désert

■ Part used

The leaves and stems with leaves on are collected in the spring and prepared as an infusion, decoction, oil, or powder, alone or mixed with other plants. It is taken by mouth, or externally, as an ointment, etc.

■ Constituents

No data found in the literature on the chemical composition of this plant.

■ Pharmacological action and toxicity

No data available in the literature on the pharmacological action. According to the available literature and field investigation, this plant does not appear to be toxic.

■ Pharmacopeias

Not relevant for this species.

■ Pharmaceutical products

Not relevant for this species.

■ Traditional medicine and local knowledge

It is used for colics, colds, cough, fever, digestive troubles, helminthiasis, and nausea. Babies are given an infusion as an antifebrile remedy. The powdered leaves are put in water and drunk for digestive troubles and helminthiasis. Poultices are applied to the thorax to cure coughs. The crushed leaves are mixed with onions to cure furuncles. In Tissint (Morocco), the plant is used as soap. When eaten by cattle, it increases the amount of butter in the milk. In the Dra (Morocco) *Marrubium deserti* mixed with other plants is used for colds.

***Moringa peregrina* (Forssk.) Fiori**
Moringaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photo by K. H. Batanouny

■ Morphological Description

Deciduous tree, 3-10 m high, green, glaucous with erect trunk, and white bark. Leaves are 30 cm long, the axes persistent, imparipinnate with early deciduous leaflets. Each leaf is formed of 3 pairs of long, slender junciform pinnae looking like opposite virgate branches. Leaflets are remote, small, oblong. Flowers appear before leaves in May. The pendulous pods ripen in October. The pod is pendulous and contains angled, nut-like white seeds (behen nuts) which are of bitter sweet taste and rich in oil (ben oil). Flowering and fruiting: February-April.

■ Geographical Distribution

Local: Sinai, South Eastern Desert, Red Sea Region and Gebel Elba.

Regional: No records in other North African Countries.

Global: Ethiopia to Somalia, Northwards to the Sudan and Eastwards to Arabia. Also recorded from Palestine and Jordan.

■ Ecology

The plant grows in Sinai and the Red Sea Zone on steep rocky slopes and precipitous cliffs of the mountains. The plant is confined to the base of mountains that are higher than 1300-1500 m above sea level.

■ Status

The plant is vulnerable.

***Moringa peregrina* (Forsk.) Fiori,**

Agr. Colon.; 5:59 (1911); *Hyperathera peregrina* Forssk, F1. Aegypt. Arab.; *Moringa aptera* Gaertner, Fruct. Sem. P1.2:315 (1775).

Names

Arabic: حب اليسار , حب البان , حبة غالبة , baan aweyr , bayreh, terfaal, yawn.

English: Wild drumstick tree, Ben-oil tree, Ben nut (seed), Moringa.

French : Ben blanc, Moringe aptere, Arbre noix de ben..

■ Part(s) Used

Seeds and oil obtained from seeds.

■ Collection

The leaves and flowering tops are collected when the plant is in late flowering stage.

■ Preparations

Infusion, tincture, capsule and cream.

■ Use

Oral.

■ Constituents

The seed oil of *Moringa peregrina* contains a high level of oleic (70.5%), followed by gadoleic (1.5%), while the dominant saturated acids were palmitic (8.9%) and stearic (3.82%). a-g-and d-tocopherols were also detected. B-sitosterol was found as the most predominant component of the sterolic fraction of the oil. Campesterol, stigmasterol, brassicasterol and cholesterol were also found.

■ Pharmacological Action and Toxicity

The seed oil contains almost all the fatty acids that are also found in olive oil. Moringa wood is reported to be resistant to termites and is therefore popular as a building material.

■ Pharmacopoeia

Not available



Phytopharmaceutical Products

Not available

Traditional Medicine and Indigenous Knowledge

History: Moringa was well known in the ancient world, but only recently has been "rediscovered" as a multipurpose tree with a wide variety of potential uses. The pleasant-tasting edible oil, which can be extracted from the seeds, was highly valued by the ancient Roman, Greek and Egyptian civilizations for use in making perfume and in protecting skin. The ben oil has been used by the Egyptians since Old and Middle Kingdoms (3000-2000 BC).

Traditional Medicinal Uses

- Analgesic
- Abdominal pain
- Burns
- Constipation
- Febrifuge
- Laxative
- Headache

Other Uses of the Plant: The bark of the *Moringa peregrina* tree was used to remove freckles. The wood is seen as a good source for fire-wood and charcoal.



***Myrtus communis* L.**
Myrtaceae

Compiled by: Dr. Zeineb Ghrabi
Edited by: Prof. Kamal H. Batanouny

Morphological description

Myrtle is a shrub or small tree 1-3 m. in height, evergreen, with a red bark that peels off in patches. The leaves are evergreen and when crushed give off an aromatic smell. They are opposed, briefly petiolated, simple, entire, oval, tough, glabrous and gleaming on top. The flowers are solitary, in the axils of the leaves, with a urceolate receptacle fused to the ovary, with white petals and many stamens. The berries are blue-black, bitter to the taste and resinous, with few seeds. Flowering and fruit-bearing are spread out between May and July-August.

Two varieties are mentioned in Tunisia's flora: the var. *italica* L., which is the most widespread and has 10-15 mm.-wide leaves, and the var. *baetica* L., which has wider leaves than the former (20 mm.) and bigger fruits. These varieties do not appear on the Med-Checklist. The list indicates the presence in Tunisia of two subspecies: *Myrtus communis* subsp. *communis* and *Myrtus communis* subsp. *tarentina* (L.) Nyman, Consp. Fl. Eur.: 245. 1879 = *Myrtus communis* var. *tarentina* L., Sp. Pl.: 471, 1753, = *Myrtus tarentina* (L.) Miller, Gard. Dict. ed. 8: Myrtus no. 6. 1768. Only the subspecies *myrtus* is mentioned for Tunisia.

Geographical distribution

Local: Widespread in the Kroumirie, Mogods, the Tunisian dorsal ridge and Cap Bon.

Regional: North Africa.

Global: The Mediterranean, Madeira, the Azores.

***Myrtus communis* L.**, Sp. Pl.: 471. 1753

Arabic: Rayhan, a'as, mersin - اس

French: Myrte sauvage

English: Myrtle

Ecology

The wild myrtle is especially confined to the Kroumirie-Mogods chain over an area of about 80,000 ha. It is found in cork oak formations and also in zen oak and lentisc olive formations, where it is systematically associated in varying proportions with other species. It prefers acid soils and a rainfall of over 600 mm.

Status, conservation, culture

The wild myrtle is frequently picked for use in Tunisia. Its use as a source of oil has prompted the Direction Générale des Forêts to take very strict steps regarding its use. Every year, in all the country's governorates concerned, the areas where myrtle is used are defined according to an action plan based on a three-to-four year rotation according to the state of the vegetation. These areas are then made available to farmers after a tender. The leaves and flowers are distilled locally on the spot, to extract the myrtle oil. Approximately 500-600 kg. of young shoots (twigs) is needed to extract 1.25 kg. of essential oil of myrtle. The flower buds are picked to extract cosmetic essences. The fruits are eaten locally or sold to make flavouring, jams and compotes. Myrtle is not planted in Tunisia.

Economic value

In July and August, stretches of myrtle are harvested to extract the essential oils, particularly in the four delegations of Sejnane, Nefza, Tabarka and Aïn Draham.

Out of the 80,000 ha. of myrtle registered in Tunisia, only 7,500 ha. is used, producing 0.3 to 0.8 tonnes/ha. of green matter (i.e. 0.65 kg. of essential oil of myrtle). On average, 3,787 kg./year of essential oil of myrtle is exported, at a price of 47,817 TD the kilo, mainly to Europe (France and Spain), to be used in the manufacturing of sweet-smelling

substances as an adjunct to the making of scent. In 1991, the Régie d'Exploitation Forestière (REF, a state-controlled body) sold about 20 tons of myrtle berries, as against 7 tons in 1990. The berries were bought and sent to Italy to make myrtle liqueur.

Part used

The leaves and flower buds, which are picked to extract cosmetic essences. The fruit is eaten locally or sold to make flavouring, jams or compotes.

Constituents

The leaves contain an essential oil (0.3-0.6%) that is rich in terpenes, myrtenol and eucalyptol; tannins (14%); and a resin.

Pharmacological action and toxicity

The myrtle is recognised by practitioners as having balsamic, antiseptic, astringent and haemostatic properties. No toxicity is mentioned in the literature.

Traditional medicine

The leaves and buds are used for stomach-ache, haemorrhoids and skin problems.

The fruits are picked in autumn and, as well as being used for their medicinal properties (ocular disorders), are used as a scented liniment. They give

off a pleasant scent and, like henna, are made into a paste and used as a capillary beauty product. The ripe fruit is eaten as a healing substance for gastric ulcers. An infusion of the leaves is used as a mouthwash for gingivitis and for diarrhoea. The leaves in association with walnuts and mulberry are given for diabetes.

Pharmaceutical production

The essential oil of myrtle is used in many medicines.

Use in herbal medicine

An antiseptic for chronic pulmonary disorders and urinary infections; a stomachic.



***Myrtus nivellei* Batt & Trab.**
Myrtaceae



Compiled by Dr. Salima Benhouhou

Morphological description

A tall evergreen shrub, with a rough bark, frequently up to 150 cm. high in good shady sites.

The dark green, opposite, lanceolated, sessile leaves give off a pleasantly fragrant essential oil. The flower parts are in multiples of five, with an amazingly large number of stamens. Petals are usually white. The fruit is a small globose blue-black berry 1 cm. in diameter. The flowers are pollinated by insects, and the seeds dispersed by the birds that feed on the berries.

There is no particular flowering period since the plant has been seen in flower at different times during the year.

Geographical distribution

Local: Common in the Hoggar and Tassili mountains.

Regional: Algeria and Tchad (Tibesti).

Global: The Saharan myrtle is endemic of the mountains of the central Sahara.

Ecology

The plant occurs in small areas of sparse relict woodland and is found in wadis above 1000 m, on gravelly soil and in rocky sites. Rainfall values for this shrub vary between 50 and 100 mm. per year.

Status

According to the IUCN criteria this endemic species

***Myrtus nivellei* Batt & Trab.**

Myrtus: from the Greek myrtos, shrub; *nivellei*: according to a French army officer, Nivelle

Targui: tefeltest

English: Saharan myrtle

French: myrte du Sahara

falls into the "EN" category and is listed as an endangered species. Despite being on the list of species protected under Algerian law, the threat to this plant from human collection is severe, since it is a medicinal plant much appreciated by the Tuareg. The plant is on the floristic list of biosphere reserve (Tassili), terrestrial ecoregion (Tibesti in Libya) and national parks in both the Hoggar and the Tassili. Measures should be taken for its propagation in nurseries.

Part used

The leaves are collected throughout the year, prepared as a decoction, and taken by mouth.

Constituent

No data available in the literature on its constituents.

Pharmacological action and toxicity

No data available in the literature on the pharmacological action and toxicity of this plant.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for liver problems. In the Tassili region, the usual use is a decoction of a handful of leaves mixed with goat's milk and heated on charcoal.

A GUIDE TO MEDICINAL PLANTS IN NORTH AFRICA

N
R

***Nauplius graveolens* (Forssk)**

Wiklund

Compositae (Asteraceae)



Compiled by Dr. Salkha Benhouhou

Morphological description

A chamaephyte (semi-shrub) that can reach 50 cm. in good conditions; stems are whitish at the top, densely ramified and spread out. The bright green leaves are deeply cut and covered with dense hairs. The flowers form a large capitulum 1-2 cm. wide, with small orange ligules and an involucle formed by tough bracts that extend beyond the capitulum. The fruit are small achenes covered with dense hairs. It flowers in spring from March to May.

Geographical distribution

Local: Very common in the Algerian Sahara.

Regional: North Africa.

Global: A Saharo-sindian species spreading from North Africa to the desert regions of Asia.

Ecology

This plant is found in hot deserts with low rainfall (average 100 mm. per year). The typical habitats are sandy-gravelly soils of the wadis and the sand-clayey soils of small depressions (dayas).

Status

According to the IUCN criteria this Saharo-sindian species falls into the "C" category. The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre.

Part used

The leaves. Collected in the spring, they are

***Nauplius graveolens* (Forssk) Wiklund**

Bubonium graveolens (Forsk.) Maire

Asteriscus graveolens Forsk.

Bupthalmum graveolens Forssk.

Bupthalmum stenophyllum Link

Odontospermum stenophyllum Sch. Bip.

Asteriscus stenophyllum Ku

Nauplius: from the Greek, a kind of shellfish. In Greek mythology, Nauplius was the son of Poseidon and Amymone. He founded Nauplia (modern Nafplion) in Argolis; *graveolens*: strong smelling

Arabic: tafssa, rob'd

Targui: amayou, hasnem

English: fragrant oxeye

French: asterolide du désert

prepared as an infusion or decoction; the sap of the fresh leaves is used as drops for the nose and a poultice for headaches (for children, infusions are preferred). It is taken internally by mouth and externally.

Constituents

No data available in the literature on its constituents.

Pharmacological action and toxicity

Antimicrobial activity. The plant is not reported as toxic by nomads and Tuareg.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used fororrhagia, diabetes (infusion), diarrhoea, facial neuralgia, head cold, gastralgia, headache (poultice for adults and infusion for children), pulmonary problems, and sinusitis.

It is sometimes added to tea. It is a much appreciated pasture.



In Tissint (Morocco) an infusion of the entire plant is used for toothache and as a gargle. The powdered leaves when sniffed are helpful for headache. A

decoction of the plant is used by women to combat sterility (infertility).



Compiled by: Dr. Zeineb Ghrabi

Morphological description

Nerium oleander is a perennial shrub that can form clumps 2-4 m. tall with erect stems and branches. The big leaves are in whorls of three, can be 10 cm. long, and are usually drab, evergreen, leathery, simple, entire, lanceolate lengthwise, pointed, with a median vein that is very prominent underneath and a number of parallel secondary veins. The showy flowers have a strong scent and are bunched in terminal corymbs. The calyx is twice or three times as short as the tube of the corolla, the throat of which has 5 multifid scales opposed to the lobes that are spread out in a 3-5 cm.-diameter ring. The stamens are enclosed and inserted in the middle of the corolla. The fruit is cylindrical, composed of two fused, linear, 4-8 cm.-long follicles. There are many seeds, each with a red-haired pappus.

Flowering occurs from March to June.

Two subspecies are signalled in the Mediterranean: the subsp. *kurdicum* (Asian Turkey) and the subsp. *oleander*, an endemic of the Mediterranean.

Geographical distribution

Local: A very widespread species in all of Tunisia, from north to south; absent in the Saharan part.

Regional: Morocco, Algeria, Tunisia and Libya.

Global: The Mediterranean, south-western Asia and North Africa.

Ecology

Nerium oleander is a nanophanerophyte or phanerophyte taxon that grows in all bioclimates

Nerium oleander L.

Sp. Pl.: 209. 1753

Arabic: defla

French: laurier rose

English: oleander, rose-bay

falling between the damp and the arid. It always indicates permanent dampness of the soil, but not hydromorphia. Thus it is found in wadi beds and along watercourses, in watering places and damp stony ground. It is especially abundant in the coastal fringe.

Status, conservation and culture

The oleander is grown in Tunisia as an ornamental plant; growing it from seed seems difficult but from cuttings is easier: cuttings from young shoots are put into light soil that is kept very damp. Its toxicity is well-known.

Part used

The root and leaves.

Constituents

The leaves contain about 1.5% of cardenolides, the major element being oleandrine. It is accompanied by close derivatives. There are also weakly active cardenolides (heterosides of uzarigenine) and inactive cardenolides (heteroside of adynergenine, of D-digitalose), triterpenoids, a resin, tannins, glucose, a paraffin, ursolic acid, vitamin C and an essential oil. The seeds contain glucosides (oleandrine, odorosides, adigoside). The bark also contains glucosides (rosaginoside, nerioside, corteneroside). The roots contain steroids.

Traditional medicine

For gangrene: pound the leaves of *Nerium oleander* with honey and apply it as a poultice.

For eczema: decoct equal amounts of the leaves of *Nerium oleander* and of *Stipa tenacissima* and use locally as a swab.

Headaches and colds: fumigate with the roots.

Toothache: a mouthwash with a decoction of the leaves.
Scab, lice and hair loss: rub with leaves that have been macerated.
Abortion: an infusion of the leaves alone or associated with harmel seeds is an abortifacient.
Slight skin lesions that do not bleed (bruises, burns, tumours etc.): the local application of crushed leaves.

Pharmacological action and toxicity

Oleandrine is antiinflammatory, antitumoral and emollient and potentialises apoptosis. The hydroalcoholic and aqueous extract of the flowers is antinociceptive and cardiotonic. The leaves and seeds provoke poisoning with nausea, vomiting, mental confusion, bradycardia and ventricular hyperkalaemia that can quickly end in death.

***Nitraria retusa* (Forsk.) Asch.**
Zygophyllaceae – Nitrariaceae



Compiled by: Dr. Zeinab Gharabi
Edited by: Prof. Kamal H. Batanouny

Morphological description
A perennial shrub that can be 1.5 m. high, sometimes more; mound-shaped (*nebka*) because of the sand it accumulates. The leaves are simple, alternate, fleshy, spatulate, entire or ending in 3-5 teeth. The flowers are white, set together at the tips of short branches in little corymb-like panicles. The corolla is made up of 5 petals covered with long stiff hairs, and the androecium is composed of 15 stamens. The fruits are red and contain a single seed; they come from an ovary with three loculi. Flowering takes place in early spring.

***Nitraria retusa* (Forsk.) Asch.**

Nitraria tridentata Desf.; *Peganum retusum* Forsk.

Arabic: Ghardag - غرقد

French: Nitraire à feuilles rétuses

Geographical distribution

Local: Rare in the north, but widespread in central and south Tunisia. Common all along the coast up to Libya.

Regional: In North Africa, restricted to Algeria and Tunisia.

Global: Tunisia, Algeria, the western Sahara and Mauritania, Senegal, Palestine and Arabia.

Ecology

It is a species more frequently found in bioclimates ranging from the upper arid to the Saharan. It is gypsophilous, occupying the plains and depressions of the lower steppes in the centre and south. It stabilises sand by putting out lots of branches that cover the ground. It marks the zonal or subazonal groups of the Tunisian south or localised on the coast, the Jeffara and the edges of *chotts*.

Status, conservation, culture

It is picked wild for use in Tunisia. The young branches and leaves are appreciated by camels and goats.

Part used

The leaves and ashes. Fruits are edible.

Traditional medicine

The leaves are used to reduce swellings, and the ashes to dry fluids secreted by infected wounds.

***Origanum syriacum* L.**
Labiatae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams

Edited by: Prof. K. H. Batanouny

Photo by K. H. Batanouny

Morphological Description
Perennial herbs, tomentose low shrub 40-90 cm. high, with erect stems, much branched. Leaves are broadly ovate, entire, palmate-veined, obtuse, the basal rounded, nearly sessile, densely hairy. Bracts are small, 4-ranked, white canescent. Flowers heads are often cylindrical, in terminal spikes, panicled, with characteristic aromatic odour (of thyme smell) and taste. The plant in Egypt represents *v. aegyptiacum* (L.), more spreadingly hairy and less grey than the type.

Geographical Distribution

Local: Sinai.

Regional: North only in Egypt.

Global: Native to the Middle East.

Ecology

The plant is rare and grows in the mountains of Sinai in rocky habitats. It is common in dry temperate regions.

Status

The plant is vulnerable. It is collected for medicinal use and to prepare hot tea, and is considered in need of conservation; both in situ and ex situ. The type of *Origanum moru* var. *sinaicum* was collected on mountains of Sinai, 13 June 1835, Schimper 385 (K.). The plant is endemic.

Part(s) Used

The leaves or the whole herb.

***Origanum syriacum* L.**

Sp.Pl., ed. 1, 590 (1753), *Majorna syriaca*, *Origanum moru* Boiss.

Names

Arabic: Za'ater, Bardaqoash بردقوش، زعتر

English: Marjoram, Origanum, Sweet marjoram, Knotted marjoram, Bible hyssop.

French: Marjolaine d'Orient, Marjolaine.

Collection

The leaves and flowering tops are collected when the plant is in late flowering stage.

Preparations

Infusion, hot tea, dry leaves.

Use

Oral.

Constituents

The herb contains volatile oil consisting of more than 80 carvacrols, resins and flavonoids.

Pharmacological Action and Toxicity

The infusion has an agreeable flavour and is often used by herbalists to treat pulmonary diseases. Hyssop is commonly combined with horehound to ease sore throats, and to treat asthma and bronchitis. Acute inflammatory conditions of the respiratory system are best treated with herbs that soothe the inflamed tissue rather than strong expectorants. This approach of cough therapy is said to rapidly ameliorate symptoms and shorten the duration of respiratory illness. A basic herbal tea for coughs would contain coltsfoot (*Tussilago farfara*), marshmallow (*Althea officinalis*), hyssop (*Hyssopus officinalis*), licorice (*Glycyrrhiza glabra*) and aniseed (*Pimpinella anisum*).

A few cases of toxicity resulting from ingestion of hyssop essential oil have been reported. The clinical symptoms of hyssop toxicity include convulsive seizures that resemble epileptic fits and vomiting, and may develop within a few minutes to two

hours. The commercially available essential oil of hyssop contains pinocamphone and isopinocamphone, which may be responsible for the neurotoxicity. Injections of a relatively low dosage of these drugs (0.02 mL/kg) proved to be lethal in rats.

