



Dryland Systems Solutions

Producing More with Less

Pastoral and Agro-Pastoral Systems

Managing rangelands: promoting sustainable native shrub species

Atriplex halimus: mitigating highly saline soils.

Arid and semi-arid rangelands face increasing climate variability and grazing pressure as the world's demand for food increases. ICARDA is promoting drought-tolerant species as a crucial means of assisting rangeland rehabilitation efforts, helping to conserve rapidly-depleting water resources and maintain grazing at sustainable levels. The result: a win-win situation for rural communities and the environment.

One of the most commonly planted shrubs in the Mediterranean, *Atriplex halimus* is known for its remediation of degraded rangelands and salt-affected areas. It is commonly used as a forage plant for sheep and goats in arid areas and contributes significantly to the feed calendar when herbage availability is low. It is the only green, protein-rich forage available during late summer and early fall – when it is needed for the nourishment of pregnant and early-lactating ewes and does.

Atriplex halimus: mitigating highly saline soils

Atriplex halimus is a perennial native shrub of the Mediterranean basin with an excellent tolerance to drought, salinity, and alkaline soils. It is used as a phytoremediation plant in highly saline sodic clay loam soils. The plant is adapted to warm and cool variants in temperature and flourishes in areas receiving 150 - 500 millimeters (mm) of annual rainfall. It grows in poor and shallow soils, on steep slopes, and in depressions with loamy clay, saline, alkaline, or gypsiferous soils, as well as on heavy soils. It is a medium-sized, rounded-elliptical evergreen shrub of two meters (m) in height. Leaves are alternate, silvery, and fleshy ovate or ovate-triangular. It exhibits both male, female, and bisexual flowers. The male flowers are situated at the top of the branches and the female flowers are at the base, enabling the plant to self-reproduce. Flowering occurs from June to September and seeds mature in



Scientific name: *Atriplex halimus* L., spp. *halimus*, spp. *Schweinfurthii*

Common names: Mediterranean saltbush, Tall Orache, Sea Orache, Shrubby Saltbush.

Location: Arid Areas of the Mediterranean and Middle East

November-December. Seeds are black, enclosed by hard remnants of the flower (bracteoles), and further covered by a rounded flat green outer covering, also known as a utricle, which becomes brown when dried.

Atriplex halimus benefits:

- Tolerant to drought, salinity, and alkaline soils
- Good plant for phytoremediation of highly saline soils
- Self-reproduces
- Can grow in shallow soils, on steep slopes, and in depressions
- Can grow in various soil types
- Produces a lot of seed after two growing seasons

Seeds of *Atriplex halimus*Six-months old *Atriplex halimus*One-year old *Atriplex halimus* at Al Karama station, Jordan

Establishment and management

Atriplex halimus is the most planted native species in the Mediterranean region and is established by either direct seeding or containerized seedlings, depending on the distribution and amount of rainfall. In areas receiving 150-250 mm of annual rainfall, direct seeding in wide contour furrows or strips is recommended. Contour furrows or strips should be 50-100 Centimeters in width. In areas with low and erratic rainfall receiving 100-150 mm annually, containerized seedlings of five to six months should be transplanted. For vigorous growth it is recommended to transplant into contour ridges or bunds. They assist in harvesting and catching water for greater plant growth. Significant amounts of seed are produced after two growing seasons, following establishment. Seeds are dropped around the mother plants and germinate immediately after good rainfall. With enough water, these small seedlings can grow into mature plants further promoting self-regeneration.

The seeds are usually collected by manual or mechanical stripping of flower remnants in December when seeds are ripe and are not as susceptible to shattering. To produce high quality seeds they must be cleaned, dried, treated with fungicides, and stored under dry and well-aerated conditions. Successful seed germination is relatively moderate at 60 percent, which can be enhanced substantially by washing the seeds under running tap water for 10-12 hours. The weight of 1,000 seeds is 0.76g.

Effective maintenance:

- Flowers from June to September and seed mature in November-December
- Direct seed in wide contour strips (150-250 mm rainfall)
- Transplant 5-6 month containerized seedlings (100-150 mm rainfall)
- Seeds should be cleaned, dried, and treated with fungicides

Rangeland plant factsheets:

This series of flyers is designed to build awareness of sustainable rangeland species among extension workers and those working in the agricultural research and policy sector.

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.



RESEARCH
PROGRAM ON
Dryland Systems



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