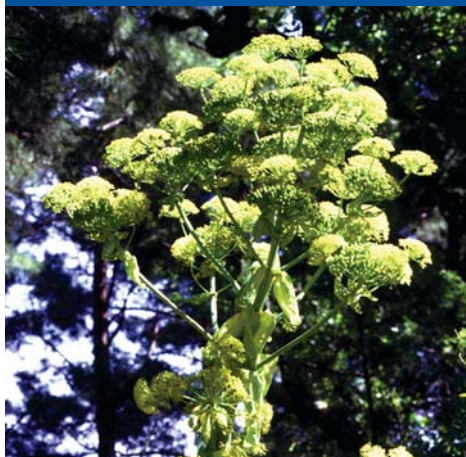


***Ferula communis* L.**
Umbelliferae



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■ **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.

الكليخ او كليخ - كشيور - بسيس - حرمي

Berber: Aboubal, aouli, ouffal.

English: Giant fennel, african ammoniacum

French: Grande f r le, f r le 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 2 200 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, (ferulenoloxo-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 umbelliferone (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 α -pinene (6.6 %). Several sesquiterpenes were present at appreciable level: aristolene (8.5 %), (E,E)-farnesol (4.3 %), gurgunene (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 hypothermic 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 hypothermia. The hypothermic 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-hysterical, 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 Dioscorides, 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 *Féculisme*. A severe haemorrhagic syndrome characterizes the poisoning known as *ferulosis* or *féculisme*. 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 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 *l'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.

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