Pharmacopoeia

Not available

Phytopharmaceutical Products

Not available

Traditional Medicine and Indigenous Knowledge

History: The name Hyssopus was used by Hippocrates derived from the Hebrew word ezob meaning 'holy herb'. It is mentioned in the Old Testament where the herb was used for purification, yet could also possibly refer to Origanum syriacum. Already well known in ancient times, it was referred to in the Bible for its cleansing effect in connection with plague, leprosy and chest ailments. Hyssop was used for purifying sacred places and as a strewing

herb in the Middle Ages to ward off lice. Dry leaves were used as a spice, condiment and to relieve pain.

Traditional Medicinal Uses

- Anti-rheumatic
- Antiseptic
- Antispasmodic
- Carminative
- Cicatrizant
- Digestive
- Diuretic
- Emmenagogue
- Expectorant
- Nervine
- Sedative
- Stimulant
- Tonic and vulnerary

Other uses of the plant: The flowers and leaves can be used as flavouring agents in teas, tonics and sweets, and as spices in cooking. The essential oil has been used in perfumes. The fresh herb is used with sesame seeds and olive oil to make a special dish.

Peganum harmala L.
Zygophyllaceae



Compiled by: Dr. Zeineb Ghribi

Morphological description
A perennial plant 30-60 cm. high, glabrous, with a woody stock and branched stems from the base. The leaves are alternate, multifid, with an unpleasant smell when crushed. The flowers are opposed to the leaves, with a big corolla, white veined with green, much longer than the evergreen sepals. The androecium is made up of 12-15 stamens set in a disc. The fruit is a protruding capsule with prickly seeds and a side opening. Two varieties are mentioned in Tunisia: the var. *typicum*, very common in Tunisia, with flowers whose petals are white veined with green, and the var. *garamantum* Maire, which is rare, sighted in Jerba, and which differs from *typicum* by having petals that are light ochre to orange pink. Flowering takes place in April-May.

Geographical distribution
Local: Common in the whole of central and south Tunisia, but rare in the north-east.
Regional: From Morocco to the orient.
Global: Mediterranean: from Spain, Italy, Albania, Greece to the Sahara (Hoggar, Tibesti); from Morocco to the orient.

Ecology
It develops in bioclimates ranging from the semi-arid to the Saharan. It is nitratophilous, growing in mesiculous groups in the centre of Tunisia, near watering places and places where domestic animals are stalled. It either forms fleeting steppes on

Peganum harmala L.
Zygophyllaceae

Arabic: Harmel
French: Peganum harmel

grazed routes, indicating very intense overgrazing, or forms a ruderal facies localised in several plant groups on coastal paths.

Status, conservation, culture
It is thought by the people of North Africa to be a panacea. It is mentioned in the Hadith as a healing plant. Picked for use, it is sold in all herbalists' (capsules and seeds) and local markets. It is very little grazed because of its toxicity at the fruiting stage. Multiplication is possible by dividing the clumps.

Part used
The roots, leaves and seeds.

Constituents
The whole plant contains alkaloids, particularly the seeds (4%) and roots (3%). These alkaloids give the plant a certain toxicity.

Traditional medicine
A decoction of the leaves is mentioned for high blood pressure and haemorrhoids: decoction of 50 grammes of roots in a litre of water, in a hip-bath twice a day morning and evening for one week. The powdered seeds of *Peganum harmala* mixed with the powdered seeds of barley are suggested for rheumatism. The powdered seeds of *Peganum harmala* mixed with the powdered seeds of cumin plus honey are used for bronchitis.

Use in herbal medicine
The seeds are aphrodisiac and galactagogue. The leaves are used for high blood pressure and haemorrhoids, rheumatism, inflammation and intestinal worms.

Pelargonium capitatum Ait.
Geraniaceae



Compiled by: Dr. Zeineb Ghribi

Morphological description
A suffrutescent shrub forming clumps up to 1 metre high and wide, sagging as it ages. The stems are erect; the leaves are simple, ropy, with a long petiole. The limb, covered with scabrous hairs, gives off a penetrating scent when crushed. It is divided into 3-5 obtuse toothed lobes. The flowers are irregular, light pink tinted with mauve, packed together in dense umbels. The fruits are dry and crowned with a very long beak. It flowers from March to May.

It should be pointed out that *Pelargonium graveolens* is a species with small pure pink flowers with purple spots on the upper petals. The garden *Geranium rosat*, probably a hybrid, is not the same.

Geographical distribution

Local: It is not mentioned in Tunisia's flora. It was introduced into Tunisia. It is widely grown for its essence, especially in Cap Bon and in gardens.

Regional: Cap Bon, north-eastern Tunisia.

Global: Originally from the Cape of Good Hope.

Ecology

It dislikes extremes of heat and humidity, and is sensitive to temperatures that go below 3°C.

Status, conservation, culture

It has been grown in Tunisia for a very long time. It is particularly used by farmers in Cap Bon (Nabeul), Ariana and Gafsa, and is still a traditional crop. The plantation lasts for several years but the yield

Pelargonium capitatum Ait.
Geranium rosat

Arabic: Aterchia

French: Géranium à la rose

English: Rose geranium

decreases from the third year. It is dry farmed or sometimes irrigated; it is planted in light, neutral, well-drained soil with a regular addition of fertilizer. Multiplication is done via herbaceous cuttings between spring and autumn (500 cuttings per ha.). Generally, two cuttings are put cross-wise in a hole, enabling the plant to develop along the lines. Between April and September the plant is cut twice or three times, with an average yield of 20-25 tons/ha. for the spring cut, from which 25 kg of essence can be extracted.

Economic value

Production is clearly growing since the amount of land set aside for it rose from 42.5 ha. in 2002 to 74.5 ha. in 2003. In 2002, recorded production was 502 tons, and in 2003 about 993 tons. The plant matter is picked and sold fresh. Companies specialise in extracting the essential oils and aromatic extracts (modern equipment); almost every family in the Nabeul region distils the flowers (with steam, using a traditional still, generally made of aluminium, consisting of a boiler, a head and a coil). The geranium water thus obtained is for family consumption (it flavours traditional Tunisian pastries).

Part used

The flowering branches.

Constituents

The leaves of *Geranium rosat* contain 0.15% of rich essential oil and tannins.

Traditional medicine

A hydrolat of the leaves is given for headaches and advised for diabetes.

***Periploca angustifolia* Labill.**
Asclepiadaceae



Compiled by: Dr. Zeineb Ghribi

Morphological description

An erect small tree up to 3 m. high or a bushy-branched shrub when nibbled by animals. The branches are interwoven; the foliage evergreen. The leaves are subsessile, with an entire, narrowly lanceolated limb. The flowers are grouped in little axillary cymes, with few flowers; the corolla is wheeled and has purple-brown lobes edged with greenish yellow, alternate, with 5 purple filaments hooked inwards. The fruit is dry, formed of two smooth divaricated follicles containing a number of small seeds. Flowering starts in February and goes on until June. Multiplication is usually done by sowing.

Geographical distribution

Local: It is mentioned in north-eastern Tunisia, Cap Bon, the Sahel, central Tunisia and all the mountains in pre-Saharan Tunisia.

Regional: North Africa: from Morocco to Egypt.

Global: A species thought to be a Mediterranean-Saharan element since it is found wild in the low and middle hills of the Mediterranean basin and descends southwards to the northern and central Sahara. It is found in North Africa (from Morocco to Egypt), southern Spain, Sicily, Malta, Crete, Lebanon and Syria.

Ecology

It is present from the sub-humid stage to the Saharan stage, between the annual 400-100 mm. isohyets, in hot to temperate variants. It is highly accommodating as to rainfall and can adapt to extremely varied hydric conditions, but is particularly

***Periploca angustifolia* Labill.** Icon. Pl. Syr. 2:

13. 1791

Periploca laevigata Ait., Hort. Kew. 1: 301. 1789;

Periploca laevigata subsp. *angustifolia* (Labill.)

Markgraf in Bot. J. Linn. Soc. 64: 375. 1971

Arabic: Hallab

French: Périploque

abundant in the upper semi-arid stage. From the edaphic point of view it is fairly indifferent, growing on the driest and poorest soils, but its substratum is formed of calcareous rocks. In pre-Saharan Tunisia, its distribution area is scattered, and its presence signals degradation of the forest. It is therefore seen as a relict species of forest degradation groups.

In fact, *Periploca angustifolia* belongs to the shrubby stratum (3 m. high) of the Tetracliniae (*Tetraclinis articulata* mixed with *Juniperus phoenicia*, *Rhus tripartitum*, *Olea europaea* form *oleaster*, *Rhamnus lycioides*, etc.) which dominates a low dense stratum with a *Stipa retorta* base. But usually this Tetracliniae is degraded (wood-cutting and overgrazing) and

Periploca angustifolia becomes infrequent, lower, prostrate and sometimes stunted. As an example we can mention the association with *Callitris articulata* and *Lavandula multifida* (Boukornine) or the association with *Genista microcephala* var. *tripolitana* and *Teucrium alopecurus* (Jbel Matmata).

Status, conservation, culture

Periploca angustifolia is sought after for its traditional medicinal virtues (picking) and for its pastoral and anti-erosion interest. Much research work has been done on it (collection, conservation, characterisation, evaluation and domestication) in order to integrate and use it in development programmes linked to pastoralism and water and soil conservation work.

It is a fodder that is much appreciated in arid areas, eaten by camels, sheep and goats. The long tender shoots of the current year and the leaves are grazed. But the heavy pressure of livestock grazing pulls it down and stunts it.

Multiplication by sowing has been successfully tried to use this sand-resistant species for stabilizing dunes or reafforesting the talweds in arid areas.

Part used

The leaves and roots.

Constituents

It contains triterpenes: β sitosterol, α and β amyrin, periplocadiol and phenol acid derivatives, particularly caffeic acid.

Traditional medicine

Rheumatism: bathe with a decoction of the leaves.

Haemorrhoids: decoction of 50 grammes of bark of the roots of *Periploca angustifolia* Labill. in a litre of water; three times a day for a week in a hip-bath.

Gastric ulcer: decoction of 50 grammes of bark of the roots of *Periploca angustifolia* Labill. in a litre of water; three glasses a day taken by mouth before meals.

Sugar diabetes, with no mention of complications: decoction of 50 grammes of bark of the roots of *Periploca angustifolia* Labill. in a litre of water; two glasses a day taken by mouth.

In the Ababsa region, the resin is used as a masti-catory. When burned, this resin gives off a pleasant smell that country people appreciate.

Pistacia lentiscus L.
Anacardiaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

A small tree with a strongly resinous smell, bushy, 1-3 m. high but able to reach 5-6 m. in protected stations. It is always many-branched and tortuous. The foliage is evergreen and dense. The leaves are compound, paripinnate, usually 6-10 pairs of leaflets, tough, gleaming, with rachis and petiole narrowly winged. The flowers are unisexual, red, packed in dense axillary spike-like bunches no longer than a leaflet. The fruit is a small, subglobular, apiculate drupe, red then turning black. Flowering and fruit-bearing extends from March to July.

Geographical distribution

Local: It is very widespread in the whole of northern Tunisia.

Regional: It is frequent in the Maghreb and in Cyrenaica.

Global: From the Mediterranean basin to the south-western Black Sea.

Pistacia lentiscus L. Sp. Pl.: 1026. 1753

Pistacia chia Desf.

Arabic: tharou

French: lentisque

English: mastic tree, lentisc

Ecology

It is an essential part of the maquis. It is found in various bioclimatic stages, from the upper arid to the humid, in the hot to temperate variants. It is absent in the temperate variant of the humid and the cool variant of the sub-humid and semi-arid. It is restricted to hot stations.

In the humid and part of the sub-humid stage, it usually develops in association with the myrtle on marl-clayey soils, and even hydromorphous soils. But in the sub-humid and semi-arid bioclimates it prefers humus-rich soils.

In Tunisia, the lentisc has its optimum in association with the olive, but it is obviously found in formations of cork oak, Aleppo pine, thuja and Phoenician juniper. In the Kroumirie, it can go up to 450 m. on northern slopes and 550 m. on the southern side. In the *jbel*s of the dorsal ridge and the centre, it can be found at an altitude of 1,200 m.

Status, conservation, culture

The lentisc is not grown in Tunisia, and throws out vigorous stocks. It is an essential part of the maquis, and is picked for use and sold in herbalists' in little bunches of dried leafy stems. The extraction of oils from its fruit is only recent. These oils are now marketed.

Part used

The roots, leaves, fruits and mastic.

Constituents

The mastic obtained by incising the trunk contains 30% of resin, an essential oil (2%) and a bitter principle.

The leaf contains flavonoids, an essential oil and tannins. The fruit is rich in a fatty oil.

■ Pharmacological action

Apart from its antiseptic activity, preparations from the lentisc have not been the subject of conclusive pharmacological work.

■ Traditional medicine

This species is well known in the countryside, especially in northern Tunisia, for its virtues in treating stomach ulcers. A decoction of the leaves or bark of the root is used for gastric ulcers and the oil of the fruit is used for gastric disorders and constipation. An infusion of the leaves is said to freshen bad breath. Used externally to treat sore throats, leaves of *Pistacia lentiscus*, *Phillyrea angustifolia* and *Rosmarinus officinalis* are pounded and mixed with olive oil and applied locally around the neck.

The oil of the fruit is rubbed in to treat rheumatism and locally applied for wounds. Ground up leaves are used as a poultice to heal wounds, and especially after circumcision.

■ Pharmaceutical production

The mastic is marketed to obtain a number of dietary and cosmetical pharmaceutical preparations.

■ Other uses

The leaves, for tanning; the oil from the fruit for lighting. The lentisc flowers in spring and is much visited by bees for its pollen (melliferous). In northern Tunisia, it is one of the country people's best-liked maquis essences for making charcoal, after *Quercus suber* and *Quercus coccifera*.

***Pituranthos scoparius* (Coss. & Dur.) Benth. & Hook.**
Apiaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

Pituranthos scoparius is an aphyllous (or almost) perennial plant; the upper leaves are reduced to their sheath, ending in a point. The stems are erect, 40-80 cm. high, and form dense clumps that send out laterally short stiff branches. The flowers, with an often short peduncle, white petals and narrow veins, are bunched in lateral umbels that are fairly spread out, with 4-8 spindly spokes. The fruit is a 1.3 mm.-long globular mericarp.
Flowering occurs from February to October.

Geographical distribution

Local: Widespread in Tunisia: the Medjerda valley, the dorsal ridge, central and southern Tunisia.
Regional: From Tripolitania to Morocco.
Global: An endemic species of North Africa; from Tripolitania to Morocco, and southwards to the central Sahara.

***Pituranthos scoparius* (Coss. & Dur.) Benth. & Hook.**
Pituranthos virgatus Coss.

Arabic: guezzah

French: pithuranthos à balai

Ecology

Pituranthos scoparius is one of the Umbelliferae with a wide distribution area, sometimes river banks. It is also a feature of the *Rosmarinus officinalis* and *Pituranthos scoparius* association that develops in pre-Saharan Tunisia.

Status, conservation and culture
The species grows wild in Tunisia and is picked wild.

Part used

The aerial part.

Constituents

The root contains mannitol and isocoumarines. The seeds and stems contain an essential oil.

Traditional medicine

For headaches: mix equal amounts of the aerial part of *Pituranthos scoparius* and *Teucrium polium*, and of the leaves of *Artemisia campestris* and *Plantago albicans*, all reduced to a powder, with water; apply locally to the crown of the head overnight. Diarrhoea: decoct 3 kilos of the aerial part of *Pituranthos scoparius* in three litres of water and boil it down to one litre; one cup to be taken a day on an empty stomach. Eczema: decoct 5 kilos of the aerial part of *Pituranthos scoparius* in five litres of water and boil it down to one litre; swab three times a day until a cure results.

Pharmacological action and toxicity

The isocoumarines increase the antitumoral activity of radiotherapy. The plant causes allergic reactions in animals.

Plantago afra L.
Plantaginaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams

Edited by: Prof. K. H. Batanouny

Photo by K. H. Batanouny

Morphological Description
Annual herb, erect stem, simple or thyrsoid-branched. Leaves grow opposite, linear-lanceolate, entire or with a few teeth, narrowed at both ends, glabrescent. Inflorescence arises from upper axils, scapes 1-5 cm long; spikes are ovate-spherical, glandular hairy. Bracts are ovate-lanceolate to lanceolate, acute or acuminate with wide scarious margin below. Sepals, hairy and glandular, are equal, oblanceolate. Corolla is cream to yellow, lobes narrow ovate, acute. Seeds are narrow-elliptic, reddish-brown, shining.

Geographical Distribution

Local: It is rare in the Mediterranean, Arabian Desert, Red Sea, Gebal Elba and Sinai regions.

Regional: North Africa.

Global: Western Asia, Southern Europe, France, Spain and Cuba.

Ecology

The plant is rare and grows in particularly sandy habitats.

Plantago afra L., sp. Pl., ed. 2, 168 (1762).

Plantago psyllium L., sp. Pl., ed. 2, 167 (1762),

Non L., sp. Pl., 1, 115 (1753)

Plantago parviflora Desf., Fl. Atlant. 1: 141 (1798).

Names

Arabic: Qatoona ،قطونة ،

Hashishet el-brageeth ،حشيشة البراغيث ،

Asloudj ، Merwash ، عسلوج ،

Harmola ، Umm rwis ، حرمولة ،أم رويس .

English: Flea wort.

French: Herbe aux puces, Puciere, Psyllium.

Status

This rare plant is considered endangered, and in need of conservation ex situ, as a result of the threatening of its habitats. It is cultivated and sometimes becomes a weed in fields of cumin in Upper Egypt. It is known by farmers as kammoun dakar (dakar being the Arabic word denoting male).

Part(s) Used

Ripe seeds

Collection

The plants are cut during the growing season and used fresh, as juice or dried for decoctions. Leaves are cut before flowering and dried.

Preparations

Decoction, infusion, liquid extract, tincture, powder.

Uses

Oral external.

Constituents

Mucilages (only in the epidermis of the seed coat) mainly arabinoxylans.

Pharmacological Action and Toxicity

Emollient; in chronic constipation; demulcent and decrease serum cholesterol, LDL cholesterol, and LDL:HDL ratios, and triglycerides, by binding bile

acids, hence increasing faecal excretion while increasing bile salt synthesis from cholesterol. Psyllium seed has laxative properties due to the swelling of its husk in water to form a gelatinous mass, thus keeping the faeces hydrated and soft. The resulting bulk promotes peristalsis and laxation. Adequate fluid should be taken with the seed to ensure that it swells effectively in the stomach. Psyllium husk strongly reduced the colon tumors in rats. An uncontrolled study reported that the use of the fresh leaves prevented itching and the spread of dermatitis in poison ivy-induced dermatitis. Also, it is commonly taken to reduce autotoxicity.

Modern studies on humans have investigated psyllium for treating irritable bowel syndrome and chronic constipation.

Plantago afra is used to treat sluggish or irritable bowels. Its non-irritant nature means that it is safe to use in such conditions as Crohn's disease. It may be applied topically for infections and furunculosis. A preparation of psyllium is also used to assist the production of smooth, solid faecal mass after a colostomy. Ground seeds or husk are used in various dietary supplement formulations for increased fibre, cholesterol reduction and laxative activity e.g., weight loss products.

Pharmacopoeias

Egyptian Pharmacopoeia (1984)

Indian Pharmacopoeia (1985)

British Pharmacopoeia (1993)

US Pharmacopoeia (1995)

Pharmaceutical Products

Metamucil (Searle)

Traditional Medicine and Indigenous Knowledge

History: Decoction of seeds with water overnight is used as a cure for dysentery, gastroduodenal ulcers, diarrhoea, chronic constipation, (especially when

the condition is resulting from an over-relaxed bowel), internal haemorrhoids; it is also used as an emollient, and demulcent.

Seeds are crushed and applied in a poultice for furunculosis.

An infusion of the seeds is given for urethritis. Psyllium husks are soaked in an infusion of calendula making an effective poultice for external use, drawing out infections for boils, abscesses, and whitlows.

In China, both the seeds and whole herbs of related plantago species are used as a diuretic and to treat diarrhoea, gonorrhoea, urethritis, hemorrhoids, and kidney and bladder problems. Seeds are used to treat hematuria (bloody urine), coughing, high blood pressure (with ca. 50% success in clinical trials) and are often specially treated by frying with saltwater before drying.

The husk mucilage is used as a thickener or stabilizer in certain frozen dairy desserts.

Traditional Medicinal Uses

- Blood disorders (high cholesterol, diabetes and high blood pressure).
- Cancer (colon).
- Cough (symtom).
- Crohn's disease.
- Gastro intestinal tract disorders (gastro-duodenal ulcers, dysentery ulcerative colitis, to maintain remission, juvenile ulcerative colitis, constipation, diarrhoea, irritable bowel syndrome).
- Oesophageal varices (internal haemorrhoids).
- Skin disease (furunculosis).
- Urinary tract disorders (kidney, bladder, urethra, hematura [bloody urine]).
- Venereal disease (gonorrhea).
- Weight loss and obesity.

Other uses of the plant (Ethnobotany): Fresh leaves are applied topically for poison ivy, insect bites and stings.

Plantago lanceolata L.
Plantaginaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,

Dr. N. S. Abdel-Azim and Dr. K. A. Shams

Edited by: Prof. K. H. Batanouny

Photo by K. H. Batanouny

Morphological Description

A perennial plant that has erect, hairy, lanceolate leaves which grow from the rootstock on marginated petioles in a basal rosette. Several grooved flower stalks, tipped by a short spike of true white flowers whose brownish sepals and bracts give the spike its predominantly dark colour.

