

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: promoting halothyctic drought tolerant shrub species

Atriplex mollis Desf.: mitigating highly saline soils

Many arid and semi-arid regions in the world have soils and water resources that are too saline for most common conventional crop and forage systems. The distribution of the genus *Atriplex* in arid and semi-arid areas and its abiotic stress tolerance combined with the utility of *Atriplex* species for restoration, remediation, and forage for livestock have helped these plants to rank among the most widely studied native stress-tolerant species.

Benefits:

- Easy and quick to establish
- Potential fodder plant for use in reclamation of saline areas
- Grows in semi-deserts and dry steppes, adapted to sand and dunes
- Adapted to saline-alkaline soils and extremely arid habitats
- Used for soil conservation purposes
- Has medicinal properties
- Good livestock feed due to its ability to regenerate after winter cutting



Scientific name:
Atriplex mollis Desf.

Common names:
(الرغل اللين، القطف اللين)

Locations:
Northern Africa &
Southeastern Europe

Atriplex mollis is one of the species especially recommended for arid zone restoration projects, with its use associated with improving physical characteristics of soil and providing environmental protection by controlling runoff and reducing soil erosion on slopes. *A. mollis* plant litter can modify the topsoil salinity, along with other soil properties such as infiltration. In other areas, this species may also be used for wildfire prevention purposes, with the high salt concentration found in its leaves increasing their moisture content, makes it behave as a fire retardant in the event of wildfire.

Atriplex mollis is a highly palatable, highly salt-tolerant plant species, with height of 60–120 cm. It predominantly



Woody twigs of *Atriplex mollis* with leaves and flowers at the top



Atriplex mollis at flowering stage, Southern Tunisia



Atriplex mollis at seed maturity stage

grows on sandy soils where a high water-table is present. The plant lowers its excessive salt levels by excreting salt into inflated vesicular hairs. It is also an ornamental species owing to its pink-reddish bladdery fruiting bracts assembled in clustered panicles on the upper part of the shrub. It has been planted on abandoned land for rehabilitation or livestock feeding purposes.

Due to its ability to tolerate low moisture levels, its rain- and water-use efficiencies increase productivity 3–5 times compared to other species. This species can be established on non-farming land (steep slopes, saline land, dunes, and stony, rocky, and shallow soils), showing its adaptability to harsh conditions.

Its fodder has a high nitrogen concentration and is stable throughout the annual cycle, maintaining its greenness throughout most of the year. It produces 2.5–20 t of dry matter per hectare per year and it is available most of the year. For maximum utilization, its potential is fully realized when supplementing it with other types of feed like barley grain, barley straw, or spineless cactus so that the animals can obtain energy from the hay and grain, and protein and minerals from *A. mollis*.

Establishment and Management

Atriplex mollis grows and establishes well in environments receiving less than 200 mm/year of rainfall and in salt-affected and potentially nitrogen- and phosphorus-poor soils. The maximum absolute temperature for its maximum growth is in the range of 38–45°C, and minimum absolute temperature is 8.6–11.5°C.

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This species also establishes from cuttings, seedlings, or by direct seeding. The establishment of *A. mollis* from cuttings planted directly in the field is usually not reliable, but cuttings survive well in the nursery and, once established, may even be used for propagating desirable clones. Seedlings are the most reliable method of ensuring establishment. Seeds may need pretreatment such as soaking in water or removing the bracteoles in order to break dormancy.

Generally, the recommended method of grazing *A. mollis* is to leave the newly planted shrubs for 18–20 months before light grazing. Grazing of this species usually begins at the end of autumn, when the traditional annual pasture and stubble (crop residues) are at their lowest nutritional level. To protect carbohydrates stored in stems and favor satisfactory regrowth in the spring, fall browsing should not be intensive, as this depletes these reserves and reduces regrowth in the onset of the following growing season. The flowering stage is the best browsing time during the growth stage, as this ensures successful recovery.

Effective Management

- Seeds should be treated to remove physiological dormancy, e.g. removing the bracteoles
- Seeds should be cleaned, dried, and treated with fungicides
- Grazing in the first year of growth is not recommended
- Store seeds dry, cold, and not more than 8–10 months

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.