

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.

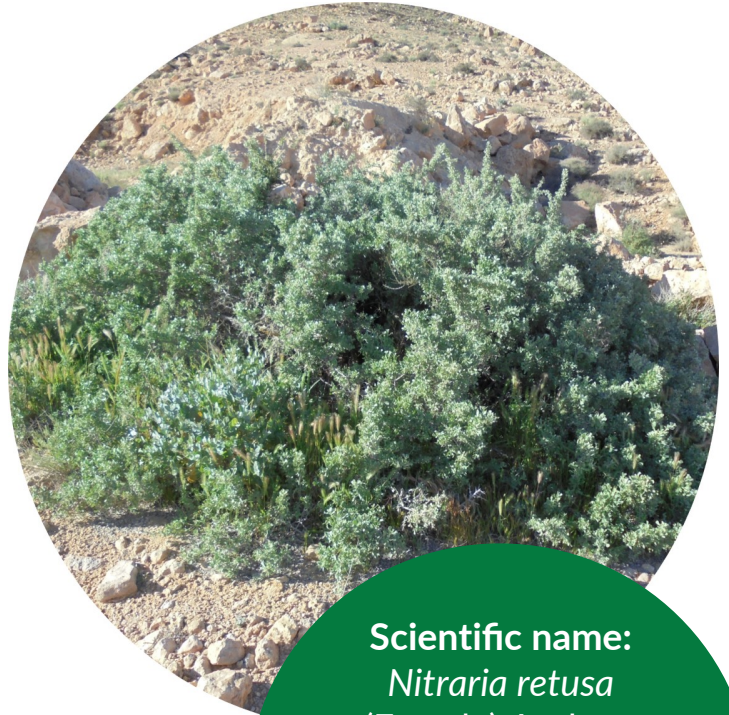
Managing rangelands: promoting an important sand stabilizer

Nitraria retusa (Forssk.) Aschers: an important sand controller for saline deserts

Nitraria retusa, also known as Ghardaq or Sahanoon, is one of the leading halophyte perennial shrubs belonging to the Nitrariaceae family where it was separated from the Zygophyllaceae family.

Benefits:

- Efficient horizontal sand traps for wind-driven sediments
- Palatable for grazing animals
- Used as a traditional medicinal plant up to 50 degrees Celsius (°C) and tolerant to frost and diseases
- Resistant to salinity and drought
- Easily adapted to the harsh environmental conditions of desert areas
- Selected for the application of tissue culture techniques in order to restore or rehabilitate damaged areas.



Scientific name:

Nitraria retusa
(Forssk.) Aschers

Common names:

Salt tree or Nitre bush

Locations:

Native to desert areas
of northern Africa

This species is a salt-tolerant and drought-resistant shrub which grows in steppes, deserts and saline soils. It has a fairly continuous range of distribution. It is Saharo-Arabian, with some trends towards Sudanian territories, and it forms almost pure stands, mainly on the periphery of marshes. It also occurs in inland saline areas, and can sometimes reach coastlines.

The plant can reach 1-2 meters in height. The shrub has many stems and leaves that are simple, petiolate, alternate, fleshy, retuse, or crenate-dentate at the apex. It produces fleshy red fruits that can be eaten by humans, and leaves and twigs that are grazed by sheep, goats, and camels.



Adult *Nitraria retusa* growing in a saline habitat, Tataouine, Tunisia.



Nitraria retusa at flowering stage.



Fruit maturation and ripening of *Nitraria retusa* from green to red color.

Overgrazing of *Nitraria* shrubs is recognized as the greatest and the most widespread threat to the coastal ecology of *Nitraria nabkha* fields. *Nitraria retusa* is an indicator of shallow water tables and their morphology and physiology favor the accumulation of wind-driven sediments. They also support the phytoremediation of polluted soil, and their wood is used as a fuel by local communities. In addition, *Nitraria retusa* is used for several traditional medicinal purposes. Its role in the prevention or treatment of diseases has been largely attributed to anti-oxidant properties associated with a wide range of bioactive molecules. The shrub also has anti-inflammatory, anti-allergy, free radical scavenging, and anti-mutagenic properties. Its sweet drupes can be eaten to treat hypertension.

Establishment and management

The effective flowering process of *Nitraria retusa* occurs during two periods: March to May and October to December. The months of ripe fruiting are June and July, most *Nitraria* leaves fall in November and December, and new leaves grow mainly during January and February.

Research by the Kuwait Institute for Scientific Research (Suleiman et al., 2008) demonstrates that in saline soil, seeds start to germinate after 15 days: at 20 °C the maximum germination was 26 percent after 25 days, while at 25 °C it was 35 percent after the same period.

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Although the seeds failed to germinate at 20 °C, at 25 °C they started to germinate after 10 days, reaching a maximum germination of 14 percent after 25 days. Exposure of *Nitraria retusa* seeds to dry heat (50 °C) for 20 days, followed by treatment with 750 parts per million (ppm), 500 ppm and 1000 ppm Gallium (GA) was effective in enhancing germination by 94, 91 and 90 percent, respectively, compared to the control (seeds were not subjected to either heat or gallium) treatment (79%). Vegetative propagation of *Nitraria retusa* can effectively re-vegetate salt-affected soils. It favors more assured establishment in the field than direct seeding or seedling transplantation. Utilizing *Nitraria retusa* in urban landscaping can also be very rewarding, in terms of the ease of establishment, aesthetic value, and cost.

Effective Management

- Defoliation processes are an adaptive mechanism for reducing the transpiring surface
- Needs relatively fresh water for germination and establishment
- It can tolerate much more saline conditions as mature plants
- Exposing seeds to dry heat (50°C) for 20 days, followed by treatment with 750 ppm, can improve germination by up to 94 percent
- Limit firewood collection.

ICARDA's Rangeland Ecology and Management Unit

ICARDA's Rangeland Ecology and Management Unit aims to address the unsustainable use of resources induced by the adverse effects 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.