Seeds are laterally oblong and dark brown. The plant grows by the wayside. Its inconspicuous flowerhead, from which the small flowers with delicate stamens peer out, looks more like the spikelet on the end of a long stem of grass and is almost lost amongst the colourful variety of meadow flowers. On the ground, however, the narrow lance-shaped leaves that give the plant the specific epithet lanceolata, form a large rosette. The veins on the 20 to 40 cm long leaves are not branched like in other plants but run the length of the leaves. It flowers from May to September.

Geographical Distribution

Local: very rare in the Nile Delta.

Regional: rare in North and South Africa.

Global: Europe, rarely in North and Central Asia, New Zealand and Australia.

Ecology

The perennial plant grows in dry meadows, fields, pastures, roadsides, banks and wasteplaces, preferring dry sandy soil.

Plantago lanceolata L.

Sp. Pl., ed. 1,114 1753).

Names

Arabic: Azan el-kabsh آذان الكبش

English: Ribwort, Great hen plant, Rib-grass.

French: Plantain lanceole, Oreille de livre.

Status

Due to the rarity of the plant and its confinement to a particular site in Egypt (the Cairo-Inshas road), the plant seems to be endangered. The plant is of potential economic importance in Egypt if cultivated.

Part(s) used

Leaves, seed husks and roots.

Collection

The plants are cut during the growing season and used fresh, as juice or dried for decoctions. The leaves are cut before flowering and dried.

Preparation

Powder, pressed juice, decoction.

Uses

Oral, external, ointment.

Constituents

Plantago lanceolata herb contains 2-6.5% mucilage composed of at least four polysaccharides; 6.5% tannins; iridoid glycosides, including 0.3-2.5% aucubin and 0.3-1.1% catalpol; over 1% silicic acid; phenolic carboxylic acids (protocatechuic acid); flavonoids (apigenin, luteolin); minerals, including significant zinc, potassium, silicic acid; and saponin.

Pharmacological Action and

Toxicity

Plantago lanceolata L. possesses several chemically active constituents; the effectiveness of the plant is due to its mucilage, iridoid glycosides and tannin contents. Bacteriostatic and bactericidal activity have been shown in vitro for the cold aqueous extract and attributed to the aglycone, aucubigenin. The bacterio-

static and bactericidal actions are, however, destroyed by heat, so the cold macerate form is used as a rinse, gargle, and/or cataplasm for antibacterial action. Experimental research using *P. lanceolata* has shown an inhibitory effect on mouse ear edema.

In laboratory tests, plantain reduced plasma lipid, cholesterol, b-lipoprotein, and triglyceride concentrations in rabbits with atherosclerosis; it also increased isolated guinea pig and rabbit uterine smooth muscle tone. The iridoid glycoside aucubin has stimulated laxative actions in mice, and has also demonstrated protective effects on liver cells. Plantain contains mucilage, which produces demulcent and emollient actions. The iridoid glycosides, aucubin and catalpol, show antibacterial activity when isolated from fresh plants.

Studies on humans have found positive results in the treatment of chronic bronchitis and diabetes. Its antibiotic action makes it effective in febrile disorders of the lungs and bronchi, and also help with gastrointestinal problems.

Proteolytic enzymes found in the fresh leaf and the fresh or dried root make *Plantago lanceolata* useful as a gentle internal vasoconstrictor for milk intestinal inflammation.

Hepatoprotective activities have been attributed to aucubin.

The herb is used to alleviate irritation in catarrh of the upper respiratory tract (effects of mucilage and tannins).

Plantago lanceolata is a non-toxic medicinal plant.

DAB 10.

Pharmacopoeia Helvetica VII.

German Pharmacopeia.

Swiss Pharmacopeia.

Plantago lanceolata Linné
Not available.

Plantago lanceolata Linné Indigenous Name: -

History: Some old books call the species Costa canina in allusion to the prominent veinings in the leaves that earned it the name "Ribwort" and this feature is the origin of the mediaeval name of Quinquenervia.

Another old popular name was 'Kemps'. The stalks of the plant are particularly tough and wiry, and it is an old game with country children to strike the heads one against the other until the stalk breaks. The Anglo-Saxon word for a soldier was "cempa", and we can thus see the allusion to 'kemps'.

The plant was at one time considered a fodder plant, but cultivation was never seriously taken up. Gelatinous substances extracted from the seeds have been used at one time for stiffening some types of muslins of other moving fabrics. The plant is highly respected in folk medicine in Africa and Vietnam.

- Allergic and other cases of rhinitis
- Antihelminthic
- Bronchial spasm
- For the recuperation of the lungs after serious pulmonary diseases
- Gastritis and interitis
- Nasal and middle ear catarrhal conditions
- Nervous and dry coughing
- Short term palliative for painful and irritating urinary conditions
- Wound healer

Plantago major L.
Plantaginaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description

Plantago major L. is a perennial plant that belongs to the Plantaginaceae family. It can grow up to 15 cm high, though size varies depending on the growth habitats. The leaves grow in rosettes, and they are ovate to elliptical with parallel venation. The leaves are glabrous and have an entire or irregularly dentate margin. Flowers are small, brownish-green on long non-ramified spikes. Seeds are small with an ovate shape and a slightly bitter taste. The seed endosperm has highly thickened cellulosic walls with the cell lumen filled with oil and protein. It forms the major part of the seeds and surrounds the embryo completely. The seeds are located in capsules and become sticky in humid weather due to the swelling of the polysaccharides present in the seed coat.

Geographical Distribution

Local: The Nile region including the delta, the oases of the Western Desert and the entire Sinai peninsula.

Regional: The Mediterranean region, Arabia to Central and Northern Asia

Global: Europe, cosmopolitan as introduced.

Plantago major L.

Sp. Pl., 1, 112 (1753). Syns. *Plantago intermedia* Gilib., Hist. Pl. Eur., ed. 2, 1: 125 (1806).

Plantago major L. subsp. *intermedia* (Gilib.) Lange, Haandb. Danske Fl., ed. 2: 714 (1859).

Names

Arabic: ورق صابون Waraaq saboon

مساس Masaas

لسان الكلب Lisaan el-kalb

لسان الحمل Lisaan hamad (hamal)

English: English plantain, lanceleaf plantain, narrowleaf plantain, ribwort plantain, greater plantain, broad leaf plantain.

Ecology

The plant grows along the Nile and canal banks, irrigated fields and open moist grounds.

Status

The plant is common.

Part(s) Used
leaves and aerial parts

Collection

plants are collected during flowering season throughout the summer.

Preparations
decotion, tincture, ointment.

Use
oral.

Constituents

Carbohydrates: the seeds contain monosaccharide glucose, fructose, xylose and rhamnose, as well as disaccharide sucrose and trisaccharide planteose. Polysaccharides are composed of xylose, arabinose, galactose, rhamnose and galacturonic acid. The trisaccharide raffinose and the tetrasaccharide stachyoze have been isolated from the leaves. Lipids: myristic, palmitic, stearic, oleic, linoleic, linolenic, arachidic, behenic, lignoceric and 9-Hydroxy-cis-11-octadecenoic acids have been found in the seeds.

Myristic, palmitic, stearic, arachidic and behenic acids have been found in the leaves. Alkaloids: indican and plantagonin. Caffeic acid derivatives: ethyl and methyl esters of caffeic acid, chlorogenic and neochlorogenic acids were isolated. Plantamajoside is the main caffeic acid derivative, acetoside is also present. Flavonoids: apigenin 7-glucoside, baicalein, hispidulin, hispidulin 7-glucuronide, homoplantaginin, luteolin 7-glucoside, luteolin 7-diglucosid, luteolin 6-hydroxy-4'-methoxy-7-galactoside, nepetin 7-glucosid, plantaginin and scutellarein have been found in the plant. Iridoidglycosides: asperuloside, aucubin, catapol, gardsode, geniposidic acid, majoroside, 10-actoxymajoroside, 10-hydroxymajoroside and melittoside were isolated. Other terpenoids: loliolid, oleanolic acid, ursolic acid, 18b-glycrrhetic acid and sitosterol were the leaf wax.

Pharmacological Action and Toxicity

The combined methanol and water extract inhibited ulcer formation by 40% relative to the control group. A *P. major* preparation was reported to be effective in a screening system for prophylactic oncology. The aqueous extract was shown to have a prophylactic effect on mammary cancer in mice. The plant extract had a good effect on human herpes infections. The leaves extract had chemotactic activity on neutrophils using the Boyden migration chamber method. Some intermediately polar or nonpolar substances of relatively low molecular weight in the plant have shown antibiotic activity against some gram negative and gram positive bacteria in addition to a weak antimycotic activity. Antigiardiasis and antimalarial activities were reported. The aqueous extract of the dried leaves has shown immuno modulating, anti-inflammatory and analgesic activities. The infusion of *P. major* tea contained small amounts of free radical scavengers compared to black tea indicating that processing can lead to significant loss of activity. Plant decoction had intermediate diuretic activity. The 70%

ethanol extract was found to be toxic to shrimps but the plant possesses a low toxicity in rats at oral and i.p. administration.

Traditional Medicine and Indigenous Knowledge

History: *Plantago major* is a plant known by many only as a weed, but it also has an old traditional medicinal value. It was described by the Greek physician Dioscorides in "De material medica" in the first century. The leaves were prescribed for treatment of dog bites. It was also described in XII-XIII century by the Islamic author Ibn Beithar having adopted the knowledge from Greek medicine.

Traditional Medicinal Uses

- Against tumours
- Digestive system problems
- Infectious diseases
- Pain relief
- Reducing fever
- Reproduction and circulation disorders
- Respiratory diseases
- Skin diseases
- Wound healing

Other uses of the plant: Plantain is edible. The very young leaves have been cooked as greens. Leaves become stringy and strong rather quickly as they age, particularly when they grow in very sunny locations; they are therefore used to make stock. Plantain is very high in beta carotene (A) and calcium and provides ascorbic acid (C). The immature flower stalks may be eaten raw or cooked. The seeds are said to have a nutty flavour; they are added to a variety of foods and ground into flour. Medicinally, plantain is documented to affect blood sugar, usually lowering it. Plantain is currently being marketed to help stop smoking as it is said to cause aversion to tobacco.



Plantago ovata Forssk.
Plantaginaceae

Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photo by K. H. Batanouny

Morphological Description
E glandular grey to white-hairy, short stemmed annual, subcaulescent herb. Leaves are in rosettes, narrow linear, obtuse to acute, entire or remotely denticulate, 3-nerved, covered with wooly hairs. Scapes scarcely exceed the leaves; spikes are dense, globular to ovate or oblong. Bracts, rotund-ovate, glabrous, obtuse, midrib herbaceous, margin scarious; sometimes slightly hairy. Sepals are ovate, carinate, obtuse, glabrous. Corolla-tube, lobes ovate or orbicular, glabrous. Stamens exserted. Capsule c.3 mm long. Seeds 2, cymbiform, smooth. Seeds, which are oval and boat-shaped, vary in colour from pale pink to greyish brown and even reddish yellow. Plants bloom about 60 days after planting.

Geographical Distribution
Local: It is common in the Mediterranean coastal region, Sinai proper, Isthmus desert and the Arabian desert East of the Nile.
Regional: North Africa.
Global: India, Iran, Pakistan, countries of the Arabian Peninsula.

Ecology
The plant is native to the Mediterranean region and cultivated widely throughout the world.

Status
The plant grows in the deserts of Arab countries in sandy habitats. Its appearance and prosperity are

Plantago ovata Forssk.,

Fl. Aegypt-Arab, 31 (1775)

Plantago decumbens Forssk., Fl. Aegypt-Arab, 30 (1775).

Names

Arabic: Geneima ، قريطة . Qurayta .

English: Spogel Plantain.

French: Ispaghula.

affected by the irregular rainfall. Because of its wide use in the pharmaceutical industry, the plant is cultivated at Rashid (El-Behera Governerate, Egypt). *P. ovata* is a 119 to 130 day crop that responds well to cool, dry weather. It has a moderate water requirement. An environmental requirement of this crop is clear, sunny and dry weather preceding harvest. It grows best on light, well drained, sandy loams.

Part(s) Used

Seeds or Ispaghula Husk, which consists of the epidermis and the collapsed adjacent layer removed from the dried ripe seeds of *Plantago ovata* Forssk.

Collection

the harvested seed must be dried below 12% moisture to allow for cleaning, milling and storage.

Preparation

decoction, infusion, powder.

Use

oral, external.

Constituents

Constituents include a mucilaginous polysaccharide, consisting of a highly branched acidic arabinoxylan with axylan backbone and branches of arabinose, xylose, and 2-O-(galacturonic acid)-rhamnose residues, about 2.5% fixed oil, linoleic leic, and palmitic acids. Other constituents include aliphatic hydrocarbons and starch.

Pharmacological Actions and Toxicity

The main pharmacological actions of *plantago*

ovata can be attributed to the mucilage component. Ispaghula is documented to be used as a bulk laxative. The swelling properties of the mucilage enable it to absorb water in the gastro-intestinal tract, thereby increasing the volume of the faeces and promoting peristalsis. Bulk laxatives are often used for the treatment of chronic constipation. Ispagula is also known to be used in the treatment of diarrhoea and for adjusting faecal consistency in patients with colostomies and with diverticular disease or irritable bowel syndrome. Soluble fibre intake with mucilage decreases serum cholesterol, mainly LDL. Both the dried seeds and the seeds husk are demulcent, emollient and laxative. They are used in the treatment of dysentery, catarrhal conditions of the genito-urinary tract, and inflamed membranes of the intestinal canal.

An alcoholic extract lowered the blood pressure of anaesthetized cats and dogs, inhibited isolated rabbit and frog hearts, and stimulated rabbit, rat and guinea pig ileum. The extract exhibited cholinergic activity.

A clinical trial of a *Plantago ovata* flour-based solution demonstrated it to be an effective treatment for dehydration due to acute diarrhoeal diseases. It is used in reducing the number of bleeding episodes among patients with internally bleeding hemorrhoids. Probably due to its soluble-fiber content, Ispaghula has also improved glucose tolerance in some cases of diabetes.

The seeds, when taken with Mesalamine (anti-inflammatory drug), were more effective in treating ulcerative colitis. The use of fresh leaves prevented itching and the spread of dermatitis in poison ivy-induced dermatitis.

The oil in the seed embryo has been used to prevent antherosclerosis. It is also effective in reducing blood cholesterol.

Ispaghula husk is nearly as effective as Simvastatin in improving the lipid profile of hyperlipidemic patient. Psyllium has also been recommended for Crohn's disease.

Using *Plantago ovata* in recommended amounts is generally safe and non toxic.

Unlike some laxatives, Ispaghula husk is not addictive, and can be taken daily.

As Ispaghula supplements may reduce or delay the absorption of certain medications, these should be taken at least one hour before or between two and

four hours after taking Ispaghula.

In common with all bulk laxatives, Ispaghula may temporarily increase flatulence and abdominal distension, and may cause intestinal obstruction. If swallowed dry, ispaghula may cause oesophageal obstruction.

The drug can be used during pregnancy and breast feeding and is contraindicated in cases of intestinal obstruction.

Pharmaceutical products

BPC 1973 (Ispaghula husk)

British pharmacopoeia 1980, 1983, 1990
(Ispaghula husk)

Martindale 30th edition

Pharmacopoeias-U.S. under the title Plantago Seed
Ayurvedic pharmacopoeia

French pharmacopoeia

German pharmacopoeia

Pharmaceutical Products

Agiolax (Madaus, CID)

Laxiplant (Minapharm)

Biolax (Sekem)

Traditional medicine and indigenous knowledge

History: Decoction of Ispaghula has been used either as a cooling demulcent drink, or the seeds mixed with a little sugar and taken dry. In this form they take up water in the intestinal canal, the resulting mucilage acting as a protection to the swollen mucous membranes. The crushed seeds mixed with hot water are used externally as a poultice for rheumatism. Seeds are known to be taken dry or mixed with water in chronic diarrhoea and in atony of the intestine with constipation. Sold in the "Attarin" (traditional herbs' seller shops) in Cairo, they are used as contraceptive vaginal pessary for 7 days.

Seeds or Ispaghula husks tend to swell in contact with water, creating a feeling of "fullness" in the body, which can also help curb appetite. Ground seeds or husks are used as a laxative, and also as an emollient, demulcent and astringent, particularly in chronic colitis. Seeds are used in urinary infections as an ancillary treatment. Seeds are crushed and applied in a poultice for furunculosis. Fresh leaves are applied topically to treat various skin irri-

tations including poison ivy reaction and insect bites and stings as well as haemorrhoids. Ispaghula husks seem to help soften stools and reduce the pain associated with haemorrhoids. Ispaghula has also been used effectively to treat yeast infections. Psyllium has also been used in traditional herbal systems of China and India to treat haemorrhoids, bladder problems, and high blood pressure. Ispaghula may also be used to treat irritable bowel syndrome, and reduce cholesterol and blood sugar levels. Young leaves of this plant are eaten in salads. Ground seeds are added to cereal or yogurt. The husk mucilage is used as a thickener or stabilizer in certain frozen dairy desserts. Ispaghula husks can also be incorporated into soups, sauces or smoothies. The dehusked seed that remains after the seed coat is milled off is rich in starch and fatty acids and is used in India as chicken and cattle

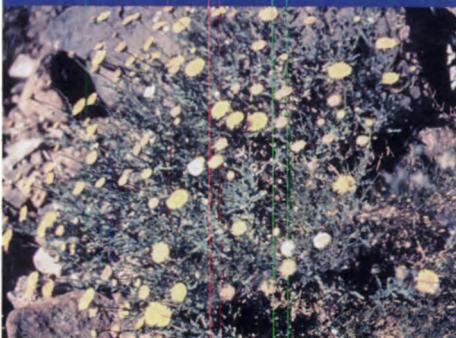
feed. Technical grade *Plantago ovata* has been used as a hydrocolloidal agent to improve water retention for newly seeded grass areas and to improve transplanting success with woody plants.

Traditional Medicinal Uses

- Helps soften stools.
- Laxative, emollient, demulcent and astringent, particularly in chronic colitis.
- Skin infections and insect bites.
- Urinary infections.
- Weight loss and obesity.
- Yeast infections.

Other uses of the plant: Contraceptive, food supplement, thickener or stabilizer in frozen dairy desserts. Also used as a hydrocolloidal agent to improve water retention for newly seeded grass.

Pulicaria incisa (Lam.) DC.



Compiled by Dr. Salima Benhouhou

Morphological description

A densely ramified woolly procumbent herb, occasionally behaving like a short-lived perennial, reaching 50 cm.

The leaves are numerous, alternate, hairy, sessile, 3-4 cm. long, with undulating borders. The inflorescence, at the end of each stem, is a discoid head with yellow tubular flowers on the receptacle and yellow ligules on the outer edge. The capitulum is no more than 3 cm. in diameter. The fruits are small achenes surmounted with one or two rows of hairs. The entire plant has a very agreeable scent. It flowers in early spring in the northern Algerian Sahara, and at any time after rain in the central Algerian Sahara.

Geographical distribution

Local: Common in the Algerian Sahara.

Regional: Morocco, Algeria, Libya and Egypt.

Global: It is common throughout the Sahara, including the Red Sea region and Sinai.

Ecology

The plant thrives in desert conditions with an average 100 mm. rainfall a year. It is always found on non-saline wadi beds and shows a wide ecological range from sandy to gravelly soils but preferring sand-loamy soils.

Status

According to the IUCN criteria this Saharo-sindian species falls into the "C" category.

Pulicaria incisa (Lam.) DC.

Pulicaria undulata (L.) DC.

Pulicaria desertorum DC.

Pulicaria prostrata (Gilib.) Aschers.

Pulicaria: from the Latin *pulex*, flea. Several plants belonging to this genus were used as insecticides; *undulata*: referring to the undulated borders of the leaves

Arabic: nogd (this name is also given to *Anvillea radiata*), shay gebeli

Targui: tamayut, ameyu

English: wild tea

French: pulicaire ondulée

Although no problems are reported for this species, human collection near settlement may be a threat in the long term.

Part used

The leaves are collected in the spring and prepared as an infusion, or dried as a poultice, to be taken internally and used externally.

Constituents

Flavonol (dihydroflavonol), inulin, a nor-guaianolide and a glaucolide-like eudesmanolide, resin, essential oils.

Pharmacological action and toxicity

It has an antialgetic and insecticidal action, and antibacterial properties.

It is not reported as toxic by the Tuareg.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for head colds, neuralgia, respiratory problems and sinusitis.

Usually the sap of the fresh leaves is taken as

nose drops to relieve the sinuses. Poultices are applied for headaches. For children, the plant is used as an infusion. Some consider an infusion of the plant good for diabetes.

It is sometimes added to tea. It is also a much

appreciated pasture plant.

In Egypt, an infusion of the leaves is used for heart diseases and is considered as a carminative and stimulant. Bedouins sometimes drink it instead of tea.

***Retama raetam* (Forssk.) Webb**
Leguminosae (Fabaceae)



Compiled by Dr. Salima Benhouhou

Morphological description
An evergreen stem-assimilating desert plant, the white weeping broom is a shrub that grows to about 3 m. and may be 6 m. across. The plants are grey-green with slender, drooping branches; the young plants are wispy, with a single stem and strong taproot. The leaves, which are very small (about 6-7 mm. long), simple, subsessile and narrow (only 1 mm. wide), drop quickly and the plant remains leafless for most of the year. The flowers are 8-10 mm. long, white and pea-like, appearing close to the stem in clusters of 3-15. The hairless grape-shaped seed pod (10-15 mm. diameter) contains one or two kidney-shaped seeds, which are about 6.5 mm. long and may be yellow, green, brown or black. The fruit is an indehiscent pod with one seed of a dark colour, 12-15 mm. long and 7-10 mm. wide.
Flowering takes place in the spring between March and May.

