RESEARCH PROGRAM ON Livestock

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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 sustainable legume species

Hedysarum coronarium L.: a biennial herbaceous legume used for forage in the Mediterranean basin.

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.

Sulla (*Hedysarum coronarium* L.) is deep rooted and drought resistant. This species native to the Mediterranean is effective in biological fixation of sloping land, and improving organo-mineral soil fertility and yields and protein value of cereals. It is a biennial or short-lived perennial with semi-erect to erect growth, height of 0.3–2 m, strongly rooted, with root depth exceeding 2 m and numerous secondary roots.

Benefits:

- Ideal for short pasture rotations in both mixed farming and livestock production systems
- Improves soil fertility and erosion control
- Excellent forage with high protein content
- Highly palatable, nutritious, and productive forage
- Multipurpose species with melliferous properties

Scientific name:
***Hedysarum coronarium* L.**
Common names:
Sulla, Italian sainfoin, Spanish sainfoin, French honeysuckle, cock's-head
Locations:
Tunisia, Algeria, Morocco, Malta, southern Italy & Spain

Flowering begins in early spring, and the melliferous inflorescences are in racemes with up to 35 florets, ranging from dark red to purple pink. It prefers well drained, medium to fine-textured soils. Performes well in slightly acid to alkaline soils (pH 5.5–8.5), sandy loams, and loams to clays. Sulla is a highly palatable, nutritious, and productive forage for ruminants. It is cultivated throughout the Mediterranean basin, where it is extensively grown as a forage crop for grazing, hay, or silage. The species plays a key role in cereal-based systems of semi-arid regions, particularly in organic and low-input agriculture, and is commonly used to enhance the productivity and sustainability of farming systems (e.g. as a nitrogen supply and to maintain soil organic matter). One of the main values of sulla is its water requirement coupled to its ability to provide large amounts of palatable forage in steppe areas.

Biological fixation of sloping land using sulla, Zaghouan, Tunisia

Sulla mellifluous inflorescences

Sheep grazing sulla, Mateur, Tunisia

There has been growing interest in sulla due to its excellent adaptability to marginal and drought-prone environments, versatility as a good quality and high-protein forage crop, and its moderate levels of condensed tannins beneficial to ruminant production. Sulla is also a melliferous plant (supporting 15 hives/ha).

Establishment and management

A well-cultivated, uniform, and weed-free seed bed is required for good establishment. Plowing to depths of 20–25 cm is indicated or passage of a chisel plow to 30–35 cm. Usually sow from the end of September and avoid seeding in December. Sow 25–40 kg/ha of seed in pods and 10–20 kg/ha of husked seeds. The use of manure in cultivation of sulla is beneficial for its establishment and development, but not advisable for economic reasons and because sulla is a pioneer plant that tolerates poor soil. Seeding is generally superficial at 1–2 cm deep. With its high dry matter yields and ease of cutting, sulla is suitable for green forage, grazing, or hay/silage. Sulla should be cut at early flowering as the stems can become woody after flowering and quality will be much lower despite higher yields. Sulla makes good silage. Including large amounts of sulla in silage (e.g. 75% and above) increases the level of lactic acid, resulting in lower pH and higher quality silage. Sulla has a high water-soluble carbohydrate content, which enhances silage quality. However, fresh sulla has a dry matter (DM) content of about 25% that can hinder the ensiling process, and wilting may be necessary. Good fermentation is achieved when sulla is ensiled at a DM content of at least 35% at the early bud stage, and fermentation is also acceptable when ensiled at 25% DM at the early flowering stage.

For hay, sulla should be cut before peak flowering, preferably around 10% flowering. Like other legumes, it tends to shed leaves during hay making but leaf retention is better than for alfalfa. Sulla retains most leaf if conditioned and raked carefully. In the establishment year, sulla should be lightly grazed to ensure good root development and plant numbers for the second year. Sulla does not tolerate heavy grazing as the relatively high soft crowns and succulent stems are preferentially grazed and easily damaged. In its first year, sulla gives about 20–30 t of green fodder/ha and 30–50 t in the second year. Sulla must be rotationally grazed. It should be grazed when it reaches about 40–50 cm in height and should not be grazed lower than 15 cm because regrowth is faster from the leaf axils than from crowns. Sulla is best managed by cutting for forage/silage or strip grazing. When grazing, it is advisable to move large numbers of stock onto small areas for rapid grazing and promptly remove stock when the desired grazing height is achieved.

Effective Management

- Prefers slightly acid to alkaline soils
- Superficial seeding of 1–2 cm deep
- Good fermentation when ensiled at DM content of at least 35%
- Should be grazed when height is 40–50 cm
- For hay production, sulla should be cut before peak flowering (around 10%)
- For silage production, sulla should have at least 35% dry matter

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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.

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