


Harmal

Harmal	
	
Harmal (<i>Peganum harmala</i>) flower	
Scientific classification	
Kingdom:	Plantae
Unranked:	Angiosperms
Unranked:	Eudicots
Unranked:	Rosids
Order:	Sapindales
Family:	Nitrariaceae
Genus:	<i>Peganum</i>
Species:	<i>P. harmala</i>
Binomial name	
<i>Peganum harmala</i> L. ^[1]	

Harmal (*Peganum harmala*) is a plant of the family Nitrariaceae, native from the eastern Mediterranean region east to India. It is also known as **Wild Rue** or **Syrian Rue** because of its resemblance to plants of the rue family.

It is a perennial plant which can grow to about 0.8 m tall,^[2] but normally it is about 0.3 m tall.^[3] The roots of the plant can reach a depth of up to 6.1 m, if the soil it is growing in is very dry.^[3] It blossoms between June and August in the Northern Hemisphere.^[4] The flowers are white and are about 2.5–3.8 cm in diameter.^[4] The round seed capsules measure about 1–1.5 cm in diameter,^[5] have three chambers and carry more than 50 seeds.^[4]



Harmal seed capsules

Peganum harmala was first planted in the United States in 1928 in the state of New Mexico by a farmer wanting to manufacture the dye "Turkish Red" from its seeds.^[3] Since then it has spread invasively to Arizona,

California, Montana, Nevada, Oregon, Texas and Washington.^[6] "Because it is so drought tolerant, African rue can displace the native saltbushes and grasses growing in the salt-desert shrub lands of the Western U.S."^[3]

Common names:^[7]

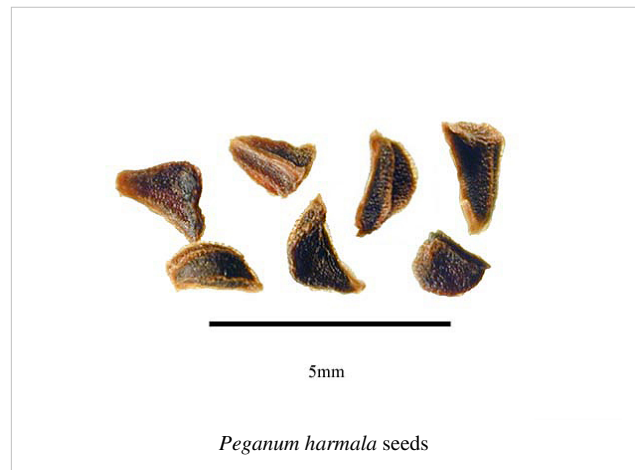
- African rue
- Esphand (Persian, دن پسا - دن پسا)
- Harmal peganum
- Harmal shrub
- Harmel

- Isband
- Ozallaik
- Peganum
- Steppenraute
- Syrian rue
- Yüzerlik, üzerlik (Turkish)
- Üzərlik
- Luotuo-peng (Chinese, 骆驼蓬)

Traditional uses

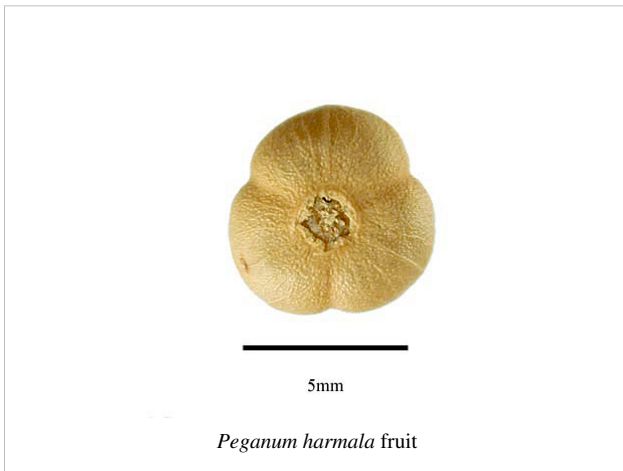
In Turkey *Peganum harmala* is called **yüzerlik** or **üzerlik**. Dried capsules from this plant are strung and hung in homes or vehicles to protect against "the evil eye."

