

PASTORAL AND AGRO-PASTORAL SYSTEMS

CGIAR RESEARCH PROGRAM ON LIVESTOCK

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

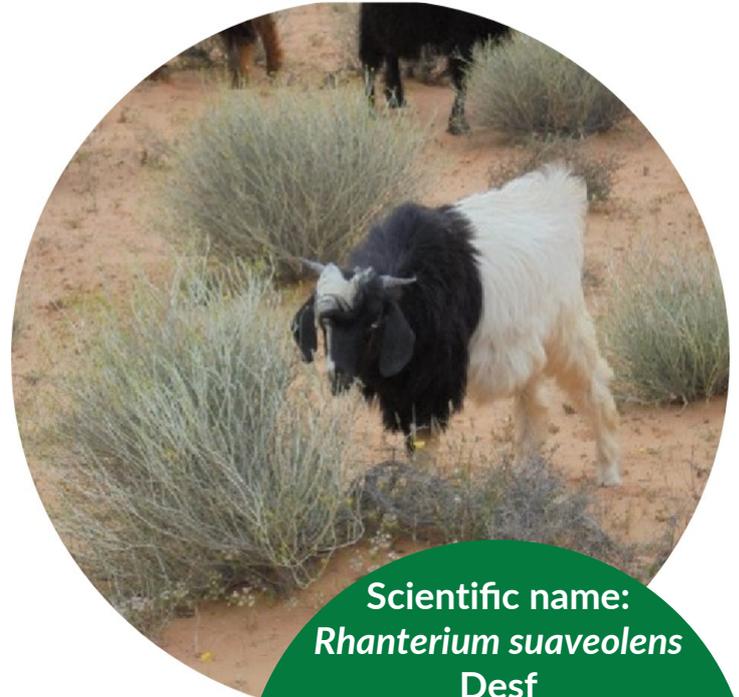
Managing rangelands: promoting native shrub species

Rhanterium suaveolens Desf: a keystone species critical to rangeland structure and functioning

Rhanterium suaveolens is a desert plant endemic to North Africa and is best developed in parts of the sandy plains of the northern Sahara characterized by deep sierozem soils. Due to their attractiveness for various human activities (grazing, clearing, and extensive cropping), the steppe formations are threatened with extinction, despite their low palatability. In arid rangelands, the production of *Rhanterium suaveolens* can represent a great part of fodder production. It is especially valuable when accompanied by annuals following good rains, and is preferentially consumed during summer grazing, when it is among the preferred destinations of many herds of sheep, goats, and camels.

Benefits:

- Critical to ecosystem structure and functioning: keystone species
- Able to tolerate sand accumulation and thereby fix drifting sand
- Tolerates multiple stress and disturbances
- Represents a great part of rangeland production
- Promotes rangeland diversity



Scientific name:
Rhanterium suaveolens
Desf
Common names:
Arfej
Locations:
North Africa &
sandy plains of the northern
Sahara

Shrub-steppe of *Rhanterium suaveolens* also plays an important ecological role; its low palatability allows it to grow better, thus improving vegetation cover and in turn fixing soil, which protects rangelands against desertification. However, wind erosion resulting from overgrazing and cultivation of *Rhanterium suaveolens* steppe has increased desertification, becoming a major problem in large areas of rangeland. *Rhanterium suaveolens* is a plant of the Asteraceae family. Known as Arfej, is a perennial shrub of 40-60 cm high tufts, highly branched and recognizable by the presence of whitish hairs. The leaves are alternate, sessile, linear, small, and toothed. The inflorescences are in capitula with ligulate tubular yellow flowers and the bracts of the involucre bent outwards.



Rhanterium suaveolens growing on sandy soil, Tataouine, Tunisia



Yellow flower of *Rhanterium suaveolens*



Goats browsing *Rhanterium suaveolens* in Southern Tunisia (March 2018)

Rhanterium suaveolens is able to protect the kidneys against acetamiprid induced nephrotoxicity. Ceramides isolated from the aerial parts are key sphingolipid metabolites, having clinical potential as therapeutics.

Establishment and management

After rainfall, *Rhanterium suaveolens* produces new leaves quickly. In a few months, the branches and newly formed leaves become vigorous. Flowering begins in April and reaches a peak in May, and can last until August depending on soil water availability. Under dry soil conditions in summer the leaves fall and the branches become naked. In times of stress, these alterations may be important and represent an adaptive strategy when evaporative demand is high. Because of the high allocation to roots, *Rhanterium suaveolens* is more likely to provide the water requirement to aerial parts of the plant. In late spring, *Rhanterium suaveolens* produces several fruits, which fall off the branches after maturity and normally remain under the shrub.

Grazing livestock can also disperse seeds (zoochory) and can limit excessive leaf production, *Rhanterium suaveolens* does not have appropriate internal mechanisms regulating its growth, and would die in summer due to excess evapotranspiration. This long-lived species can tolerate multiple stresses and disturbances to a certain degree, but is difficult to regenerate after total destruction by plowing or very heavy overgrazing.

Contact

Dr. Mounir Louhaichi, ICARDA Range Ecology and Management Research Scientist. M.Louhaichi@cgiar.org

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

The plant does not tolerate water deficit, and the germination rate of seeds is low. The germination rate at -3 bars is less than 50%, at -7 bars less than 20%, and beyond 10 bars *Rhanterium suaveolens* is unable to germinate. The optimum temperature for germination is typically higher than 20 °C. The seeds have been found to be negatively photosensitive, with their germination capacity and speed increasing in darkness. The favored seeding depth is 8 cm. Germination is strongly hampered by the presence of integumentary inhibitory substances, which need to be washed out by rains. All these characteristics slow down the seedling establishment of *Rhanterium suaveolens*, with particularly favorable conditions being necessary for germination.

Effective Management

- Difficult to regenerate after total destruction by plowing or very heavy overgrazing
- Moderate grazing during the dormant season may help reduce the plant material and excessive evapotranspiration
- The optimum temperature for germination is higher than 20 °C
- Darkness is necessary for the germination of seeds

ICARDA's Rangeland Ecology and Management Unit

ICARDA's Rangeland Ecology and Management Unit aims to address the unsustainable use of resources induced by adverse effect of climate change and an increasing demand for food and feed in the dry areas. ICARDA programs promote the enhanced quality and productivity of crop, forage, livestock, and the improved management of water resources through close cooperation with farmers and national researchers.