Geographical distribution
Local: Northern Algerian Sahara.

***Retama raetam* (Forssk.) Webb.**

Genista raetam Forssk.

Lygos raetam (Forssk.) Heyw.

Retama: from the Arabic r'tam, small genus of Mediterranean shrub; **raetam:** similar derivation

Arabic: r'tam

Berber: telit, telggit

English: white weeping broom

French: genêt du désert

Regional: North Africa.

Global: The plant is native on maritime sands in the Mediterranean region and on sandy sites in the Sahara.

Ecology

Retama raetam, grows on sandy soils (dune slope/dune base) and in dry conditions (rainfall around 100 mm. per year).

Status

According to the IUCN criteria this Saharo-Mediterranean species falls into the "C" category.

The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre.

Part used

The stems, leaves and flowers, collected in the spring and prepared as an infusion, a decoction and mixed with other plants. It can be taken by mouth, or used externally as a poultice.

Constituents

Flavonoids, quinolizidine alkaloid.

Pharmacological action and toxicity

Diuretic activity and hypoglycaemic activity.

The fruits of *Retama raetam* are considered toxic and thought to provoke hallucinations.

Ingesting the plant to produce an abortion has sometimes led to poisoning and even death.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used as an abortifacient, anthelmintic, anti-septic, purgative, sedative, and vulnerary.

The flowers are an important source of fodder for dromedaries; when taken in excess this can lead to dangerous urinary problems. When eaten during drought this can lead to abortion, and gives a bitter taste to the milk. The plant is a valuable legume shrub producing good fuel wood. It is also used to stabilise sand dunes.

In Morocco, the stems and leaves are crushed and

mixed with honey and given orally as an emetic. A decoction of the leaves is given as a purgative and anthelmintic.

In Tissint (Morocco), the powdered leaves and flowers are used to heal circumcision wounds and as an antiseptic for wounds, skin rash and pruritus.

In Marrakech the plant is crushed in either milk or butter and used for the same purposes. The decoction is used as a massage for pruritus and scabies (human and animal).

The roots are used in fumigation as an abortifacient. Likewise, an infusion of the leaves and flowers can help produce an abortion; it is used with great caution since it can lead to poisoning.

***Ricinus communis* L.**
Euphorbiaceae



Compiled by: Dr. Zeineb Ghrabi

***Ricinus communis* L.** Sp. Pl.: 1007. 1753

Arabic: kharouâa
French: ricin commun
English: castor oil plant

Ecology

Ricinus communis is a xenophyte taxon, a cultivated plant that does not grow wild. It develops on rubble, at waysides, near places where people live and in wadi beds.

Status, conservation and culture

Ricinus communis is naturalised in Tunisia; it is picked wild. It is thought to be toxic.

Part used

The leaves, seeds and oil.

Constituents

The seed contains a little water, 15-20% proteins, 40-60% lipids and ricin, a toxic substance.

Traditional medicine

For cold and mild respiratory problems: soak the fresh leaves in olive oil and put on the thorax (especially for children and new-born babies). For abortion: eating a seed of *Ricinus communis* will bring on an abortion. As a contraceptive: eating a seed of *Ricinus communis* will inhibit a woman's gestation for a year.

Pharmacological action and toxicity

The castor oil plant is antitumoral; the minimum lethal dose is about 0.4 milligrammes per kilo given parenterally in rats. Poisoning from the seed leads to nausea, headache, diarrhoea with blood, dehydration, ECG changes, necrosis of the liver, loss of consciousness, etc. The oil is laxative and purgative.

Use in herbal medicine

Oil from the castor oil plant seeds is laxative and purgative.

Rosa canina L.
Rosaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

A small climbing tree, perennial, 1-2 m. high, whose stems have robust, extremely hooked thorns that thicken at the base. The leaves are compound imparipinnate, with 5-7 simple toothed glabrous leaflets that are non-glandulous on the underside or have glands that only smell when crushed. The flowers are solitary or gathered in a corymb-like inflorescence, with bracts. The sepals are reflected after the anther and rapidly caducous. The corolla has 5 white or light pink petals. The gynoecium has many free, fairly protruding styles.

The fruits are oval, and red when mature (rose-hips). The achenes are hairy and inserted on the inner face of the urceolus.

Flowering takes place between May and June. *Rosa canina* is an extremely polymorphous species; in North Africa it has 5 subspecies, including 30 varieties and 10 different forms. Four subspecies are mentioned in Tunisia: the subspecies *obtusifolia* Desvaux (Algeria, Morocco, central and southern Europe) with the var. *tomentelle* (Lem.) Crép. and the var. *obtusifolia* R. Kell.; the subspecies *pouzini* (Tratt.) Crép. (Algeria, Morocco and southern Europe); the subspecies *dumentorum* (Thuill.) Batt. (Algeria, Morocco, Europe and western Asia); and the subspecies *vulgaris* Gams var. *dumalis* (Bechst.) Back (Algeria, Morocco, Europe and western Asia). According to Krichen (2001) the sweet-smelling dog-rose or white rose appeared at the end of the 16th C resulting from a natural hybridization

Rosa canina L., Sp. Pl.: 491. 1753

Arabic: Nesri

French: Rosier des chiens, églantier, églantier aromatique

English: Wild rose, dog-rose

between the two species *Rosa gallica*, French rose, and *Rosa canina*, dog-rose.

Geographical distribution

Local: The Tunisian dorsal ridge and eastern Tunisia.

Regional: Algeria, Tunisia and Morocco.

Global: Tunisia, Algeria, Morocco, Europe and western Asia.

Ecology

It particularly develops beside forest watercourses, scrub in the plains, and well-watered semi-arid parts of the mountains. It is common in hedges and at the edges of woods.

Status, conservation, culture

The dog-rose is one of the old roses grown and exploited in Tunisia; it is especially characteristic of the town of Zaghouan. Zaghouan has Andalusian roots and is famed for its rose water-flavoured cakes. For several years now, it has held a yearly rose festival. A botanical garden to protect this heritage and its genetic diversity and the traditional knowledge of how to grow the roses was set up in the Moghrane Grande Ecole of Agronomics, jointly with the National Agronomics Institute of Tunisia, as part of a project funded by the Secretariat of State for Scientific Research and Technology.

Now only the people of Zaghouan cultivate the wild rose (gardens, small plots). Its essential oil is extracted in most of the houses of the town.

It is multiplied by cutting or by layering. Usually farmers prefer layering (the success rate for cuttings is 20% or less of all the cuttings planted out). Just one surface in full vegetation can cover 12 sq. m.; to give access to the flowers developing within the clump, farmers leave a passage free when layering the branches of that plant.

Flowering usually starts in late April; farmers pick the opened flowers early in the morning. The average daily yield is between 1 and 5 kilos, varying with the size and age of the plant. The flowers are picked over a period of three weeks, thus giving a total yield of about 50 kg., or even 150 kg. according to the number of plants exploited. Distilling one kilo of flowers gives one litre of pure rose water and 0.5 litres of low-concentration rose water.

Part used

The flower buds, rosehips (flower receptacle with the dried sepals).

Constituents

The rosehips contain vitamin C (0.2-2% of dry weight), provitamins A, tannins (procyanidols), sugars, citric and malic acids, pectin, D-sorbitol, an essential oil (0.3%), flavonoids and a fatty oil (1.5-2%).

Pharmacological action

The pharmacological action of the dog-rose is great and varied: tonic (by vitamins); anti-inflammatory (by lipid fraction); laxative (by fruit sugars); astrigent (by tannins); anti-oxidant and anti-radical (poly-phenolic extract); mild diuretic and depurative action.

Traditional medicine

Acne: the powdered stigmas of *Carthamus tinctorius* L. mixed with *Rosa canina* L. rose water; local application at night before sleeping.

Asthenia: rub the body with the hydrolat of *Rosa canina* L. flower buds.

Cardiopathy: 3 glasses a day of the hydrolat of *Rosa canina* L., taken by mouth before meals.

Headaches: rub the head with the hydrolat of *Rosa canina* L. flower buds; and 3 glasses a day, taken by mouth before meals.

Encephalitis, myelitis and encephalo-myelitis: equal amounts of bitter almond fruits, *Rosa canina* L. flower buds, leaves of *Origanum majorana* L., *Lavandula*

angustifolia Mill. and *Lawsonia inermis* L., all pounded together and mixed with water and egg yolk to make a paste; applied locally as a poultice.

Sunstroke: berries of *Lycopersicum esculentum* Mill., tubers of *Solanum tuberosum*, and fruits of *Echallium elaterium* (L.) Richard, all pounded together and mixed with the water of *Rosa canina* L. and blackberry paste; applied locally to the crown of the head for three days.

Constipation: decoction of equal amounts of *Rosa canina* L. flower buds and *Papaver rhoeas* L. flowers; one glass a day taken by mouth early in the morning.

Use in herbal medicine and toxicity

Preparations of *Rosa canina* L. are especially given preventively for chill, flu, infectious diseases, vitamin C deficiency and fever.

The plant is a laxative and a tonic to increase the body's immune defences against general tiredness, for stomach cramp, gastric insufficiency, or to prevent gastritis, ulcers, intestinal disorders, diarrhoea, biliary pain, disorders of the urinary tract, dropsy, uric acid metabolism disorder, rheumatism, sciatica, diabetes and brittle hair.

It should be pointed out that rosehip achenes contain neurotoxic substances that must be eliminated during the preparation, and that the hairs are extremely irritating to the skin and mucous membranes.



Rosa gallica L.
Rosaceae



Compiled by: Dr. Zeineb Ghribi

Morphological description
The *Rosa gallica* is a small perennial tree, rarely more than 1 metre tall, with a creeping rhizome, and thin stems with very unequal thorns interwoven with glandulous hairs. The leaves are compound, imparipinnate, with 5 simple toothed tough leaflets. The inflorescences have non-existent bracts. The flowers are very sweet-scented, big, with a very crimson or pinkish corolla that is often double or semi-double. The sepals are glandulous and reflected after the anther. The styles are free. The fruitbearing receptacle is subglobular or pear-shaped, orange or brown. The fruit is an achene inserted on the inner face of the urceolus. Flowering takes place from March to June.
According to Maire, the Tunisian taxon belongs to the variety *eryostyla* A. Keller in Asch. et. Gr., syn. 6, p. 48 (1900) with bristly styles.

Geographical distribution
Local: It is rare; in some parts of north-western Tunisia it grows wild.
Regional: Tunisia.
Global: Central and eastern Europe, Asia Minor and the Caucasus.

Rosa gallica L., Sp. Pl. 492. 1753

Arabic: Wared
French: Rosier de France

Ecology

It grows wild in forests in well-watered regions. When cultivated, it prefers fertile, permeable soil. But stagnation of water around the root system must be avoided.

Status, conservation and culture

Today, the dry farming or irrigated farming of this rose is basically concentrated in the Kairouan *gouvernorat*. Multiplication is done either via 40-cm. rose suckers, or by cuttings (harvested cuttings 25-30 cm. long with 5 to 6 buds), or by grafting onto *Rosa indica Major*. Newly installed shoots only start producing the second year after planting. Planted density is about 4-5,000 trees/ha. for intensive cultivation, and 1,000 trees/ha. 5 m. apart for dry farming and 2-3 m. apart when irrigated for an extensive system. It is a crop that is extremely demanding in terms of care. Farmers make hollows, harrow, hoe and thresh to protect the plant from direct contact with the irrigation water. The average production of a tree is about 1-3 kg. of roses picked as flower buds.

Part used
Petals and flower buds.

Constituents

An essential oil (0.01% to 0.02%) rich in geraniol and citronellol; flavonoids; anthocyanes and tannins (10-24%).

Traditional medicine

Rose water is prepared and used mainly as an eyebath and to improve the taste and smell of teas and tisanes. Also, because of the presence of tannins, infusion of rose is used as a gargle for its astringent properties.

The dried flower buds are used as spices.

Rosmarinus officinalis L.
Lamiaceae



Compiled by: Dr. Zeineb Ghrabi

Morphological description

Rosemary is a perennial plant forming a stiff shrub, much branched and densely bushy, with a characteristic aromatic smell. The leaves are simple, tough, linear with revolute margins, greenish and crinkled on top and tomentose underneath, 2-4 mm. wide.

The flowers are grouped in little axillary and terminal clusters with bracts. The calyx is bell-shaped and bilabiate and has a pale to bright blue corolla; the upper lip is entire and lower lip trilobate. Two prominent stamens with a simple filament bearing a fertile loculus; a long very exert style. The nutlets are smooth.

Rosemary foliage has a seasonal dimorphism; it flowers abundantly in late spring.

In Tunisia, four variants are mentioned, including one Tunisian endemic (Neffati et al., 1999). They differ as to colour of corolla, shape, inflorescence, bract and calyx: var. *typicus* Batt. with a pale blue corolla; var. *laxiflorus* De Noé often with a white corolla; var. *troglodytorum* M. with a bright blue corolla; and var. *lavandulaceum* Batt. = *Romarinus tournefortii* De Noé with a bright blue corolla but a hairier calyx.

Geographical distribution

Local: Rosemary covers large areas (about 346,000 ha.) in the regions of Béja, Kasserine, Le Kef, Siliana, Kairouan and Zaghouan. It is also found in the

Rosmarinus officinalis L., Sp. Pl. 23. 1753
Rosmarinus laxiflorus De Noé; *Rosmarinus lavandulaceum* De Noé

Arabic: Klil

French: Romarin officinal

English: Rosemary

north-east, the Medjerda valley, Cap Bon and central Tunisia for the var. *typicus* Batt.; southern **Tunisia:** Matmata for the var. *troglodytorum* and Matmata, Sakket and Tamerzet for the var. *lavandulaceum*.

Regional: A species that is very widespread in Tunisia and North Africa.

Global: The Mediterranean: in the northern Mediterranean, it extends from Portugal to Turkey; in the southern Mediterranean, it extends from eastern Morocco to Cyrenaica. It is also present in the Near East.

Ecology

Rosemary is a perennial chamaephyte, usually growing in the garrigue and thin forests of pine, Barbary thuja or juniper. It is found in various bioclimates (from the sub-humid to the upper arid) but is dominant in the semi-arid Mediterranean bioclimatic stage.

Status, conservation and culture
The plant, both flowering tips and leaves, is present throughout the year, fresh or dried in herbalists' and in regional markets.

It is much sought after for its therapeutic virtues and as a condiment.

There is an ever-growing demand for essential oil of rosemary on the national and international market. In Tunisia, rosemary is one of the species most used for its medicinal interest; it is picked. Its use as a source of essential oil much prized by industrialists has caused the Régie d'Exploitation Forestière to take very strict steps concerning such picking. Every year the areas where rosemary is picked in all the country's governorats is defined according

to an action plan based on a three-to-five year rotation according to the state of the plants. These areas are then made available to farmers after a tender. The rosemary is distilled on the spot in a traditional, ecologically-friendly way.

This method of controlled exploitation of vast stretches of rosemary in Tunisia helps keep it young. The laws enforced by the Régie de la Direction Forestière allow for a rational exploitation by applying the rotation system, and by the laws' precision as to which part of the plant may be picked.

The state of the stretches of rosemary exploited must be assessed after five cuttings to discover trends in the species' plant matter yield. This assessment must be accompanied by an analysis of its main active substances in order to judge the quality of the essential oil extracted in comparison with that produced in other countries.

The mushrooming demand for Tunisian-origin essential oil of rosemary has led some farmers to grow it in Tunisia, and researchers to work on the biodiversity (morphological, genetic, chemical, etc.) of the Tunisian taxa. Thus strategies to protect and rationally use the natural populations are under way and should be strengthened to protect this natural heritage. Research programmes are being set up to analyse the biodiversity found within the Tunisian taxa (morphology, genetic polymorphism, floral pigmentation, etc.), to create varieties, and to develop growing techniques (*in vitro* cultivation) etc. All such action is closely linked to socio-economic imperatives.

Economic value

The total area covered by stretches of rosemary in Tunisia is thought by the Forestry Commission to be 346,000 ha. In 1990, only 59,516 ha. was made available to farmers to extract essential oil (Badri, 2000). This figure rose to 90,657 ha. in 2000, i.e. only 40% of available area. It should be noticed that the production is between 0.3 and 0.8 tons/ha. of plant matter, an average 1.2 kg. of essential oil of rosemary.

According to the Cepex (2000) statistics, exports of essential oil of rosemary are about 70.45 tons, at a price of 20 TD the kilo. The countries concerned by these exports are France, Belgium, Germany, Italy, Spain, etc.

Part used

The leaves and flowery tips. The leaves of cultivated rosemary can be 3 cm. long and 4 mm. wide; their smell is very aromatic, the taste bitter and rather pungent.

Constituents

An essential oil (1-2.5%) made up especially of cineol, camphor and α -pinene; tricyclic phenolic diterpenes including carnosolic acid and carnosol; tannins; methylated flavons; triterpenes; steroids; lipids, especially in the young shoots; polysaccharides; and traces of salicylate.

Pharmaceutical action and toxicity

Rosemary has many very diverse actions:

- antibacterial and antiseptic
- limited antiparasitic
- antispasmodic, anticonvulsant
- cholagogic and choleric, seen especially with young shoots
- antioxidant action of rosmarinic acid
- general tonic action of the essential oil
- diuretic
- stimulates the scalp
- anti-inflammatory
- analgesic
- hepato-protective
- emmenagogic and oxytocic.
- The essential oil of rosemary is very irritating to the skin and can provoke burns; it is strongly hyperemiant.

Traditional medicine

In Tunisia, rosemary leaves are used as an antispasmodic for the digestive tracts and as a vermifuge. Dried leaves ground up and mixed with olive oil are put on the recent circumcision wound.

Use in herbal medicine

The essential oil of rosemary is part of many antiseptic and antibacterial medicines for the respiratory passages. Taken by mouth, a rosemary tisane is given for flatulence, bloating and mild spasms of the gastro-intestinal and biliary tracts. Externally, rosemary preparations are incorporated in mixtures used in the supplementary treatment of rheumatism of the joints and muscular pain.

Rumex vesicarius L.
Polygonaceae



Compiled by Dr. Salima Benhouhou

Morphological description

An annual herb, with ramified stems and branching from the base, on average 40-50 cm. but reaching 80 cm. The plant is entirely glabrous and presents at the nodes a membranous sheet. The leaves are big, slightly fleshy and lanceolate/spear-shaped, alternate, with a long petiole.

The flowers are grouped in dense, elongated inflorescences; the perianth has 6 membranous tepals. The flowers are grouped in twos and borne on a tiny red peduncle. When the fruit is ripe, the perianth becomes winged and purplish-red veined. It flowers in spring, from March to April, in the northern Algerian Sahara, and any time after rain in the central Algerian Sahara.

Geographical distribution

Local: Very common in the Algerian Sahara.

Regional: North Africa.

Global: It is common throughout the Sahara.

Ecology

The plant lives in desert conditions with an average 100 mm. rainfall a year and favours sandy-loamy soils. It usually occurs on non-saline wadi beds, on gravelly-sandy soils. It is also found in djebels and grows on sandy patches between rocks benefiting from water runoff.

Status

According to the IUCN criteria this Saharo-sindian species falls into the "C" category. Although no problems are reported for this species, human collection near settlement may be a threat in the long term.

Rumex vesicarius L.

Rumex roseus Desf.

Rumex: from the Latin rumex, plant with spear-like leaves; *vesicarius*: bladder-like

Arabic: hourmeidh, hanbeit

Berber: brissémou, tasemumt

Targui: ténasmint

English: sorrel, bladder-dock

French: oseille sauvage, oseille vésiculeuse

The best way to conserve this annual is to collect the seeds and sow them in nurseries. So far no data has been reported regarding its propagation and conservation.

Part used

The whole plant, particularly the leaves; the seeds. These are collected in the spring and prepared fresh or as a powder for internal use.

Constituents

Flavonoids, C-glycosides: vitexin, isovitexin, orientin and iso-orientin and anthraquinones: emdin and chrysophanol, ruminicine, lapathine, oxalic acid, tannins, mucilage, mineral salts and vitamin C.

Pharmacological action and toxicity

Research has yet to be done to clarify the plant's pharmacological action. A search on its toxicity appears to be negative. When eaten in excess by animals, it causes minor digestive troubles due to the oxalic acid that can lock up other nutrients in the food, especially calcium, thus causing mineral deficiencies.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species

Traditional medicine and local knowledge

It is used as an antiscorbutic, appetiser, astringent, carminative, laxative, stomachic and tonic, and for jaundice.

The leaves are eaten fresh and much appreciated for their acid taste; it can be added to salad. The plant is considered as excellent pasture to fatten up dromedaries and goats.

In Marrakech, the powdered seeds are used to treat liver diseases and also as a laxative. In Tissint the

fresh leaves are used for jaundice, liver problems, and constipation. In general, the consumption of raw leaves is known to be tonic.

In Egypt, the plant is known to be a laxative, stomachic, tonic and analgesic.

Ruta chalepensis L.
Rutaceae



Compiled by: Dr. Driss Lamnauer

Edited by: Prof. Kamal Batanouny

Morphological Description:
A malodorous shrublet with much branched leafy stems. Leaves bi- or tripinnatisect, glaucous leaflets narrowly oblong-lanceolate to obovate, to 6 mm wide, inflorescence glabrous, corolla with oblong, ciliate petals. Color yellow. Fruit a globose capsule 6-9 mm.

Geographical Distribution:

Local: In Morocco, there are four varieties of *Ruta chalepensis* with some differences in geographical distribution.