In Afghanistan, Azerbaijan, Iran, Iraq, Turkey, Uzbekistan and Tajikistan, dried capsules (known in Persian as دن پسا *espænd* or هن دادن فسا *esfænd-dāneh* and испанд *ispand* or испандут *ispandut* by Tajiks and Bukharian Jews of Central Asia) mixed with other ingredients are placed onto red hot charcoal,^[8] where they explode with little popping noises, releasing a fragrant smoke that is wafted around the head of those afflicted by or exposed to the gaze of strangers. As this is done, an ancient prayer is recited. This prayer is said by Jews (more specifically, Bukharian Jews) and Muslims as well as by Zoroastrians. This Persian practice dates to pre-Islamic, Zoroastrian times. In Iran, this ritual is sometimes performed in traditional restaurants, where customers are exposed to the eyes of strangers.





Syrian Rue



Peganum harmala fruit

Harmal has been used as an entheogen in the Middle East, and in modern Western culture, it is often used as an analogue of *Banisteriopsis caapi* to create an *ad hoc* Ayahuasca, the South American mixture of phytoindoles including DMT with β -carbolines. However, Harmal has distinct aspects from caapi and a unique entheogenic signature. Some scholars identify Harmal with the entheogenic haoma of pre-Zoroastrian Persian religions.^[9]

A red dye, "Turkey Red,"^[3] from the seeds is often used in Western Asia to dye carpets.^[10] It is also used to dye wool.^[3] When the seeds are extracted with water, a yellow fluorescent dye is obtained.^[11] If they are extracted with alcohol, a red dye is obtained.^[11] The stems, roots and seeds can be used to make inks, stains and tattoos.^[12]

Medicinal uses

Peganum harmala is used as an analgesic and antiinflammatory agent.^[13]

In Yemen it was used to treat depression,^[14] and it has been established in the laboratory that harmaline, an active ingredient in *Peganum harmala*, is a central nervous system stimulant and a "reversible inhibitor of MAO-A (RIMA),"^[15] a category of antidepressant.

Smoke from the seeds kills algae, bacteria, intestinal parasites and molds.^[10] *Peganum harmala* has "antibacterial activity,"^[16] including antibacterial activity against drug-resistant bacteria.^[17]

The "root is applied to kill lice" and when burned, the seeds kill insects.^[18] It also inhibits the reproduction of the *Tribolium castaneum* beetle.^[19]

It is also used as an anthelmintic (to expel parasitic worms).^[18] Reportedly the ancient Greeks used powdered *Peganum harmala* seeds to get rid of tapeworms and to treat recurring fevers (possibly malaria).^[20]

Peganum harmala is an abortifacient,^[21] and, in large quantities, it can reduce spermatogenesis and male fertility in rats.^[22]



Peganum harmala seeds as sold in a Middle Eastern foods grocery store



Peganum harmala

Antiprotozoal

It is fairly effective against protozoa including malaria. There is evidence that it may be effective against drug-resistant protozoa.^[17] It is given in a decoction for laryngitis.^[18]

One of the compounds found in *Peganum harmala*, vasicine (peganine) has been found to be safe and effective against *Leishmania donovani*, a protozoan parasite that can cause potentially "fatal visceral leishmaniasis."^[23] "Peganine hydrochloride dihydrate, besides being safe, was found to induce apoptosis in both the stages of *L. donovani* via loss of mitochondrial transmembrane potential."^[24]

Another alkaloid harmine found in *Peganum harmala*, ". . .because of its appreciable efficacy in destroying intracellular parasites as well as non-hepatotoxic and non-nephrotoxic nature, harmine, in the vesicular forms, may be considered for clinical application in humans."^[25]

One study using the medicinal plant *Peganum harmala* showed it to have a lifesaving effect on cattle infected with the protozoal East Coast fever,^[26] which can be 100% fatal and killed 1.1 million cattle in Africa in 1992.

