RESEARCH PROGRAM ON Livestock

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ICARDA

Science for resilient livelihoods in dry areas

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

Salsola vermiculata L.: Highly palatable shrub for silvopasture in arid and semi-arid ecosystems.

Climate change and an increasing demand for food are severely affecting the already limited resources in arid rangelands. Through better management of natural resources, ICARDA's programs are designed to improve the livelihoods of those living in these areas. The aim is to ensure food availability and alleviate poverty by promoting the use of stress-tolerant trees and shrubs which can lead to sustainable increases in productivity.

Tolerant of low annual rainfall and poor soils, *Salsola vermiculata* has become an important perennial species in arid and semi-arid areas of the Mediterranean, the Middle East, and North Africa.

Benefits:

- Drought tolerant
- Seeds germinate rapidly with adequate soil moisture and cool temperatures
- Can tolerate moderate salinity
- Can grow in soils with poor charateristics, including desert and silt soils
- High palatability
- Good source of protein for livestock
- Prolific seed producer

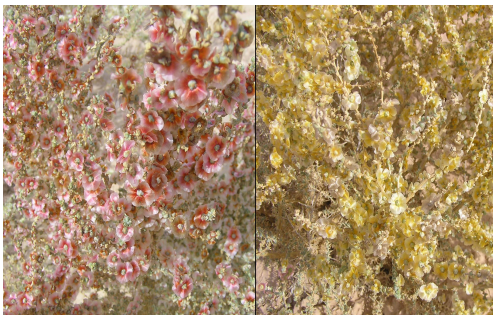
Scientific name: *Salsola vermiculata* L.
Common names: Mediterranean Saltwort, Damascus Saltwort, Wormleaf Salsola, Barrilla
Locations: Arid and semi-arid areas of the Mediterranean, the Middle East, and Northern Africa.

Known for its high palatability and nutritional value, this plant is used in this region to improve vegetation cover and provide suitable grazing for livestock.

This evergreen can be described as as branched shrub, 20 to 100 cm high, woody at the base, with slender and erect stems. With a deep tap root and woody crown, this shrub is able to grow many new buds originating at the bottom of the plant, close to the soil surface. Leaves are coated with a dense layer of minute hairs.

Salsola vermiculata seeds are small and can easily reach long distances when spread by the wind. In addition, unlike most plants adapted to arid conditions, this species is capable of self-sowing – an extremely useful feature when the plant is used for the rehabilitation of rangelands with limited resources. However, under optimal rainfall and temperature conditions, saltworts can spread widely and become very invasive in areas outside the Mediterranean basin.

One year seedling of *Salsola vermiculata*



Mature plants of *Salsola vermiculata* in flowering stage (left) pink flower and (right) yellow flower

Rehabilitated rangeland site using *Salsola vermiculata* (Syrian Badia)

This shrub is well-adapted to a wide range of soils, including silt soils, alluvial plains in the steppe, desert, and salty habitats. Drought-tolerant, it can grow in areas with an annual precipitation of around 100 to 200 mm, typical of temperate and subtropical regions.

Establishment and management

In areas with a yearly rainfall above 150 mm, *Salsola vermiculata* can be directly seeded in contour furrows about 50 to 100 cm wide. In this case, soil scarification is recommended as it significantly improves seed establishment by developing small pockets that can trap water to be used during the early stages of germination. In drier areas with an annual and erratic rainfall below 150 mm, it is usually safer to transplant 5–6 month old seedlings, produced using local micro-water harvesting techniques. It is important to note that this method can be more costly than direct seeding.

As low soil moisture may restrict plant establishment, the best time to sow saltwort is after the first rains, which occur typically during autumn or early winter. Under these conditions, seeds germinate quickly as long as they still have cool temperatures around 15°C and low salinity levels. Germination rates can reach over 70% without any treatment.

Seed collection can start from established plants once seeds have ripened, but before they disperse from the plant, which usually occurs in December. If kept at room temperature, these seeds have a limited life span, and lose viability within 6 to 9 months.

This can be a limiting factor for long-term and extensive rehabilitation projects, but storage in refrigerated conditions below 0°C can significantly extend the longevity of the seeds.

Considered a valuable pasture for ruminants, this nutritious plant is mainly a good source of protein, with levels ranging from 7.1% in the winter and 16.4% in the spring. In addition, this crop also provides reasonable energy levels, with total digestible nutrients varying from 44% in the winter to 49% in the spring. Ideal for livestock feeding, *Salsola vermiculata* is capable of producing many side shoots after direct grazing or cutting, but excessive use can threaten or even eliminate its presence from the pasture.

Effective Management

- Under appropriate conditions, this plant can be seeded directly, but in dry regions it is recommended to use 5–6 month old seedlingse
- Sowing should be done in autumn or early winter
- Soil scarification improves plant establishment
- Seed collection should be done in December
- Excessive grazing or cutting must be avoided

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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.