- *Var. angustifolia* (Pers) Wilk.: Rif, Oranian sector, western part of the central Morocco, occidental Morocco, Macaronesian sector, Sous, High Atlas,
- *Var. bracteosa* (DC) Bois.: Rif, North part of central Morocco, Macaronesian sector, Tingitane peninsula.
- *Var. intermedia* Rouy.: Central Morocco.
- *Var. Jacobae* Maire: mentioned in Talat n'Yacoub (High Atlas), it is endemic to Morocco.

Regional: Morocco to Libya.

Global: Europe, Mediterranean region, Asia Minor

Ruta chalepensis L.

Ruta bracteosa DC. ; *Ruta graveolens* L. var. *angustifolia* Hook. ; *Ruta Frangiata* (*Ruta Chalepensis*)

The genus name "Ruta" comes from the Greek word "reuo", to set free, showing its reputation as a freer from disease.

Arabic: Fijel, Fijla, fidjel, Fidjla, Bou ghans, Chedab, Sadhab, Sadab, Routsa, Rutsa, Ruta. Shazab, Fejel فigel - فجـل - روـط - سـذـاب - Jbel.

Berber: Aourmi, Issin, Zent, Issel, Dje

English: Aleppo rue, Syrian rue, Fringed rue, Egyptian rue, Ruda

French: Rue d'Alep, Rue.

Ecology:

This plant grows in rocky limestone areas and on cliffs from sea level to 2 300 m.

Cultivation: sunny, dry, rock crevices, protection against winter wet.

Propagation: seed in spring; division in spring; cuttings in late summer.

Status:

IUCN not threatened.

Parts Used:

Leaves, Flowering stems, Roots,

Constituents:

Phytochemical studies of root and aerial parts of the plant showed that *Ruta chalepensis* is rich in active alkaloids and furocoumarins and contain other coumarin classes, flavonoids, tannins, volatile oil, sterols and/or triterpenes.

Several alkaloids were isolated from the aerial part and/or root of *Ruta chalepensis*: arborinine, graveoline, graveolinine, dictamnine, pteleine, skimmianine, isogravacridonechlorine, maculosidine, and 4-methoxy-1-methyl-2 (1H)-quinolinone, kokusaginine, ribalinidine, rutacridone, isotaifine, 8-methyltaifine, taifine, Chaloridone, 1-hydroxy-N-methyl-lacridone, 5-methoxy-dictammine and others.

Among these, some were also found in other *Ruta* species like *Ruta graveolens*, the cultivated species.

Coumarins and coumarin glucides: xanthotoxin, bergapten, chalepensin, clausindine (= rutolide), isopimpinelline psoralen, chalepine (= helittine), chalepine acetate, rutarin, byakangelicine, chalepensol, acetyl chalepensol rutalpine, xantilene, angustifolin 7-methyl ether, rutarenine, daphnorine, and other coumarins : ombelliferone. Shikimic derivatives: moskachan A, B, C, D, dehydromoskachan C.

Dry seeds contain 26.4 % protein and 33.2 % fat..

Pharmacological Action and Toxicity:

The alkaloid, arborinine, has abortive, anti-inflammatory, antihistaminic, and spasmolytic properties. The furanocoumarins, bergapten and xanthotoxin, have spasmolytic effects on smooth muscles and have phototoxic properties useful in treating psoriasis. Rutin is best known for its ability to decrease capillary permeability and fragility. It is also said to be cancer preventive. Rutin is also useful to counteract edema, atherogenesis, thrombogenesis, inflammation, spasms, and hypertension. It was once official in U.S. for arteriosclerosis, hypertension diabetes, and allergic manifestations. It is suggested that it may be useful for stroke prevention.

Ruta chalepensis is among other herbs used in the traditional medicine of Arab countries for the treatment of rheumatism, arthritis, gout and other forms of inflammation were tested against carrageenan-induced acute inflammation in rats. The ethanol extract of this plant produced significant inhibition of carrageenan-induced inflammation in rats and also inhibited cotton pellet-induced exudation. An ethanolic extract of the aerial parts of *Ruta chalepensis* tested in laboratory animals produced anti-inflammatory, antipyretic and CNS depressant activities but was not analgesic and did not produce any significant changes in prothrombin time and fibrinogen level. However, the alcoholic extract of *Ruta chalepensis* was demonstrated to have a significant inhibitory effect on collagen-induced platelet aggregation of human blood in vitro. In traditional medicine, plants are used in fertility regulation. Extracts from Rutaceae are known to possess such activity. Among these *Ruta chalepensis* has been used as an antifertility in Turkish and Chinese cultures. Antifertility activity of *Ruta*

chalepensis extracts and some coumarins (bergaptol, chalepensin, xanthotoxin, chalepin) was established. Bergaptol being the most active compound. In *Ruta graveolens*, chalepensin was the most active principle.

Chalepensin was shown, on the other hand, to have an effect on the sleep time of hexobarbital in mice. Chalepensol had no effect whereas chalepin have only relatively weak activity. The traditional use of *Ruta chalepensis* in Morocco to treat jaundice may be related to the enzyme induction of its components and increased conjugation of bilirubine by liver.

Chalepensin was also found to have molluscicidal activity. On the other hand, ether extract, capric acid, xanthotoxin, and isopimpinellin were demonstrated to be active against insects of stored grains and confirm the traditional use of this plant as stored grain protector.

In the Rutaceae Family, the species of toxicological importance are *Ruta graveolens* and *Ruta chalepensis*.

Oral acute and chronic toxicity studies of the ethanolic extracts of *Ruta chalepensis* aerial parts were carried out in mice. The results showed a significant fall in RBC level in treated animals, but failed to show spermatotoxic effects. Male mice gained significant weight during chronic treatment while a loss or no significant change in weight was noticed in the female mice treated with the same extracts.

Perinatal toxicology of *Ruta chalepensis* studied in mice tends to confirm the embryotoxic effect of the plant and its harmful use.

All furanocoumarins are capable of inducing photosensitivity such as psoralen, xanthotoxin, and bergapten. Furanocoumarins have long been used for the treatment of vitiligo areas. After contact with juice of the plant, the skin can develop erythema, hyperpigmentation, and occasionally vesication upon exposure to sunlight.

Traditional Medicine and Indigenous Knowledge:

Flowering branches are used as vulnerary, emmenagogue, spasmodic. Fresh plant as scorpion and insects repellent, leaves and seeds boiled in olive oil and the mixture is rubbed for rheumatism pains and swellings.

The infusion of the aerial part is used orally or in external application in respiratory affections, gout, edema, oliguria, paralysis, and menstruation with pain, epistaxis, headache (poultice on the head). Oral administration of the infusion of entire plant for colds, in abdominal pains, intestinal parasites, and scorpion bites.

Plant boiled in milk and taken against nervousness; dried plant used as snuff for nasal diseases. The infusion of plant is cooled and used as eardrops for earaches. It is also used as nose drops against vomiting and fevers in children and babies. The powder is snuffed to children in case of fever (east of Morocco). The infusion of the roots is used for treatment of hepatic diseases, especially jaundice with 2 cups per day.

In fumigation the plant combined with harmel, coriander seeds, and cade oil is used to treat epilepsy, against the bad eye.

The toxic as well as abortive properties of the plant are well known by women, who use it for this purpose in decoction to drink or for vaginal injections. Therefore, the plant is best avoided during pregnancy.

History:

Ruta is known since ancient times for its medicinal uses. HIPPOCRATE mentioned it as a remedy against snake's venom. RHAZES reported its use as a constituent of asa fetida used against "colds poisons". ABDEREZAQ mentioned that the plant is a good appetizer, diuretic, enmenagogue. It was used in paralysis, and all the affections of the articulation (Arthritis). Its sap was used to purify the eyes.

In the writings of DAWOUD EL-ANTAKI, in his "Tazkarat Oli El-albab" gave a detailed account of drug in treating the skin diseases.

Both spontaneous and cultivated species were mentioned by IBN AL-BAYTAR (LECLERC, 1877-1883, n° 905, 999, 1166, 1413, 1718), Umdat at-tabib (n° 2240), AL-WAZIR AL-GHASSANI (n° 286), Tuhfat al-ahbab (n° 364, 404) and ABDEREZAK (LECLERC, 1974, n° 712, 819) under the names sudab and figel.

Ruta chalepensis was said, in addition to its medicinal properties, to be used as antifertility plant in Turkish and Chinese civilizations for hundreds of years.

A GUIDE TO MEDICINAL PLANTS IN NORTH AFRICA

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N

***Scorzonera undulata* Vahl.**
Asters



Compiled by: Dr. Zeineb Ghrabi

Morphological description

Scorzonera undulata is a perennial with a thick blackish stump, and can be eaten in the spring. The leaves, surrounded at the base by the remains of old leaves, are in clumps, with a narrow, very long limb that is wavy at the edge, glaucous, with very short woolly hairs. The stems are usually simple, very short (10-30 cm.), carrying bare peduncles each ending in a capitulum. The capitulum is very big, 3-5 cm. in length and diameter when open, with big, very unequal membranous bracts at the edge with long, purple-rust ligules. The flowers are ornamental, opening in the sun and closing in the shade. The lower parts of the slightly ribbed achenes are rather swollen.

***Scorzonera undulata* Vahl.**

Arabic: guiz

French: scorzonère à feuilles ondulées

English: viper's grass, black salsify

Scorzonera undulata is a very polymorphous species. Two subspecies are signalled in Tunisia: the subsp. *deliciosa* (Guss.) Maire = var. *lacifolia* Pomel, and the subsp. *alexandrina* (Boiss.) Maire. Between these two subspecies exist intermediate forms that are hard to define.

Geographical distribution

Local: The whole of Tunisia: the subsp. *deliciosa* is signalled in the north and centre; the subsp. *alexandrina* in the centre and south.

Regional: North Africa: the pre-Saharan region, from Egypt to Morocco.

Global: Sicily and North Africa.

Ecology

Scorzonera undulata is a geophyte that develops on waste land and at waysides, especially in the steppe and the pre-Saharan regions.

Status, conservation and culture

Scorzonera undulata grows wild in Tunisia; it is picked wild and sold at the roadside (in southern Tunisia).

Traditional medicine

A species that is much sought after for its flowers (that taste like chocolate), its leaves, its stem and its fleshy root that is thought to be tasty.

Senna alexandrina Mill.
Leguminosae (Fabaceae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photo by K. H. Batanouny

Morphological Description

Flower and Fruit: The flowers are yellow, occasionally white or pink. They are located in axillary or terminal positions on erect racemes. The calyx is deeply divided with a short tube and 5 regular, imbricate sepals. There are 5 layered petals. The 4 to 10 stamens are often irregular and partially sterile. The ovary is sessile or short-stemmed with a short or oblong style. The pod can be cylindrical or flat angular winged and often with horizontal walls between the seeds. The seeds are numerous and either horizontally or vertically compressed.
Leaves, Stem and Root: The genus Cassia comprises shrubs, subshrubs, and herbaceous perennials with paired-pinnate leaves. There are axes with stem glands either between the leaflets or on the petiole. The stipules have varying shapes.

Geographical Distribution

Local: The South Eastern desert of Egypt, Red Sea region, Sinai and Gebel Elba.
Regional: Egypt, Libya and Algeria.
Global: Central Sahara to Arabia and India, Sudan along the Red Sea coast to Somalia and Southwards to Kenya.

Ecology

C. senna is native to tropical Africa and cultivated in Egypt and the Sudan and elsewhere; it is native to India and cultivated mainly in India and Pakistan.

Senna alexandrina Mill.,

Gard. Dict., Ed. 8, no.2 (1768).

Cassia senna L., *Cassia lanceolata* Forssk., *Cassia acutifolia* Delile,

Names

Arabic: سنا , Sana makki ، سنا هجاري ، Sana hegazi ، سلامكى ، Salamekki

English: True senna, Alexandria senna

French: Cassia Sen

Status

The wild plants are overexploited and collected to be sold in the market for their folk medicinal uses. Cultivation of the plant is important. It could be cultivated with limited water resources.

Part(s) Used

Senna leaf and pods

Collection

the leaves are gathered by cutting the branches in autumn, commencing in September, exposing them to the sun until they dry.

Preparation

infusion, decoction, dried leaflets, dried pods, cold macerate, fluid extract.

Use

oral.

Constituents

Anthraquinone glycosides; in the leaf; sennosides A and B based on the aglycones sennidin A and sennidin B, sennosides C and D which are glycosides of heterodianthrones of aloë-emodin and rhein. Others include palmidin A, rhein anthrone and aloë-emodin glycosides, some free anthraquinones. In the fruit: sennosides A and B and a closely related glycoside sennoside A1. Naphthalene glycosides; tinnevellin glycoside and 6-hydroxymusizin glycoside, in both leaves and fruits. Miscellaneous; mucilage, flavonoids, volatile oil, sugars, resins.

■ Pharmacological Actions and Toxicity

Senna is a stimulant laxative. Sennosides are cathartic. Sennosides A and C have equal purgative power in mice.

Senna products along with cascara products are generally considered the drugs of choice among anthraquinone cathartics and are also generally considered safe. Excessive or prolonged use of senna may lead to colon damage and other problems. However, when senna is given in doses sufficient to produce a motion of physiological water content, it can be safely administered, even over a long period of time. Senna dose not induce specific lesions in the nerve plexus of the intestinal wall, and when used rationally, does not lead to electrolyte losses or habituation. Chronic abuse can disturb electrolyte balance, leading to potassium deficiency, heart desfunction, and muscular weakness, especially under concomitant use of heart-affecting glycosides, thiazide diuretics, corticoadrenal steroids, and licorice root. Significant inhibitory activity in mice against leukaemia has been documented for aloe-emodin. For the treatment of constipation, senna is usually administered as tablets, granula or syrup.

Senna should not be given to patients with intestinal obstruction or with undiagnosed abdominal symptoms; care should also be taken by patients with inflammatory bowel disease and prolonged

use should be avoided.

Non-standardized anthraquinone-containing laxative preparations should not be taken during pregnancy or lactation since their pharmacological action is unpredictable.

■ Pharmacopoeia

- Egyptian pharmacopoeia 1972
- British pharmacopoeia 1980
- BHP 1983.
- BHP 1990.
- Martindale 30th edition.

■ Pharmaceutical Products

- Sennalax Tablets (purified calcium salt of extract) (Nile).
- Mucinum Tablets (Amriya Pharm. Ind.).
- Laxative tea bags preparation. (Mepaco).
- Intestinal tea bags preparation. (Sekem).
- Eucarbon, (Sedico).

■ Traditional Medicine and Indigenous Knowledge

History: Senna is an Arabian name, and the drug was first brought into use by the Arabian physicians.

■ Traditional Medicinal Uses

Constipation: a stimulant laxative, useful for either habitual constipation or occasional use.

Senna italica Mill
Leguminosae (Fabaceae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny

Morphological Description
A perennial herbaceous plant about 60 cm high, with an erect or procumbent, smooth stem, downy at the base. Leaves are alternate, equally pinnate, smooth, with no gland upon the petiole; leaflets in 4 to 6 pairs, opposite, obovate, rounded, mucronate at the apex, unequal at the base, the uppermost gradually the largest; stipules narrowly triangular, rigid, acute, spreading, and persistent. The flowers are pale-yellow, on erect, rather lax, axillary, stalked racemes. The legumes are oblong, falcate, membranous, smooth, rounded at each end, with an elevated ridge upon the valves over each side, so as to have an equally interrupted ridge along the middle, towards which the veins of each legume are directed nearly at right angles; 6 to 8 cordate seeds. Flowers over summer until the autumn.

Geographical Distribution

Local: All over the deserts of the country, especially the Eastern desert, Red Sea region, Sinai and Gebel Elba.

Regional: Egypt, Libya and Algeria.

Global: North Africa, from Cape Verde Is. to Egypt, extending south to Nigeria, Sudan and Somalia, also in Arabia to S. Iran and Pakistan.

Ecology

The plant grows in habitats sometimes similar to that of *Senna alexandrina*. This species grows in the wild in dry sandy habitats in different African countries.

Senna italica Mill.,

Gard. Dict., Ed. 8, no.2 (1968).

Cassia obovata Collad, *Cassia italica* Mill.

Names

Arabic: Sana mekki ، سنا مكى ،
Sala mekky ، سلامكى ، Ischrik ، عشقرق

English: Senna

French: Senne

Status

The plant is fairly common in its habitats. However, the disturbance of its habitat in addition to the collection of the herb have a great effect on the plant.

Part(s) Used

Leaves, pods and seeds.

Collection

The leaves are gathered by cutting the branches in autumn, commencing in September, exposing them to the sun until they dry.

Preparation

Infusion, decoction, dried leaflets, dried pods, cold macerate, fluid extract.

Use

Oral.

Constituents

The leaves and pods contain anthrone glycosides which by drying (20-50%) are transformed into sennosides and they contain 6-hydroxymusizin glycoside, while seeds contain pipecolic acid. Ten flavonoids were isolated from the aerial parts including a new compound identified as tamarixetin (3-rutinoside-7-rhamnoside). Moreover, b-sitosterol, stigmasterol, alpha-amyrin, 1,5-dihydroxy-3-methyl anthraquinone and a new anthraquinone were isolated.

Pharmacological Action and Toxicity

Plant powder is taken orally for elephantiasis. The

leaflets and pods are well known for their purgative effect. Crushed seeds are used for ophthalmic diseases. It is reported that *Cassia italica* is CNS depressant, manifested as anticonstipation and sedation, and has anti-inflammatory, antipyretic, analgesic, antineoplastic and antiviral activity.

■ **Pharmacopoeia**

Not available

■ **Pharmaceutical products**

Not available

■ **Traditional Medicine and Indigenous Knowledge**

History: *Senna italica* is a plant of Arabian origin. The plant is widely acknowledged in Bahrain as medicinal; as an infusion, its pods and

leaves are used as a purgative. Senna is apparently not used as a medicine today in the nearby Eastern Province of Saudi Arabia, where some Bedouins regard it as toxic to livestock. However, the seeds are eaten by Bedouins in Central Saudi Arabia, who say they are good for the stomach and as a purgative. A decoction of the crushed seeds is used as a laxative in the United Arab Emirates. In his day, Avicenna prescribed senna as a purgative for expelling black bile. In recent times, the leaves have been exported from Egypt to Europe, where they are used as the drug "dog senna".

■ **Traditional Medicinal Uses**

Constipation: a stimulant laxative, useful for either habitual constipation or occasional use.

Silybum marianum (L.) Gaertn.
Asteraceae (Compositae)



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photo by Prof. K. H. Batanouny

Morphological Description

Silybum marianum is an annual to biennial herb, up to 2m high. It has a stem 20-150 cm high, rarely shorter, glabrous or slightly downy, erect and branched in the upper part. The leaves are alternate, large, white veined, glabrous with strongly spiny margins. The inflorescences are large and round capitula, solitary at the apex of the stem or its branches, surrounded by thorny bracts. The florets are hermaphrodite, tubular in shape with a red-purple corolla. The fruits are hard skinned achenes 6 to 8 mm long, generally brownish in color with a white silk like pappus at the apex. The fruits are harvested in May - June, after blooming.

Geographical Distribution

Local: Nile region, including the Delta, the Valley, the Fayum, Oases, Western Mediterranean Coastal Region, and the Isthmic desert, i.e. El-Tih and the region North of Wadi Tumilat.

Regional: All North African countries.

Global: *Silybum marianum* is native to Central and Southern Europe, Southern Russia, Asia minor, North and South America and South Australia.

Ecology

The plant grows wild in Egypt on canal banks and in wet ground regions in the Nile Valley. The soil supporting this plant is fine-textured and moist. It

Silybum marianum (L.)

Gaertn. Fruct. Sem. Pl. 2:378 (1791).
Carduus marianum

Names

Arabic: قرطم, Harshaf barri
شوك الدمن,
شوك النصارى

Berber: Tatoura Doujnilourman.

English: *Carduus marianus* L. (botanical synonym),
Milk thistle, Holy thistle.

French: Chardon marie, Chardon argente,
Artichaut sauvage.

occurs in two types, the most abundant has purple flowers while the least abundant has white flowers (v. *albiflora*). It is indigenous to Europe.

Status

The plant is common in the Nile Delta. It is not seriously endangered. Trials to cultivate it in Egypt have been carried out.

Part(s) used

Fruits (seeds) and herb.

Collection

Plants are cut when flowering and seeds are collected when ripe. The fruits are dried for use in infusions and tincture or for extraction of silymarin.

Preparation

Infusion, decoction, tincture.

Use

Oral, external.

Constituents

The fruits: A flavonolignan complex, silymarin, was first isolated from the seeds in 1968. Silymarin (4-6% in ripe fruits) consists primarily of three flavonolignans: silybin (silibinin), silychristin (silichristin), and siliidianin. Other flavonolignans include dehydro-silybin, 3-desoxysilichristin, deoxysilydianin (silymonin), siliandrin, silybinome, silyhermin, and neosi-

lyhermin. Fixed oil (20-30%), flavonoids, taxifolin, sterols.

The herb: Flavonoids: apigenin and its 7-O-glucoside, 7-O-glucuronide and 4',7-diglucoside, kaempferol and its 7-glucoside and 3-sulphate, luteolin and its 7-glucoside, Sitosterol and its glucoside, a triterpene acetate, polyacetylenes, and fumaric acid. The very young leaves of the herb contain only traces of silymarin.

Milk Thistle effectively acts as a hepatoprotective and/or antihepatotoxic. It protects the liver from the poisonous effects of alcohol and other toxic chemicals and heavy metals. The silymarin compounds in Milk Thistle actually accelerate protein synthesis in the liver, which stimulates the production of new healthy liver cells.