Anticancer

"The beta-carboline alkaloids present in medicinal plants, such as *Peganum harmala* and *Eurycoma longifolia*, have recently drawn attention due to their antitumor activities. Further mechanistic studies indicate that beta-carboline derivatives inhibit DNA topoisomerases and interfere with DNA synthesis."^[27]

Peganum harmala has antioxidant and antimutagenic properties.^[28]

Peganum harmala as well as harmine exhibit cytotoxicity with regards to HL60 and K562 leukemia cell lines.^[29] Ground *Peganum harmala* seeds have been used occasionally to treat skin cancer and subcutaneous cancers traditionally in Morocco.^[30] Seed extracts also show effectiveness against various tumor cell lines both *in vitro* and *in vivo*.^[30]

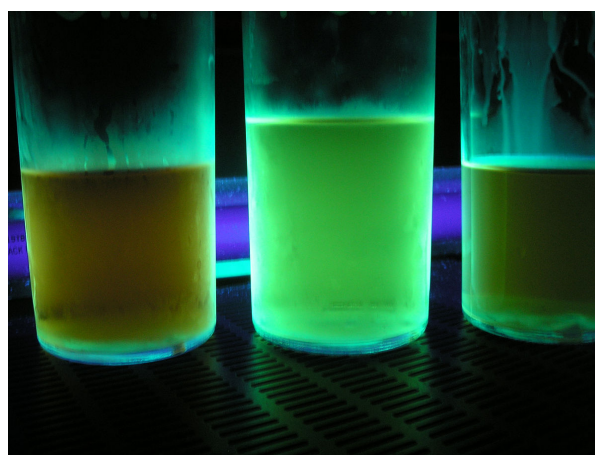
Alkaloids

The active alkaloids of Harmal seeds are the MAOI-A (monoamine oxidase inhibitor A) compounds:

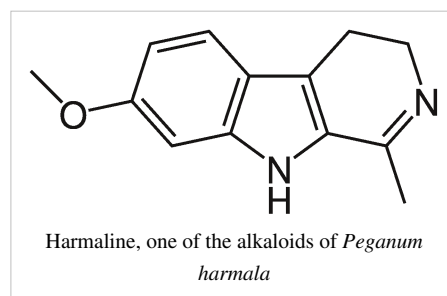
- Harmane, 0.16%^[31]
- Harmine, 0.44%^[32] –1.84%^[31] –4.3%^[33]
- Harmaline, 0.25%^[31] –0.79%^[32] –5.6%^[33]
- Harmalol, 0.6%^[33] –3.90%^[31]
- Tetrahydroharmine, 0.1%^[33]

Total harmala alkaloids were at least 5.9% per dried weight, in one study.^[31]

- Vasicine (peganine),^[21] 0.25%^[32]



Harmine, a compound present in *Peganum harmala*, fluoresces under ultraviolet light



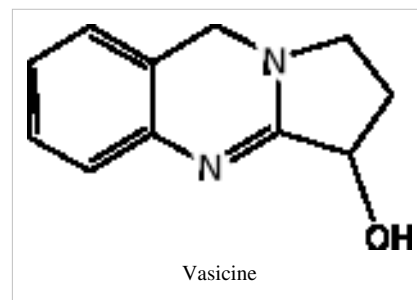
- Vasicinone,^[21] 0.0007%^[32]

The stems of the plant contain about 0.36% alkaloids, the leaves about 0.52%,^[34] and the roots up to 2.5%.^[35]

Harmine and harmaline are reversible inhibitors of MAO-A (RIMA).^[15]

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Further reading

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External links

- Erowid Syrian Rue Vault (http://www.erowid.org/plants/syrian_rue/syrian_rue.shtml)
- Peganum harmala* (Plants for a Future Database) (<http://www.pfaf.org/database/plants.php?Peganum+harmala>)
- Aspand (*Peganum harmala* Seeds Used in Religious Rite) (<http://www.luckymojo.com/aspand.html>)
- Peganum harmala* List of Chemicals (Dr. Duke's Databases) (<http://sun.ars-grin.gov:8080/npgspub/xsql/duke/plantdisp.xsql?taxon=706>)
- Peganum harmala* (FAO — Food and Agriculture Organization of the United Nations) (http://193.43.36.103/ag/AGP/agpc/doc/Gbase/new_species/pegahar.htm)

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