RESEARCH PROGRAM ON Livestock

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Science for resilient livelihoods in dry areas

RESILIENT AGROSILVOPASTORAL SYSTEMS

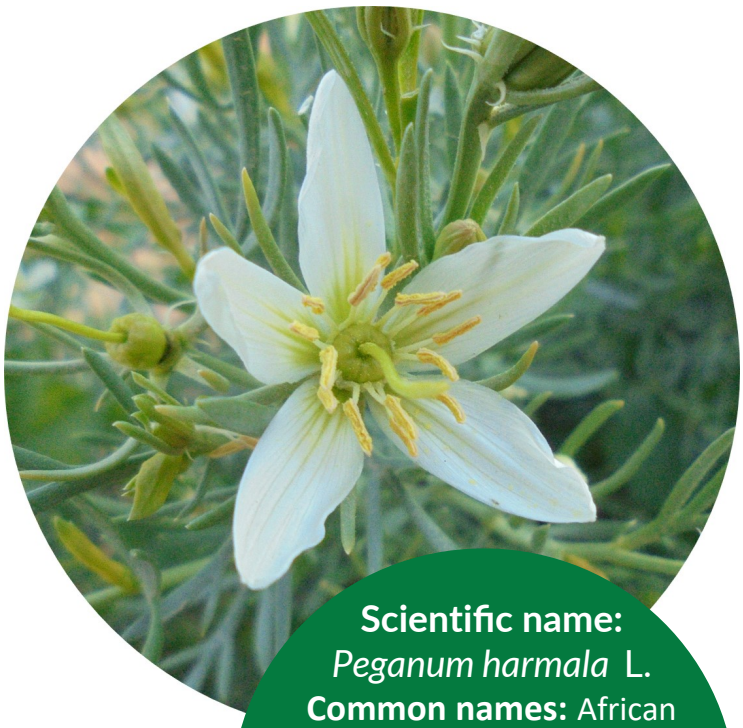
CGIAR RESEARCH PROGRAM ON LIVESTOCK

Aims to increase the productivity of livestock agri-food systems in sustainable ways across the developing world.

Managing agrosilvopastoral systems: controlling invasive perennial species

Peganum harmala L.: noxious invasive species, toxic to livestock but medicinally important

Peganum harmala, commonly known as African rue, Syrian rue, and wild rue is an herbaceous perennial flowering plant that is widely distributed in Central Asia, North Africa, and the Middle East. This plant, known as harmal in North Africa, belongs to the Nitrariaceae family. It is nitratophilous, occurs mainly in dry areas and saline waste areas, but is also common along roadsides, in degraded pastures, and near camping sites, field edges, and watering facilities. It prefers disturbed environments.



Scientific name: *Peganum harmala* L.
Common names: African rue, Syrian rue, wild rue, harmal, (حرمل)
Location: Native to the desert regions of northern Africa, Asia, & southern and eastern Europe

Benefits:

- Extremely drought tolerant and exhibits "drought evader" growth characteristics
- It has been used in traditional medicine
- Rapid vegetative growth
- Can grow in many soil types
- Used as an indicator species for degraded rangelands due to overgrazing or from agricultural activities
- Commonly used as an insecticide
- Contains β-carbolines such as harmaline, harmine, and the quinazoline derivatives vasicinone and deoxyvasicinone.

It can grow in many soil types, including alkaline soils and those with high salinity. It is persistent, difficult to control, and can become the dominant plant in dry rangelands. It is also the ruderal plant par excellence of the desert. Is a hemicryptophyte herb or shrub erect and stiff-stemmed, growing 30–50 cm tall, contrasting green, glaucous with woody base, and a strong characteristic smell. Its strong pivotal root system is thick and robust and has a branching taproot (to depth 180 cm). Leaves are alternate, dissected, and 2–5 cm long. Flowers are white, solitary, five-petaled, and about 2.5 cm in diameter. Round seed capsules carry more than 50 seeds. The long, slightly curved angular seeds are narrowly triangular in cross section. Their surfaces are rough and dull, with a honeycomb or bubbled texture. Round seed capsules carry more than 50 seeds.

Peganum harmala spreading over a degraded rangeland in the Syrian Badia

Peganum harmala fruit

Peganum harmala seeds

The long, slightly curved angular seeds are narrowly triangular in cross section. Their surfaces are rough and dull, with a honeycomb or bubbled texture. The seed color varies from black to brown to red, likely depending on the amount of processing. *Peganum harmala* is listed as a noxious weed, is extremely drought tolerant, and undergoes robust and rapid vegetative growth when soil moisture is available. This weed is extremely toxic to cattle, sheep, and humans; it contains at least four poisonous alkaloids. The seeds and fruit are the most toxic, followed by young leaves and mature leaves. Most parts of the plant contain allelopathic chemicals that reduce the growth of surrounding native plants. Animals typically avoid eating *Peganum harmala* because of its bad taste and smell. It is occasionally grazed in autumn–winter when dry, but poisoning may still occur. It is a definite indication of severe and often complete range degradation and recent human settlement. Since this plant is very unpalatable and toxic, heavily infested rangelands lose much of their forage value. *Peganum harmala* is a source of several substances used in medicine including harmine, a sedative prescribed to improve the mood of patients. It is largely used in traditional medicine as an emmenagogue and an abortifacient agent in North Africa and the Middle East. Medicinally, the fruits and seeds have digestive, diuretic, hallucinogenic, hypnotic, antipyretic, antispasmodic, nauseant, emetic, and uterine stimulant activities.

Establishment and Management

Peganum harmala is a wild-growing herb; it dies back to the roots during winter and initiates new annual growth in mid-to-late March. Flower production begins in mid-April, and fruit maturation occurs in June and July. After spring growth and flowering, plants may become senescent (old-looking) and die back to the base as soils dry in summer.

With cooler temperatures and additional moisture later in the season, *Peganum harmala* usually undergoes a second vegetative growth phase until cold occurs in early November. Seeds are secured in a leathery fruit capsule, and each plant may produce as many as 1,000 seeds. Seeds and root fragments are readily transported by running water and may also adhere to the feet, fur, or feathers of animals. Seed longevity is probably persistent. *Peganum harmala* reproduces by seed, but new shoots and plants are also produced from adventitious buds along lateral roots. Seedlings have two elongated oval cotyledons. The first true leaves are deeply dissected into three narrow lobes. The plant quickly grows back after mowing or burning, and deep cultivation only divides and spreads the roots. Since *Peganum harmala* can regenerate from root fragments, grubbing or cultivation may actually increase the population size.

Effective Control

- Due to its bad taste and smell, *Peganum harmala* is usually avoided by livestock
- Can cause poisoning effects on livestock including loss of appetite and coordination.
- Mowing causes the plant to resprout and spread
- Fire is not an effective control method as plants grow back rapidly after burning
- Early detection and plant removal are critical for preventing *Peganum harmala* establishment and spread
- Use foliar active or soil active herbicides for effective control of *Peganum harmala*

Contact
Dr. Mouldi Gamoun, International Center for Agricultural Research in the Dry Areas (ICARDA). M.Gamoun@cgiar.org
Dr. Mounir Louhaichi, International Center for Agricultural Research in the Dry Areas (ICARDA). M.Louhaichi@cgiar.org

www.icarda.org

ICARDA's Rangeland Ecology and Forages unit (REF)

The REF team promotes advances in rangeland ecology and pasture management in the dry areas. This series of factsheets is dedicated to the characterization of promising range and forage species aimed at alleviating the feed gap, limiting water runoff and soil erosion, restoring degraded rangelands and maintaining a healthy ecosystem.