The flavonoids present in Milk Thistle act as effective free radical scavengers, which also protect the liver from damage. Milk Thistle helps to block certain inflammatory reactions and is an anti-allergenic substance.

Certain chemical constituents of Milk Thistle help to increase the flow and solubility of bile which is beneficial for both the liver and the gallbladder. Increased bile flow helps to prevent the formation of gallstones.

Milk Thistle can effectively treat jaundice, cirrhosis, hepatitis, and fatty infiltration of the liver. Silymarin is considered a spleen, and gallbladder tonic. Milk Thistle may be helpful in treating psoriasis, chronic fatigue syndrome, diabetes and oestrogen-related disorders.

German research suggests that silybin, a flavonoid component of the seed, is clinically useful in treating severe Amanita mushroom poisoning. The antihepatotoxic effect of silymarin was found to depend on the time interval in which poisoning and therapy took place as well as the degree of liver damage.

The most recent clinical investigations have demonstrated that the flavonolignan silibinin is the most effective compound, used as an adjunct to current methods, and has lowered the mortality rate below any levels previously achieved. Future breeding activities should be directed to the production of genotypes and lines that produce silibinin.

Even in large doses silymarin is safe, with practically no side effects, as well as no embryo toxic effect. Also, silymarin is used as a reference standard to evaluate the efficacy of new substances found.

Pterocaryaceae

Deutsches Arzneibuch 10.1991.

Rote liste, Germany, 1987.

Dictionnaire vidal, France, 1986.

Silybum marianum is covered by a positive Commission E monograph and has the following applications:

- i) Crude drug: Dyspeptic disorders.
- ii) Preparations: For toxic liver damage; as supportive treatment in chronic inflammatory liver conditions and liver cirrhosis.

Pharmaceutical products

Legalon tablets (CID under licence from Madaus, Köln, Germany)

Silymarin granules "Instant" (SEDECO, Egypt)

Hepanox Capsules (Technopharma Egypt For: National Pharmaceuticals Co. Under licence from: Tishcon Corporation USA)

Hepaticum Capsules (Medical Union Pharmaceuticals Abu-Sultan, Ismailia, Egypt)

Hepamarin Capsules (UNI PHARMA – EL Obour City, Cairo – Egypt)

Hepadox Capsules (Arab Caps – Alamreya – Alexandria, Egypt)

Mariagon Capsules (Alpha Chem Advanced Pharmaceutical Industries Co. – Badr City, Third Industrial Zone – Cairo, Egypt)

Levatone Capsules (Under licence from Pan Pharmaceuticals Australia for Golden Queen Co.)

Levanox Capsules (Tiba Pharmaceutical Industries)

Liver Albumin Plus Capsules (Sigma Pharmaceutical Industries)

Silipex Capsules (PHARO PHARM pharmaceuticals for EMA pharm)

Simepar Capsules (MINAPHARM – EGYPT Under licence from Mepha Ltd. Basel, Switzerland Mepha pharma Egypt S.A.E)

Seralon-E Capsules (TIBA Pharmaceutical Industries)

Cyncholine Plus Capsules (The Arab Company for Pharmaceuticals and Medicinal Plants, Egypt)

Mepacure Capsules (The Arab Company for Pharmaceuticals and Medicinal Plants, Egypt)

Traditional Medicinal and Indigenous Knowledge

History: The plant is a medicinal plant widely used in traditional European medicine. In France the roots, leaves and fruit are thought to be effective in the treatment of chronic constipation and of various hepatic diseases such as jaundice, bile stones, hepatitis and steatosis. In addition, decoctions and tinctures of the fruits, due to their cholagogic, anti-allergic and decongestant activity on the circulatory system, are used in the treatment of haemorrhoids, varicose ulcers, hay fever, asthma and nettlerash. In Italy, the fruits are used in the treatment of hepatic diseases of various origins, oliguresis and hypotension, thanks to their detoxicating action on the liver, and their diuretic, hypertensive, cardiotonic and temperature reducing properties. In Germany, the fruits find applications as decoctions and tinctures in the treatment of bile stones, hepato- and cholangiopathies, thanks to their cholagogic, stimulant of portal circulation and liver protective actions. Similar applications, above all of the fruits, are found in traditional medicine in Hungary. In Greece, it is used in the treatment of varicose veins, cholelithiasis, duodenal ulcer and forms of amenorrhea. Homeopathic medicine also makes use of tinctures of the

fruits in the treatment of disorders of the liver, icterus, and cholelithiasis, as well as in peritonitis, pleuritis, bronchial coughs and congestion of the uterus and varices.

Traditional Medicinal Uses

- Anorexia
- Cancer
- Demulcent in catarrh and pleurisy
- Diabetes
- Oestrogen-related diseases
- Haemorrhoids
- Hydrophaints
- Liver diseases (toxic liver diseases, chronic inflammatory hepatic disease and liver cirrhosis)
- Malaria
- Spleen disease

Other uses of the plant: For improving appetite as a food. Young leaves are eaten as a spinach substitute. Young stalks are peeled, soaked and eaten as Asparagus.

Roots soaked overnight to remove bitterness are eaten as salsify. Flowers are boiled and eaten as Artichoke. Roasted seeds are used as a coffee substitute.

***Solanum sodomaeum* L.**
Solanaceae



Compiled by: Dr. Zeineb Ghribi

Morphological description

Solanum sodomaeum is a perennial with a branched, spiny bushy appearance. The stems and leaves are covered with starry hairs. The leaves, easy to recognise by their strongly spined veins, are alternate, simple, sinuate, lobed and pinnatifid. The flowers have a purplish, downy corolla three times as big as the calyx, which is covered with spiny hairs. The fruit is a big globular berry about 3 cm. in diameter, soft, yellowish, containing many seeds. Flowering occurs from March to May.

Geographical distribution

Local: The whole of Tunisia.

Regional: Tunisia, Algeria and Morocco.

Global: The western Mediterranean.

Ecology

Solanum sodomaeum is a species that is present all

***Solanum sodomaeum* L.** Sp. Pl.: 186. 1753

Arabic: teffah el ghoul, lim ennsara

French: pomme de Sodom

English: apple of Sodom

over Tunisia on the sand of the coast and the interior. It grows in waste places, and especially likes cactus hedges.

Status, conservation and culture

The apple of Sodom is not cultivated in Tunisia; it is picked wild.

Part used

The fruits.

Constituents

The fruit has a fairly high gluco-alkaloid content (1-1.7% of solasidine heterosides) and saponosides whose genines are diosgenine and gitogenine.

Traditional medicine

For eczema: one kilo of *Solanum sodomaeum* fruits decocted in 3 litres of water, then boiled down to one litre; swab three times a day. Haemorrhoids: crushed fruits of *Solanum sodomaeum*; applied locally as a poultice.

Pharmacological action and toxicity

The fruit's toxic molecules are gluco-alkaloids, of which the main aglycone is solasidine; poisoning leads to vomiting, abdominal pain, mydriasis, dryness of the mucous membranes, headache, delirium and coma.

Use in herbal medicine

Gluco-alkaloids are being researched for the treatment of skin cancer.

***Solenostemma argel* (Del.) Hayne**
Asclepiadaceae



Compiled by Dr. Salima Benhouhou

Morphological description
A perennial shrub 60 cm. high with several vigorous stems. The leaves are opposite, oval, glaucous, leathery and covered with fine hairs. The numerous flowers have white petals, and a strong smell. Their inflorescences are dense umbels that give the plant an attractive look. The fruits are thick, pyriform follicles, 5 cm. long and 1.5-2 cm. wide, green with violet lines; they contain pubescent seeds. The plant has a long flowering period from March to June.

Geographical distribution
Local: In the central Algerian Sahara, the Tassili n'Ajjer and the Hoggar mountains.
Regional: Algeria, Libya and Egypt.
Global: Tropical plant that spreads across the central Sahara to the Sinai and the south-eastern (Arabian) desert.

Ecology
The plant grows in extremely dry conditions with a yearly rainfall of around 50-100 mm. It grows on the gravelly soils of wadis and on the stony and pebbly soils of regs.

Status
According to the IUCN criteria this tropical-Saharan species falls into the "C" category. No particular threat is reported for Algeria, but in Egypt the plant is vulnerable because of its intensive overuse. The largest population of *Solenostemma*

***Solenostemma argel* (Del.) Hayne**

Cynanchum argel Delile,
Cynanchum oleaefolium Nect.
Solenostemma oleaefolium (Nectoux) Bullock & Bruce.

Arabic: arghel, hargal

Targui: aghallachem

English: arghel

argel grows in the upper part of the Wadi Allaqi conservation area and from 1989 on has been protected by Egyptian law. The plant is cultivated on a farm in the downstream part of Wadi Allaqi to increase its population and promote the cultivation of this economically important plant.

Part used

The leaves and stems. They are collected in the spring and prepared as an infusion, a decoction or a powder. This can be taken by mouth or used externally.

Constituents

Acylated phenolic glycosides, namely argelin and argelosid, choline, flavonoids, monoterpenes and pregnane glucoside, sitosterol and a triterpenoid saponin.

Pharmacological action and toxicity

Anti-inflammatory activity, antimicrobial activity and larvicidal activity. The plant is reported to be toxic.

Pharmacopeias
Not relevant for this species.

Pharmaceutical products
Not relevant for this species.

Traditional medicine and local knowledge

It is used for colds, diabetes, respiratory troubles, rheumatism, stomach pain, urinary infection and as a febrifuge. The bitter sap from the stem is used for colds; a drop of this sap helps to clear the sinuses.

This sap helps to heal wounds and is an efficient collyrium (eye lotion). A decoction in milk or an infusion is used for respiratory troubles, diabetes, urinary infection and as a febrifuge. The powdered dried leaves are used to treat rheumatism. The dried leaves boiled in milk or any other liquid are also very helpful to stop the spitting of blood. In traditional farming, small tufts of the plant are put in irrigation channels to kill insects or as green manure. The branches are used to disinfect water. It can also be used as a soap to clean the body and clothes.

In Egypt the leaves of *Solenostemma argel* are an effective remedy for bronchitis and are used to treat neuralgia and sciatica. The plant is used in the treatment of measles and sometimes crushed and used to cure suppurating wounds. An infusion of the leaves is used for gastro-intestinal cramps, stomach-ache, colic, cold and infections of the urinary tract and is effective as an anti-syphilitic if used for prolonged periods (40-80 days). The leaves possess purgative properties which may be due to the latex present in the stems.

Tamarix aphylla (L.) Karst.
Tamaricaceae



Compiled by Dr. Salima Benhouhou

Morphological description

Athel tamarisk has a rounded or irregular, spreading crown of many heavy, stout branches and long, drooping twigs. It reaches a height of 10-18 m. and may attain a diameter of 0.8 m. The bark becomes thick, deeply furrowed in long narrow ridges on the trunk and smooth on the branches. It has a deep taproot. The leaves are tiny, grey-green, 1.5 mm.-long scales that overlap closely on the twigs, giving the branches their typical articulate appearance. The small pink flowers are grouped in hairy, dense, spike-like racemes. The fruit is a small capsule with three valves; it matures in late summer. It flowers from spring through the summer.

Geographical distribution

Local: Common in the Algerian Sahara.

Regional: North Africa.

Global: Common throughout the Sahara and further east in India.

Ecology

This native tree grows in desert environments in North Africa and the Middle East, with a low rainfall not exceeding 100 mm. a year. It is usually found in wadis on rich clay soil, with a moderate sand accumulation. This drought-resistant tree is tolerant of alkaline and saline soils. A big evergreen, it is often planted along roads to act as a windbreak and give shade in the oases of the Algerian Sahara.

Status

According to the IUCN criteria this Saharo-sindian

Tamarix aphylla (L.) Karst.

Tamarix articulata Vahl.

Tamarix orientalis Forssk.

Tamarix: according to Bonnier, tamaris refers to a small stream in the Pyrenees; *articulata*: jointed (consisting of segments held together)

Arabic: tlaïa, ethel

Targui: tabrakat

English: athel tamarisk

French: tamarix à galle, tamarix aphylle

species falls into the "C" category.

There is no immediate threat for this tree, since it grows quickly. However, its use as fuel wood may pose a conservation problem in the long term, particularly in the vicinity of oases.

Part used

The leaves and young branches; the roots. These are collected in the spring when the new twigs develop, and prepared as a decoction and an infusion. It is taken internally as a decoction, and used externally as a lotion.

Constituents

Tannin.

Pharmacological action and toxicity

A search on its toxicity appears negative.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for tuberculosis, leprosy, smallpox and all contagious diseases. In these cases, a decoction of the roots is renowned for its efficiency.

In the Moroccan and Algerian Sahara, bark from the large branches, boiled in water and mixed with vinegar, is used as a lotion against lice.

Its wood is used in construction (fence posts) and in carpentry (furniture), or as fuel, and makes excellent charcoal. It gives off a fragrant odour when burned. It is relatively unpalatable to most classes of live-stock, since its foliage contains phenolic acids.

The Tuareg use the gum as a sweetener.

In Morocco, the gall was used for its tanning properties.

In the Dra and the Tafilalt, an infusion of the gall, or the powdered plant, is taken as an astringent for

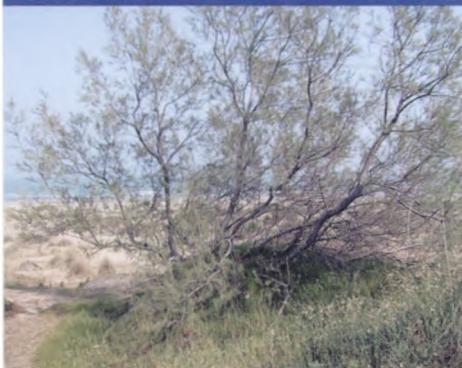
enteritis and gastralgia. It is also used as an antialgetic for toothache.

A decoction of the leaves and young branches is used for a swollen spleen. When ginger is added to the same decoction it can be used for problems of the uterus.

Tar made from tamarisk wood is used to treat dromedary scabies.

The leaves are used for prophylactic fumigation against epidemics and misfortune.

Tamarix gallica L.
Tamaricaceae



Compiled by Dr. Salima Benhouhou

Morphological description

A tall perennial shrub/small tree, densely ramified, 2-10 m. high. The purple-brown bark is initially smooth with numerous elongated lenticels, later developing shallow splits and becoming rough when mature. The tiny, scale-like, 1-3 mm.-long leaves are green or grey-green. The small flowers have 5 lavender pink or white petals 1.5-2 mm. long, numerous on long, very slender, spike-like racemes in terminal panicles. The fruits are small dry capsules containing small cottony seeds. The capsules are conical, trigonous, tapering and pale pink.
Flowering starts around March and lasts until May. In the central Sahara it has been observed in full bloom in June.

Geographical distribution

Local: Common in Algeria.

Regional: North Africa.

Global: Mediterranean and throughout the Sahara, reaching the tropical regions.

Ecology

Tamarix gallica is abundant along streams and wadis, on the banks of the rivers in moist sandy soil, with a high salt content. It has long taproots that can penetrate to the deep water tables. The French tamarisk thrives within a wide range of rainfall (around 600 mm./year in the Mediterranean regions to 100 mm./year in the Sahara).

Tamarix gallica L.

T. anglica Webb

Tamarix algeriensis Hort.

Tamarix brachylepis Sennen

Tamarix madritensis Pau & Villar

Tamarix: according to Bonnier, this refers to a small stream in the Pyrenees; *gallica*: from France

Arabic: fersig

Berber: tazuat

English: French tamarisk, saltcedar

French: tamaris de France

Status

According to the IUCN criteria this Mediterranean and Saharo-sindian species falls into the "C" category. The French tamarisk, a common garden plant, spreads vegetatively by adventitious roots or submerged stems and by seeds.

Part used

The leaves and bark are collected in the spring and prepared as an infusion, a decoction and a powder. This can be taken by mouth, or used as an external compress.

Constituents

Its principal constituent is an alkaloid, tamarixin, along with traces of its aglycone, tamariketin. The plant also contains a high level of tannin (ellagic and gallic) and quercetol (methyllic esther).

Pharmacological action and toxicity

Astringent, tonic, diuretic, hepatic stimulant and stomachic action.

The plant is not reported to be toxic.

Pharmacopias

Not relevant for this species.

Pharmaceutical products

Product Range Bonnisan, Geriforte (Gericare / StressCare), Liv.52 (LiverCare), Liv.52 drops, Digyton, Geriforte Aqua, Geriforte Vet, Liv.52 Vet. (Internet source 2 and 3).

■ Traditional medicine and local knowledge

It is used as an anthelmintic, antihaemorrhoid and haemostat and for diarrhoea and gingivitis. The plant is used to cure dromedary galls. It is used for dyeing and as fuel. It is very tolerant of maritime exposure and is a good shelter hedge in coastal gardens. It is excellent for soil stabilisation thanks

to its extensive root system and is suitable for use in erosion control in sandy soils.

In Tissint (Morocco), powdered *Tamarix gallica* is given as a vermifuge and antidiarrhoeic. An infusion of the leaves is taken for colds. It is considered as an abortifacient.

In the Dra (Morocco), the nomads lie on a bed of fresh leaves to ease rheumatic pain.

***Telosma tomentosa* (L.) M.R.
Almeida Fl. Maharashtra
Asclepiadaceae**



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial shrub about 50-60 cm. high, reaching 1 m in good conditions, with older woody stems around which the younger ones wind. The stems are covered with erect green hairs. The leaves are opposite, entire, 1-2 cm. long, heart-shaped, with long stalks that are also covered with green hairs. There are small flowers with 5 yellow-whitish free petals. The fruits are oblong, globulous follicles, covered in fleshy bristles. At the slightest touch the plant secretes a white sticky fluid from the leaves and fruits. It flowers in spring in the northern Sahara and any time of year in the central Sahara.

Geographical distribution

Local: Common in the Algerian Sahara.

Regional: North Africa.

Global: A Saharo-sindian species that spreads from Morocco in the west to India in the east.

Ecology

A hardy chamaephyte that shows a rather wide amplitude for soil from sandy, clayey to gravelly-stony sites. It is found on wadi beds as well as on gravelly plateaux (regs). The plant thrives in hot deserts where the rainfall does not exceed 100 mm.

Status

According to the IUCN criteria this Saharo-sindian species falls into the "C" category.

***Telosma tomentosa* (L.) M.R. Almeida Fl.**

Maharashtra

***Pergularia tomentosa* L.**

***Daemia tomentosa* (L.) Pomel**

***Daemia cordata* (Forssk.) R.Br. ex Schult.**

***Pergularia tomentosa*: hairy**

Arabic: ghoulga, demya, leben el hamir

Targui: tashkat, dellakal, tellakh, sellaha

French: pergulaire

The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre.

Part used

The latex, leaves and roots. These are collected in spring in the northern Algerian Sahara and any time after a rainy period in the central Algerian Sahara. They are prepared as an infusion, decoction, powder and mixed with other plants, and taken by mouth or used externally.

Constituents

Calcium oxalate crystals (leaves), cardenolides (roots), b-sitosterol glucoside, ghalakinoside (steroid), pergularine, coroglaucigenine, choline, terpenoids, saponine, polyphenols, flavonoid and carotenoids.

Pharmacological action and toxicity

Anticancer activity: recent research show promising results in killing cancer cells in laboratory tests (Internet source 1). Hypoglycaemic effects. The distribution, importance, conventional propagation, micropropagation, tissue culture studies, and in vitro production of important medicinal and pharmaceutical compounds in *Pergularia tomentosa* are currently underway (Internet source 2).

It is known to be toxic because of the poisonous milky sap and the toxic cardenolides in the roots.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products
Not relevant for this species.

Traditional medicine and local knowledge

It is used for bronchitis and tuberculosis, and for snake bites.

Pergularia tomentosa produces a corrosive white latex and may severely harm the skin.

The entire plant crushed in powder and spread on like a plaster removes the hair in a few days. In the Tassili, *Pergularia tomentosa* is known to be

the desert varan's weapon against vipers – wound around the snake.

In Egypt it is used as a depilatory, poultice, laxative, anthelmintic, and abortifacient and for skin diseases. In the Dra (Morocco), the latex is applied externally to mature furuncles and abscesses and to extract spines from the skin. The leaves are applied as poultices on snake and scorpion bites. In Tissint (Morocco), a decoction of the leaves and stems is used for bronchitis and tuberculosis. This medication should be taken with great care and is forbidden for pregnant women.

**Tetraclinis articulata (Vahl.)
Masters.**
Cupressaceae



Compiled by: Dr. Driss Lamnauer
Edited by: Prof. Kamal Batanouny

Morphological Description
Large coniferous evergreen tree, 12-15 m tall, with a reddish-brown scented trunk, having flattened branches and scale-like leaves. The tree bears characteristic cones.
It is considered a tree of particular beauty, because of the division of the branches into striated segments; where the segments join the spring decurrent leaves known as "the hair."
If it grows in rock fissures and rocky slopes it may grow up only to 5 m in height.

Geographical Distribution
Local: The largest area of distribution is in Morocco (607 900 hectares). It is found in 6 zones: 1-Rif mountains; 2-Eastern Morocco; 3-Eastern middle Atlas; 4-Valleys of the central plateau and eastern Meseta; 5-Western Middle Atlas and High Atlas; 6-Anti Atlas.
Regional: Morocco, Algeria, Tunisia, Libya.
In the semi-arid to humid ecoclimatic zones of the North African countries, the major natural shrubland ecosystems are dominated, among others, by *Tetraclinis articulata* (0.94 million hectares).
Global: Arar tree is endemic to the mountainous regions of North Africa: Morocco, Algeria, Tunisia, with isolated populations occurring in Malta and near Cartagena, Spain.

Ecology
Grows in hot, dry areas. Warm and xeric conditions.

***Tetraclinis articulata* (Vahl.) Masters.**

Callitris vulgaris Schrader; *Callitris quadrivalvis* Vent.; *Callitris articulata* (Vahl.) Mirbel; *Callitris articulata* Murb. ; *Thuja articulata* Vahl. ; *Thuya articulata* Vahl. ; *Cupressus articulata* (Vahl.) J. Forbes ; *Thuya articulata*.

Arabic: Aaraar, Sandarus, Ar'ar berboush, Shajrat el-hayat. عرعر - سنخروس - عرعر بربوش

Berber: Azouka, Imijad, Tazout.

English: Arar tree, Arartree, Sandarach tree, Thyia, Sandarac tree, Sandarac Gum Tree, Juniper gum tree, Alerce, Thuja, Gharqhar, thuya from Berberie.

French: Thuya de berbérie, Thuya, Callitris, Thuia articulé, Thuia à la sandaraque, Vernix.

As most conifers, it can withstand drought to a considerable degree, and is capable of withstanding a certain degree of salinity as it grows in coastal localities. Though it burns easily, the tree is not usually killed by fire since its vegetative growth is usually stimulated by fire. It produces shoots from a rootstock below ground level after the passage of fire. It would be an excellent tree for afforesting rocky slopes. Very ornamental as a tree, and its use as such is increasing since its declaration as the national tree.

Status

The species is listed as rare on the IUCN's Red List of plants, which notes that populations are vulnerable in Morocco.

In Morocco, priority is given to in situ conservation within reserves and protected areas.

Red List Category & Criteria:

Year Assessed: 1997

Assessor/s: Conifer Specialist Group

Country Names: Algeria, Malta, Morocco, Spain
Biome Terrestrial

Range and Population: The populations in Malta and southern Spain are highly threatened. In North Africa the species is also restricted in range.

Habitat and Ecology: It coppices well.

Data Sources

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conifer species completed by the IUCN/SSC Conifer Specialist Group between 1996 and 1998.

Farjon, A., Page, C.N. and Schellevis, N. 1993. A preliminary world list of threatened conifer taxa. *Biodiversity and Conservation* 2:304-326.

Houerou, H.N. 1969. La végétation de la Tunisie steppique. *Annales de l'Institut National de la Recherche Agronomique de Tunisie* 42(5):620.

Ibanez, J.M. et al. 1989. Data on a population of *Tetraclinis articulata* (Vahl) Masters. *Ecologia* 3:99-106.

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Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., Walters, S.M. and Webb, D.A. (eds) 1995. *Flora Europaea Volumes 1-5*. Electronic dataset supplied by R.J Pankhurst, Royal Botanic Garden Edinburgh. Citation: IUCN 2002. 2002 IUCN Red List of Threatened Species. Downloaded on 02 November 2002.

Parts Used

Leaves, Fruits, Wood, Resin, Oil,

Oil: The tar or oil is extracted by destructive distillation of wood as is the case in Cade oil from *Juniperus oxycedrus*. This is what is called Gatran el-Ghalid (thick tar). It is less fluid than Cedrus tar and the cade oil. It is also more acidic, less estimated and used as substitute in the treatment of wounds especially in livestock.

Resin: The resin exudes spontaneously or from incisions made through the bark in the trunk and branches. It quickly solidifies when exposed to air. The hardened resin can be then harvested by peeling it from the trees.

Sandarac = sandarach or gum sandarac: A brittle and faintly aromatic translucent resin obtained from *Tetraclinis articulata*, is a, breaking into cylindrical pieces. It is soluble in alcohol. It is used in the manufacture of spirit varnishes, and, when dissolved in oil, to make cooked varnishes. It is also used in powdered form to clean vellum and to prepare it for writing purposes. Its most outstanding property is its hardness. Also called "gum juniper."

An essential oil can be obtained by steam distillation of this resin or by dissolving the resin in a solution of potassium hydroxide. It is also possible to isolate the essential oil from a neutralized alcoholic solution of sandarac. The alcohol is then evaporated

and the alkaline solution is extracted with ethyl ether. After removal of the ether, a small amount of essential oil is left. Sandarac oil is pale yellow or almost colorless and has a slightly balsamic odor.

Wood: Names and Descriptions

Thuya Burl, Thyine wood: The fragrant and beautiful sweet-smelling root wood of *Tetraclinis articulata*. Golden reddish brown with heavy small dark 'eyes'. Hard, heavy (density: 1.10 à 1.20), oily, aromatic. Turns well and take a high shine. This burl wood is amazingly hard and polishes up like glass. It is stable and works very well.

Constituents

Flavones (amentoflavones, cupressuflavone and kinokiflavone). Essential oil of stems and wood of Moroccan thuya were studied: Essential oil of stems; yield: 0.25-0.80%; contain bornyle acetate (30.5%), camphor (18.6%), borneol (10.2 %), limonene (8.6 %), terpene-1-ol-4 (5.8%) and thuyone (less than 1 %).

Essential oil of wood; yield: 2%; contain carvacrol (28%), p-methoxythymol (22.1%), thymohydroquinone (16.1%), cedrol (7.2%), terpene-1ol-4 (5.4%), alpha-pinene (3.8%), and alpha-cedrene (3.6%). This Essential oil may be an interesting source of carvacrol.

Pharmacological Action and Toxicity

The Antimicrobial activity of sandarac resins was reported. The study of the effects of sandarac varnishes containing chlorhexidine on the human dental plaque flora was investigated. The results suggested that sandarac varnishes containing high concentrations of chlorhexidine could be used successfully for long-term suppression of *Streptococcus mutans* in dental fissures.

The induction of apoptosis in human melanoma, breast and ovarian cancer cell lines using an essential oil extract from *Tetraclinis articulata* was studied. All cell lines tested were inhibited in a dose-dependent fashion. Melanoma, breast and ovarian cancer cells gave IC₅₀s of around 80 micrograms/ml whilst the IC₅₀s on peripheral blood lymphocytes was almost double this value. It was concluded that the essential oil contains components that are effective at inducing apoptosis. The heartwood of this species was reported to

contain several dermatologically active compounds including thymoquinone, carvacrol, and beta- and gamma-thujaplicins.

Decoction of leaves is abortive and dangerous to use.

■ Traditional Medicine and Indigenous Knowledge

Uses

A drug made of a mixture of leaves and cones is combined with skim milk (*L'ben*) and administered as a emetic in intoxication cases and for treatment of severe diarrheas and gastric pains. Also used as an expectorant.

Crushed leaves in poultices on both sides or on the top of the head against dizziness, headache, neck pain, insulation and fever of children.

Leave's powder is used externally on wounds or applied to the umbilical wound of the newborn baby for healing.

The plant was reported to be used in the eastern part of Morocco for diabetes.

Combined with henne (*Lawsonia innermis*) they are used to treat hair (applied to the hair about one hour before washing it).

In fumigation the Araar is used to ease and fasten delivery in women, and against sorcery.

The resin is used to fill up the tooth wholes.

One peace of sandarac humidified with rose's water is applied to the eyelid against inflammation of eyes.

Tar produced from old wood for dermal diseases, especially in veterinary medicine.



■ Other indications:

In Arabian countries sandarac is still burned to treat colds. People also take the resin internally to treat roundworms and tapeworms. Sandarac is said to be used in India for hemorrhoids and diarrhea and the tincture for friction in cases of low spirits.

■ History

The tree was known in antiquity; the Greek philosopher and naturalist Theophrastus (born circa 370 BC) describes it in his History of Plants botany work (E III 7). According to Theophrastus, "thyon" (Tetraclinis) grows near the temple of Zeus at the Libyan Cyrene, looks like a cypress tree and has resistant wood and strong roots from which "they make the most beautiful artifacts".

The wood was used in burning incense, and under the name of citron-wood was highly prized by the Romans for ornamental woodwork. It yields the sandarach resin of commerce.

The resin collected in Essaouira region was exported to Europe for varnish industries and for pharmacy (fabrication of plaster). It was exported through the port of "Mogador" the old name of the city of Essaouira.

■ Modern treatment

Sandarac has a wonderful warm, light, fruity, balsamic, frankincense-like fragrance. Sandarac's warm balsamic fragrance works well in the evenings. It relaxes, calms and eases tension. It is helpful in cases of insomnia caused by tension or stress. Sandarac is cleansing, strengthening and clarifying.

■ Diseases

Severe diarrheas, gastric pains, dizziness, headache, neck pain, insulation, fever of children, umbilical wound of the new born baby, diabetes, inflammation of eyes.

As emetic, and expectorant. To treat hair, to ease and fasten delivery in women, to fill up the tooth wholes.

Dermal diseases (veterinary medicine)

■ Other uses of the plant (Ethnobotany)

Stems with leaves and cones are used as tanning products of the skins in the region of Essaouira. Root wood is very appreciated by cabinetmakers in

Essaouira and Rabat. The beautiful burled root wood is incredibly hard and polishes up like glass. It is used to make unique and beautiful handcrafted items, such as jewelry boxes, trays, tables, desktop item, pens... all said to be treasured for a lifetime. Just dip a piece of cotton cloth in vegetable oil and wipe your box or desktop organizer to shine. It is said that its unique fragrance along with its delicate texture qualified it to be used for decorating the interior trim of the finest automobiles. The wood is used locally as heating fuel. Resin or gum sandarac is used in the manufacture of

spirit varnishes, and, when dissolved in oil, to make cooked varnishes. It is also used in powdered form to clean vellum and to prepare it for writing purposes. Its most outstanding property is its hardness. The main use of sandarac is to produce varnish. Still today the best varnish is that produced by dissolving the sandarac into turpentine. Up to recently the export of sandarac was one of the most important items of Moroccan trade; it was exported from the harbor of Mogador and, for this reason, it is known in trade as Mogador sandarac.

Tetraena gaetula (Emb. & Maire)
Beier & Thulin
Zygophyllaceae



Compiled by Dr. Salima Benhouhou

Morphological description

A perennial shrub of intermediate size, 50 cm., woody at the base. Intense ramifications of the branches. The young shoots are thin and are covered with white hairs. The leaves are small, with two fleshy folioles (stipules) at the base, also covered with white hairs. The flowers, borne on a small hairy peduncle, are tiny (5 mm.), ovoid, with 5 white petals. The fruit has a tubular base which widens towards the top with five lobes and is approximately 2 cm. long.

It usually flowers in spring, but has been observed in flower in the autumn.

Geographical distribution

Local: Endemic of southern Morocco and the North-West Algerian Sahara.

Ecology

Zygophyllum gaetulum grows on sandy or loamy soils in flat salinas and wadi floors. It is a good representative of a saline pasture species in open ground. The plant grows in severe climatic conditions with an average rainfall of 100 mm./year.

Status

According to the IUCN criteria this endemic species falls into the "EN" category.

Due to its being intensely collected, it is likely to become endangered in the near future. Appropriate conservation measures for this plant are therefore urgently required.

Tetraena gaetula (Emb. & Maire)

Beier & Thulin *Zygophyllum gaetulum* Emb et Maire
Zygophyllum: leaves grouped in pairs; *gaetulum*: from the Latin *gaetuli*, the Maghreb and the Sahara

Arabic: aâgaya, berraya

Part used

The leaves and flowers are collected in the spring and autumn and prepared as an infusion, a decoction, a powder and mixed with other plants. A decoction of the dried leaves, or powdered leaves, and an infusion of the flowers are the main means of preparation. It is taken by mouth and used externally.

Constituents

Hypoglycaemia elements, flavonoids: mono and diglycoside of three flavonols: kaempférol, quercetine, isorhamnetine and saponosides.

Pharmacological action and toxicity

The hypoglycaemic effect of its leaves makes the plant known for its anti-diabetes properties.

Anti-inflammatory activity.

No toxicity is reported for this plant.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for diabetes, eczema and liver and stomach pain, and is a haemostat.

The dried flower heads are used to make a refreshing drink or added to tea. Forming extensive pastures, it is appreciated by herds of goats and camels.

Its anti-diabetic properties are well known by the nomads in the area of its distribution (north-western Sahara). In the Dra and Tarfaya region (western Sahara) the dried leaves in a decoction

used to be drunk for stomach pain, or for the liver swollen by an excess of bile.

The finely powdered leaves are applied externally to wounds to act as a haemostat and as a maturing plaster on furuncles and abscesses. The plant is used by nomads to treat eczema and skin problems; it is also used for colds. In Tissint and Tata (Morocco), suppositories are made from *Zygophyllum gaetulum* leaves to which are added garlic, nigella seeds, colocynth root and date pulp.

In the western Sahara, an infusion of the flowers is

used in baths and as an antiseptic lotion for infant hygiene and for body care.

The sap is dropped into the ear to treat otitis and into the eyes for ocular tiredness (blurred eyesight).



***Teucrium polium* L.**
Lamiaceae



Compiled by: Dr. Driss Lamnauer
Edited by: Prof. Kamal Batanouny

Morphological description

It is a very polymorphous perennial plant 10-35 cm. high. The leaves are white, tomentose on both sides, with downwards rolled rounded-toothed margins. The flowers have a white or yellow corolla, in a globular inflorescence. The calyx is bell-shaped with 5 subequal flat, triangular or acuminate triangular teeth. The fruits are light-brown to dark-brown nutlets with a latticed surface. The plant gives off a pleasant aromatic smell; flowering takes place from April until June.

In Tunisian flora, *Teucrium polium* has three subspecies:

- subsp. *polium* with white flowers and a triangular-toothed calyx
- subsp. *gabesianum* with a nervure with a short mucro, yellow flowers, a calyx with narrow triangular teeth and a flexible, branching white indument
- subsp. *flavovirens* with a lengthily mucronate nervure, yellow flowers, a calyx with narrow

***Teucrium polium* L., Sp. Pl. 566. 1753**

Teucrium polium subsp. *album* (Miller) Breistr. in Bull. Soc. Bot. France 121: 65.; *Teucrium virescens* Pomel in Bull. Soc. Sci. Phys. Algérie 11: 115. 1874

Arabic: Gattaba, jáada, khayatit lajrah

French: Germandrée polium

English: Germander

triangular teeth and a stiff, branching yellow indument.

It should be mentioned that for reasons of convenience the genus *Teucrium* includes aggregates formed by the grouping together of several species that are often confused, being usually very close to each other. Thus, Greuter et al. (1984) consider *Teucrium polium* L. to be one of the 20 species belonging to the aggregate called *Teucrium polium* aggr., which changes the status of the three subspecies mentioned in Tunisia by Pottier Alapetite (1981). The species and subspecies developing in Tunisia and belonging to this *Teucrium polium* aggr. aggregate are:

Teucrium capitatum L. Sp. Pl. 566. 1753 = *Teucrium polium* subsp. *capitatum* (L.) Arcangeli, Comp. Fl. Ital.: 559. 1882

Teucrium lusitanicum Schreber, Pl. Verticill. Unilab.: 47. 1773 = *Teucrium polium* subsp. *mairei* Maire in Bull. Soc. Hist. Nat. Afrique n. 23: 208. 1932

Teucrium luteum (Miller) Degen, Fl. Veleb 2: 587. 1937 = *Teucrium polium* subsp. *aureum* with three subspecies including:

subsp. *flavovirens* (Batt.) Greuter et Burdet in Willdenowia 15: 79. 1985 = *Teucrium polium* subsp. *flavovirens* Batt. in Batt. et Trabut, Fl. Algérie. 1: 714. 1890

subsp. *gabesianum* (S. Puech) Greuter et Burdet in Willdenowia 15: 423. 1986 = *Teucrium polium* subsp. *gabesianum* Le Houerou in Bull. Soc. Bot. France 107: 26. 1960

Teucrium polium L., Sp. Pl.: 566. 1753 = *Teucrium polium* subsp. *album* (Miller) Breistr. in Bull. Soc. Bot. France 121: 65. 1974 = *Teucrium virescens* Pomel in Bull. Soc. Sci.

Teucrium sauvagei Le Houerou in Bull. Soc. Bot. France 107: 101. 1960.

■ Geographical distribution

Local: North-eastern, central and southern Tunisia.

Regional: North Africa.

Global: North Africa, Sicily, Italy, France and the Iberian peninsula.

■ Ecology

Teucrium polium usually develops in regions belonging to the semi-arid and arid bioclimates; it likes sun and a light, well-drained soil. It grows on hillsides, sands and in arid places.

Status, conservation and culture

The plant is not grown in Tunisia; it is much picked for use, unsupervised, and is sold at almost all herbalists' and in regional markets.

Much research work on the biodiversity of the genus *Teucrium* in Tunisia has been done (morphology, palynology, caryology, etc.).

Teucrium polium is a species to be protected.

■ Part used

The flowering branches and leaves.

■ Constituents

Several diterpenoids, possessing the skeleton of clerodane or of the 19-norclero-dane, were found in *Teucrium polium*: picropolin, 6-acetyl-picropolin, isopicropolin, teucrine P1, teucrine P2, montanine-B, 19-acetyl-gnaphaline, teupoline I, teupoline II, diosphenol.

Furanic core diterpenes are the cause of the germanders' toxicity: they provoke an acute cytolytic hepatitis.

■ Traditional medicine

A healing substance; for dysmenorrhoea.



***Thymelaea hirsuta* (L.) Endl.**
Thymelaeaceae



Compiled by: Dr. Driss Lamnauer

Edited by: Prof. Kamal Batanouny

Morphological description

It is a perennial plant not more than 1 m. high, whitish tomentose and much branched. The leaves are small overlapping scales, with a cottony upper side and glabrous beneath. The flowers are small with a pale white corolla. The perigone, with obtuse oval divisions, is caducous and dry at the end. Flowering extends over a long period of the year.

Geographical distribution

Local: Not abundant in the north, fairly common in central and southern Tunisia and the Kerkennah Isles and Jerba.

Regional: From Morocco to Egypt.

Global: The Mediterranean: from Spain to Greece and Turkey; southern side from Morocco to Egypt;

Near East: Lebanon and Palestine.

Ecology

It develops especially in the arid bioclimate stage, mild and hot winter variant; on different types of

***Thymelaea hirsuta* (L.) Endl.**
Passerina hirsuta L.

Arabic: Mithnane

French: Passerine hirsute

soil: sandy and sandy-silty and stabilized coastal dunes. It is a dominant species in several groups of the steppes in the arid stage, like the association with *Lygeum spartum* and *Thymelea hirsuta*. Its distribution is helped by strong human action; in this case it can form a pastoral degradation facies for many associations and subassociations like those described for the Kerkennah Islands. It also colonises waste land that has formerly been cultivated in silty areas, and can appear in a ruderal situation.

Status, conservation and culture

It is much picked for use, and is sold in all herbalists' and in local markets. It is of no grazing interest; its stems are used to make brooms for sweeping because they are flexible and tough.

Part used

Branches and ashes.

Traditional medicine

Thymelaea hirsuta is used as a purgative and to reduce the swelling of abscesses. It is also used in veterinary medicine as a cure for colds in ewes. It is of little grazing interest because of its toxicity.

***Thymus broussonetii* Boiss**

Lamiaceae (Labiatae)



Compiled by: Dr. Driss Lamnauer

Edited by: Prof. Kamal Batanouny

■ Morphological Description

Small shrub 12-40cm; stems with short hairs, generally retrorse (curved backwards). Leaves 5-18x2-5mm, ciliate, glandular-dotted. Inflorescence capitate, 15-30x1520mm; bracts ovate to elliptical. Calyx 6-7.5 mm; teeth ciliate, lower teeth c. 4 mm, the central tooth of the upper teeth c. 1 mm. Corolla reddish to purple.

Two subspecies are recognized: Leaves more than 10 cm, subpetiolate, bracts hairy only on the back: ssp. *Broussonetii*. Leaves less than 10 cm, petiolate; bracts densely hairy on both sides, hairs long. Ssp. *Hannonis*.

Flowers March-July.

■ Geographical Distribution

Local: Mainly on the Atlantic coast; grows in the regions of Rabat and Essaouira, but also found in Middle Atlas and Anti-Atlas

Regional: *T. broussonetii* Boiss.: Morocco, Algeria and Tunisia. *T. broussonetii* ssp. *Broussonetii*: Morocco, rarely in Algeria and Tunisia. *T. broussonetii* ssp. *hannonis* (Maire) R.: Morocco, Agadir, around Cape Rhir.

Global: Section *Thymus* is found only in the western Mediterranean region. The most important species are *T. vulgaris*, *T. zygis* and *T. willdenowii*.

■ Ecology

***T. Broussonetii* Boiss.** : Altitude 10-1000m. Morocco, Algeria and Tunisia. Ssp. *Broussonetii*: Altitude 50-1000m. Morocco, mainly on the Atlantic coast; and rarely in Algeria and Tunisia. Ssp. *Hannonis*: Altitude 10-150m. Morocco: Agadir, around Cape Rhir. It usually occurs on basic soils.

Cultivation: It is primarily a warmth-needing plant. Possibly giving it superbly draining soil and

***Thymus broussonetii* Boiss**

The name is probably borrowed from Latin *thymus*, which goes back to Greek *thymós* "spirit", originally meaning "smoke" (related to Latin *fumus* "smoke"; cf. "perfume") and the verb *thýein* "smoke, cure; offer an incense sacrifice". The reference is probably the strong, smoky odour of thyme. An entirely different explanation of the name thyme gives Old Egyptian *tham*, which refers to a strongly smelling plant used for the mummification process, as the source of the Greek plant name.

Arabic: Za'itra, Za'atar el-hamir, Ra'atar essouiri. ازعيطر- زعتر لمبیر- زعتر

English: Broussoneti Thyme.

French: Le thym de Broussonet.

a completely sunny exposure would help it through the winter.

■ Status

Not IUCN threatened specie.

■ Parts Used

Flowering branches, leaves, aerial part.

■ Constituents

The essential oil of *Thymus broussonetii* from Essaouira region contains thymol (15.2 to 28.9%), carvacrol (10.1 to 30.4%), borneol (14.8 to 19.4 %), p-cymene (3.8 to 15.3%), pinenes (4.1 to 7.8%), camphene 3 to 5.9%, myrcene (2.3 to 2.8%), gamma-terpinene (2.4 to 6.8%). The same species collected in Rabat region was poor in thymol (0.2%) but rich in carvacrol (77.3%). The methanol extract of leaves was shown to contain some flavonoids: luteolin, eriodictyol, thymonin and glycosides: luteolin-7-O-glucoside, luteolin-3'-O-glucuronide, eriodictyol-7-O-glucoside. Ursolic acid and oleanolic acid were also isolated from the chloroform extract.

■ Pharmacological Action and Toxicity

The topical anti-inflammatory activity of four

extracts from *Thymus broussonetii* leaves, an herbal drug used in Moroccan traditional medicine has been studied using the croton oil ear test in mice. A bioassay-oriented fractionation revealed that the pharmacological activity is mainly in the chloroform extract. Fractionation and analysis of this extract allowed the identification of ursolic acid and oleanolic acid as the main anti-inflammatory principles.

Oil of thyme is itself quite poisonous. Thymol has caused dermatitis in dentists, and, when used in toothpaste, chelitis and glossitis. Oil of thyme, in bath preparations, has been reported to cause hyperemia, and severe inflammation.

Traditional Medicine and Indigenous Knowledge

Everywhere in Morocco, broussonet thyme is used like *Origanum compactum* Benth. In Rabat region, the mixture, obtained from the maceration of dried

plant in olive oil during one week. The oil solution is used to treat wounds, cuts, furuncles and abscess. The decoction is used against aphta, gingivitis, and sore throat. Infusion of leaves and flowering branches for colds, pains, coryzas, rheumatisms, articular pains, as gargle for throat troubles. Decoction without sugar for jaundice and other liver diseases, galactogogue, vermifuge, emmenagogue, diuretic, digestive, appetizer, general antiseptic for the intestine; used in the form of plaster on the abdomen in case of digestive troubles.

Diseases

Colds, pains, coryzas, rheumatisms, articular pains, throat troubles, jaundice, liver diseases, digestive troubles, aphta, gingivitis, wounds, cuts, furuncles and abscess.

Also as general antiseptic, galactogogue, vermifuge, emmenagogue, diuretic, digestive, appetizer.

***Traganum nudatum* Del.**
Chenopodiaceae



Compiled by Dr. Salima Benhouhou

Morphological description

A small shrub, not exceeding 50 cm., with intricate grey-whitish stems rather like Cornulaca monacantha. The leaves are alternate, fleshy, ovoid, with a very small yellowish curved spine at the top, bright green, 2-4 mm. The small solitary yellow flowers are located at the base of the leaves and surrounded by white woolly hairs. The perianth has 5 cream tepals. The fruit is a small achene surrounded by the perianth when the fruit is ripe. Flowering takes place in autumn.

Geographical distribution

Local: Common in the northern Algerian Sahara, rarer in the mountains of the central Algerian Sahara.

Regional: North Africa.

Global: Widespread throughout North Africa and Asia.

Ecology

It is a common shrub of desert pastures, usually thriving on slightly saline wadi beds. It is also found on regs (stony plateaux strewn with small pebbles). Annual rainfall is around 100 mm. or even less.

Status

According to the IUCN criteria this Saharo-sindian species falls into the "C" category.

***Traganum nudatum* Del.**

nudatum: bare

Arabic: demran, hamdh

Targui: terahit, askaf, tidja, tzara

The plant is not threatened and appears on the floristic list of several protected sites listed by the UNEP World Conservation Monitoring Centre.

Part used

The leaves. These are crushed to a fine powder and taken to ease gastric pain. The leaves are also used as a poultice to treat pimples and pruritus.

Constituents

No data found for the constituents.

Pharmacological action and toxicity

No data found on the plant's pharmacological action.

A search on its toxicity appears to be negative.

Pharmacopeias

Not relevant for this species.

Pharmaceutical products

Not relevant for this species.

Traditional medicine and local knowledge

It is used for gastric problems, pruritus and pimples. The dried plant, crushed into a powder, used to be added to tobacco.

From the ashes of the burnt plant, sodium carbonate used to be extracted to make soap and glass. The plant is useful fodder, particularly appreciated by camels.

In Morocco, it is used for the same purposes: gastric problems, pruritus and pimples.

***Tribulus terrestris* L.**
Zygophyllaceae



Compiled by Dr. Salma Benhouhou

Morphological description

An annual trailing plant up to 25 cm. with prostrate stems. The entire plant is covered with short hairs that give the plant its bright green colour. The leaves are pinnate with 8 to 12 pairs of oblong-oval leaflets. The flowers are yellow, with 5 petals. The fruit is a small 6-7 mm. capsule with spines typically arranged in a cross.

It flowers in the spring in the northern Algerian Sahara, and any time after rain in the central Algerian Sahara.

Geographical distribution

Local: Mediterranean-Saharan.

Regional: North Africa.

Global: Cosmopolite in the arid zones of the two hemispheres (southern Europe, Africa, tropical and sub-tropical Asia, North Australia and tropical regions of the new world).

Ecology

This annual herb is usually found in wadis on gravelly-sandy soils. It also occurs on sandy-loamy soils in large depressions.

Status

According to the IUCN criteria this cosmopolite species falls into the "C" category.

Due to its toxicity for animals, the plant does not appear to be threatened in its Saharan habitat.

Part used

The fruits; the roots. These are collected in the

***Tribulus terrestris* L.**

Tribulus: from the Greek, referring to the spiny, trap-like fruit; ***terrester:*** referring to the land

Arabic: adhrass el kilab, hammouss el hamir, hassak

Berber: tadjnouft, tamezlagelt, timgelest

Targui: tagaroft

English: caltrops, land caltrops

French: croix de Malte, chausse trape, tribule

spring or any time of year when the fruits are ripe. They are powdered and taken internally.

Constituents

Alkaloids (harman, harmol harmin and other b-carbolines), oligosaccharid (tribulosin), sapogenins (chlorogenin, diosgenin, gitogenin, hecogenin, ruscogenin, tigogenin and 25-D-spirosta-3,5-diene), flavonoids (kaempferol, quercetin) and sterols. For the fruit the main constituents are linoleic, oleic, palmitic, stearic acids and behemic acid, traces of alkaloids, heterosides, essential oil, resins, proteins, enzymes and nitrates in large quantities.

Pharmacological action and toxicity

Its activity is astringent, anti-rhumatismal, anti-asthenic, anti-spasmodic, diuretic and anticancer. It is reported by nomads as toxic for sheep and goats when consumed in great quantities. It produces hepatogenic photosensitivity in livestock. Other types of poisoning are reported (alkaloidic and nitric).

Tribulus terrestris is a herb used around the world for its medicinal effects. Tribulus is extracted from the plant, and used as a natural nutritional supplement.

Pharmacopeias

It has been in the Brazilian Pharmacopeia since the 1950s.

German UK and US pharmacopeia.

Pharmaceutical products

Tribulus Terrestris Powdered Extract

A Nutritional Supplement Raw Material for Body-building & Libido Enhancement.

Traditional medicine and local knowledge

It is used for gravel (small bits of stone-like material in the bladder), for urinary retention, and for colic (fruit). The fruits and roots are usually indicated for gravel and urinary problems.

During periods of famine, women used to collect the fruits, crush them and eat them raw. Nowadays it is still consumed by nomads in the Air and a porridge made from it is much appreciated for its pleasant taste.

In Egypt the plant extract is reported to be antispasmodic. The flowers are used for leprosy. The fruits and seeds have been used in folk medicine for a

wide range of conditions such as congestion, headache, hepatitis, kidney problems, impotence, spermatorrhea, neurasthenia, vertigo ophthalmia (vision) and stomatitis. They are also considered to be aphrodisiac, astringent, diuretic, and tonic. They are taken for dysentery and bladder pain.



***Urginea maritima* (L.) Baker**
Liliaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photo by K. H. Batanouny

Morphological Description

Bulbous plant with rosetted leaves. Leaves appear at the beginning of winter. Leaves are basal, lanceolate to linear-lanceolate, 10-35 x 2-7 cm, glabrous, with smooth margin. Leaves become dry by the onset of summer and the plant becomes dormant for a period of 2-3 months depending on climate conditions as well as soil moisture content. In August, or one month later, flowers appear. The bulb is large, frequently white, or red, growing in clumps up to 70 together, each bulb more than 10 cm across and weighing more than 1 Kg. In fluorescence, a long scape reaching 60 cm to 1.5 m high with small flowers from the middle upwards. The red squill has longer and more stout scapes (1-1.5 m), whilst the white squill has shorter ones (60 cm). Fruits appear by the end of October, larger in red squills than in white squills. Seeds, 1-4 in each fruit, are minute, very light, compressed, oblong ca 3 x 7 mm and dark black-glossy coloured.

U. maritima is a polymorphic species with several varieties and forms. In Egypt there are three distinct morphological features collected from different localities. The specimens collected from Sidi Barrani along the Western Mediterranean coast, show two features regarding the colour and size of the bulb. The average diameter of the bulb of white squills is 8.5 cm, while it reaches 17 cm in the case of red squills. On the other hand, in the specimens

***Urginea maritima* (L.)**

Baker, J. Linn. London (Bot.) 13:221 (1873).

Scilla maritima L., *Squilla maritima* Steinh, *Urginea scilla* Steinh

Names

Arabic: بصل فرعون, Onsul, Onsel
Onsul, Onsel, Basal el-far, عنصل الفار, Basal el-far,

بصل - باصول, Buseil; Basul

شقبيل, Samm el-far, Ishkil, Ishkil, Lksfil, Lobsol bouchen, Ibsel

Berber: Ichkil, Isfil, Ikfilen, Lobsol bouchen, Ibsel idam

English: Medicinal Squill, Sea onion, Squill

French: Scilla maritime; Oignon marin, Scille

collected from the Eastern Mediterranean coastal zone between El-Arish and Rafah, the bulbs have intermediate diameter and their white tunics have a reddish tinge. Squills growing in Egypt show therefore distinctive features regarding the morphology of their bulbs: moderate size and a reddish tinge in the Eastern coastal region, the second with white tunics and smaller size, and the third with dark-red tunics and very large bulbs.

The flowers bloom in April and May and are followed by oblong capsules.

Geographical Distribution

Local: The plant is rare in the Mediterranean coastal region (Sidi Barrani Area) and the Isthmic Desert. In the latter region, it is found in maritime sands as well as in stony grounds and ascending hills.

Regional: All North African countries.

Global: Mediterranean region and the Canary Islands.

Ecology

The plant is found in most of the Mediterranean districts in dry, sandy places especially at the coast. White and red squills are said to grow on soils with different physical and chemical properties. Soils supporting the white squill are shallower, more compact, with higher content of carbonates and soluble salts than those supporting the red squill. The soils supporting the red squill are of sandstone origin, while those supporting the white squill are

of limestone origin.

The total plant cover of the community dominated by the white squill is about 60%; almost half of it is occupied by the squill. In the case of the red squill, the total plant cover is 68 %, and the squill occupies about 90% of this cover.

The number of bulbs in 100 m² was found to be 430 for white squills and 250 for red squills, while the weight of these bulbs was 70 Kg for white squills and 123 Kg for red squills.

Status

Recently, the plant has been subject to severe uprooting and collection for pharmaceutical companies. It is now rare compared with its status thirty years ago. A study by Batanouny et al. (1970), showed that an approximately equal number of bulbs would grow three years after collection. However, the weight of the new bulbs would be 13.7 Kg compared to the 70 Kg from a natural unharvested area. This confirms that the reestablishment of the squill will take many years even in the case of protecting the habitat after collection. Conservation and cultivation of this plant for further use by pharmaceutical companies is essential. It is a very endangered species. The plant, being inedible, does not need enclosure for cultivation. Reseeding of the plant would be in the areas from which the bulbs were collected.

Part(s) Used: The medicinal parts come from the bulbs of the white variety collected after flowering and the fresh, fleshy bulb scales of the white red varieties.

Collection: bulbs are harvested after six years of cultivation in late autumn, or from the wild, sliced transversely and dried for use.

Preparation: infusion, liquid extracts, squill vinegar, tincture.

Use: oral and externally.

Constituents

White squill contains, as active constituents, several steroid glycosides (bufadienolides), including scillaren A (scillarenin + rhamnose + glucose), glucoscillaren A (scillaren A + glucose), proscillarin A (scillarenin + rhamnose), scillarin A, scillcyanoside, scilliglucoside, scilliphaeoside (12 B-hydroxyproscillarin A), and glucoscilliphaeoside (12 B-hydroxyscillaren), the most important being

scillaren A and proscillarin A. Scillaren B has been used to describe a mixture of squill glycosides as opposed to pure scillaren A.

Other constituents present in white squill include flavonoides (vitexin, isovitexin, orientin, isoorientin, scoparin, vicenin-2, quercetin, dihydroquercetin or taxifolin, dihydroquercetin-4-monoglucoside.), stigmasterol, scilliglaukosidin, and mucilage (glucogalactans).

Red squills contain scilliroside; and also cardiac glycosides, as white squills.

Pharmacological Action and Toxicity

The glycosides present in the squill have digitalis-like cardiotonic properties which are due to their aglycones. Action is faster but shorter-lasting than that of digitalis glycosides.

Squill has a stimulating action on the heart which makes it useful for heart failure and fluid retention caused by heart problems. It has been used in cases where Digitalis would be considered dangerous. In medicinal doses it acts upon the circulation like Digitalis, slowing and strengthening the cardiac contractions, making the pulse slower and stronger, raising arterial tension, and increasing the flow of urine.

The action of the drug is that of a cardiac stimulant, with three important further properties all dependent on its irritant constituents. In small doses, that would not affect the heart, it is a gastro-intestinal, a bronchial and renal irritant. The two later properties make it a powerful expectorant and a fairly active diuretic.

The difference between its actions as an expectorant and a cardiac stimulant would seem to indicate its possession of two or more active principles, one specifically affecting the secretory mucous membranes, and the other the circulatory apparatus. Squill may be combined with Marrubium and Tussilago in bronchitis, with Ipecacuanha in whooping cough.

Squill is considered an abortifacient and may lead to SAB if used during pregnancy. Its use is not recommended.

It is given in pill form, made from the powdered root beaten into a mass, with the addition of syrup or mucilage of gum arabic.

In case of overdose the plant is an irritant poison,

causing nausea and vomiting, purging, gastro-enteritis, straugury, bloody urine, perhaps suppression, convulsions, and death by paralysis of the heart in systole.

The root is bitter to the taste and so acrid that it will blister the skin if it is handled too much. Combined with a sedative, such as opium, it has been given to treat chronic bronchitis, though not for acute bronchitis, which would be aggravated; nor in phthisis, which is invariably accompanied by a hypersensitive state of the alimentary tract. For similar reasons squill should not be given in any form of Bright's disease. The text book prohibition against its use in acute Bright's disease should certainly be extended to chronic nephritis in all its forms.

Pharmacopoeias

Egyptian pharmacopoeia, 1984.
British pharmacopoeia, 1988.

Pharmaceutical Products

Scillaren (Sandoz)
Palmocadil syrup (Nile)
Cosylan syrup (Park Davis)
Lobestra syrup (Nile)
Expectyl syrup (Adco)
Broncho cough syrup (Mepaco)

Traditional Medicine and Indigenous Knowledge

History: White squill bulbs are applied fresh for the treatment of wound and tumours, and also to heal neurological pains, skin problems and eye afflictions. Infusion of dried bulb has been used as a strong purgative.

The fresh bulb is used for rheumatic pain, oedema, gout and also anthelmintic.

The squill was valued as a medicine in early classical times and has ever since been employed by physicians, being official in all pharmacopoeias.

Oxymel of Squill, used for coughs, was invented by Pythagoras, who lived in the sixth century B.C.

It is mentioned by Theophrastus in the third century B.C., and was known to all the ancient Greek physicians. Epimenides, a Greek, is said to have made

much use of it, from which we find it called Epimenidea.

It is considered to be the Sea Onion referred to by Homer. Pliny was acquainted with it, and Dioscorides, from the same period, described the different varieties of the bulb and how to make vinegar. A similar preparation, as well as compounds of squill with honey, was administered by the Arabian physicians of the Middle Ages, who introduced the drug into European medicine, these preparations still remaining in use.

Records from countries of the region: in Libya as a territory marker.

Traditional Medicinal Uses

- Cancer.
- Chest diseases (bronchial asthma, bronchial catarrh, bronchopneumonia, allergic cough, acute and chronic bronchitis)
- Constipation
- Diabetes
- Heart diseases (heart failure and fluid retention caused by heart problems, cardiotonic).
- Neurological diseases
- Renal diseases (chronic nephritis, promotion of urine)
- Skin diseases (wounds, oedema, and dermal fungus infection)
- Rheumatic diseases

Other uses of the plant: It is planted in the vicinity of Arab graves, to protect them, according to tradition. The Bedouins believe that whenever there is an abundance of *Urginea maritima* flowers, there will be a rainy winter.

In the Eastern Mediterranean zone of Egypt (El-Arish, Rafah zone), the plant was used as a territory marker between the barley fields. This practice was also recorded in Libya.

The Bedouins use it mainly as a rodenticide. Squill is a household word in many countries, especially in England, where it is freely used in domestic practice for the coughs of infants and children. It is chiefly employed as an expectorant and diuretic, through it renders excellent service as a cardiac stimulant, and hair tonic.

Zygophyllum coccineum L.
Zygophyllaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,
Dr. N. S. Abdel-Azim and Dr. K. A. Shams
Edited by: Prof. K. H. Batanouny
Photos by K. H. Batanouny

Morphological Description
Low shrub, perennial herb or desert succulent undershrub, up to 75 cm high. Numerous stems, branched, erect, the young branches being green. Leaves 2-foliate, over 10 mm long, cylindrical, bright green, glabrous, fleshy carried on a fleshy long petiole. Stipules broadly triangular, membranous. Flowers are solitary, axillary, white. Capsule 5-valved, 8-10mm long, with obtuse apex. The leaflets and sometimes the petioles are shed under severe dry conditions to reduce the transpiring surface. The fleshy cortex of the stem is shed under these same conditions.

Geographical Distribution

Local: Arid zones of Egypt (Eastern and Western Desert and Sinai Peninsula).
Regional: Syria, Palestine and Sudan.
Global: South Africa, West Asia.

Zygophyllum coccineum L.,
Sp. Pl., ed.1,386 (1753)

Names

Arabic: Rutreyt, Kammun Kermany, Ghassoul,

Balbal, Tartir, Bowa.

English: Zygophyllum.

Ecology

Zygophyllum coccineum is the most widespread Zygophyllum species in Egypt and grows in diverse habitats and different soil types. The plant is very common in the limestone wadis and plains of the Eastern (Arabian) desert and tolerant of saline soils. It dominates a community of widespread occurrence there.

Status

The plant is common. Being unpalatable, it is not grazed by animals. It does not give good fuel. The plant is therefore neither grazed nor cut for fuel .

Part(s) Used

Fruits and seeds.

Collection

The fruits (seeds) are collected when the plant is in fruiting stage.

Preparations

Infusion, Extract.

Use

Oral.

Constituents

Zygophyllin (28% in leaves, 0.18% in stems and 0.26% in fruits). Quinovic acid (0.36% in leaves, 0.31% in fruits and 0.47% in stems). Flavonoids e.g. kaempferol-3- rutinoside.

Pharmacological Action and Toxicity

Aqueous extract of the plant is documented to

produce a lowering in blood pressure, and acts as a diuretic and antipyretic, local anesthetic, with anti-histamine activity, stimulation and depression of isolated amphibian heart, relaxation of isolated intestine, contraction of uterus and vasodilation. The extract antagonized acetyl choline action on skeletal muscle, and acted additively to the muscle relaxant effect of d-tubocurarine.

■ **Pharmacopoeia**

Not available

■ **Phytopharmaceutical Products**

Not available

■ **Traditional Medicine and Indigenous Knowledge**

History: It is a plant of North Africa and Arabia.

Arabs use the aromatic seeds instead of pepper.

■ **Traditional Medicinal Uses**

- Rheumatism
- Gout
- Cough
- Asthma
- Hypertension
- Flatulent colic
- Diuretic

Other uses of the plant: The juice from fresh leaves and stems is known to be used as an abrasive cleanser and as remedy for the treatment of certain skin diseases.



About IUCN - The World Conservation Union

Founded in 1948, The World Conservation Union brings together states, government agencies and a diverse range of non-governmental organisations in a unique world partnership: over 1000 members spread across some 180 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

The World Conservation Union builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.

About The North Africa Biodiversity Programme (NABP)

With the support of the Swiss Agency for Development and Cooperation (SDC), IUCN has been engaged in a programme aimed at promoting the conservation of biodiversity in North Africa, developing the sustainable use of natural resources and empowering local communities, in particular women, in biodiversity conservation. The North Africa Biodiversity Programme (NABP) was implemented in Morocco, Algeria, Tunisia, Libya and Egypt. This programme played a pioneering role as a regional initiative, creating a platform for experience sharing and exchange of knowledge and information, promoting dialogue among the five countries, engaging IUCN Members in the region and providing them with an opportunity to develop a collective voice with respect to conservation of natural resources.

More info <http://iucn.org/places/medoffice/nabp>