

## CGIAR Research Program on Livestock

*Aims to increase the productivity of livestock agri-food systems in sustainable ways across the developing world.*

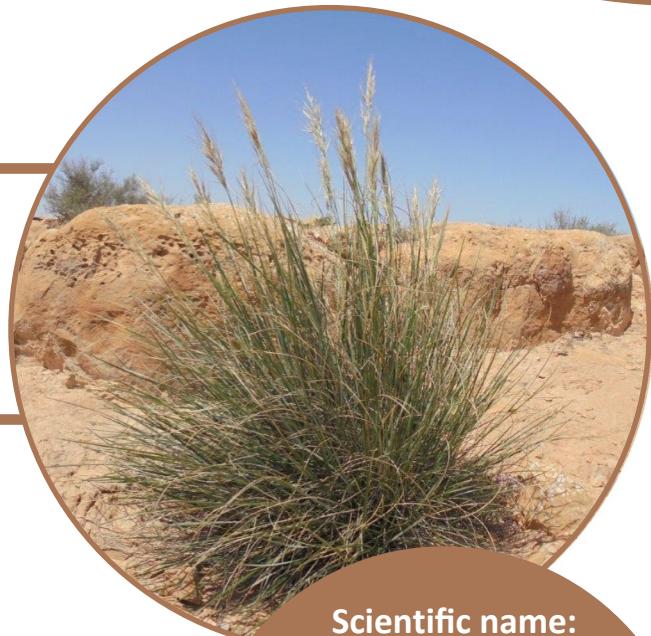
# Managing rangelands: promoting native grass species

### ***Stipa tenacissima*: nurse species to initiate the process of ecosystem restoration**

*Stipa tenacissima* is a long-lived perennial grass that dominates the Mediterranean Basin steppe, covering more than 2.8 million ha and growing in almost all geomorphological units. The plant seems to prefer calcareous soils that are shallow and permeable with a very sandy texture. It does not adapt well to soils with gypsum, salt, clay, or loam content. Besides this, it is distributed within a wide range of bioclimates with great tolerance to temperature variations. Its optimal bioclimatic stages are arid superior and semi-arid lower.

### Benefits:

- Forms a key component of arid ecosystem sustainability
- Holds high economic value
- Is highly drought resistant
- Facilitates the establishment of biological soil crusts and vascular plants
- Used in restoration programs



**Scientific name:**  
*Stipa tenacissima* L.

**Common names:**  
Esparto, halfa

**Location:**  
North Africa  
Southern and western  
Mediterranean  
Basin.

*Stipa tenacissima* belongs to the Poaceae family and its common name is Esparto or Halfa. It is a rhizomatous tussock grass with a shallow root system, reaching a maximum rooting depth of 0.5 m.

*Stipa tenacissima* grows in densely circular tufts, often wider than 50 cm in diameter, and has narrow, long leaves (up to 100 cm long and 2-3 mm wide). The leaves are thin, ribbon-like, smooth, shiny, solid, and covered at the base with a hairy sheath, becoming folded along their long axes and curling up during drought to avoid evapotranspiration. Inflorescences are dense, narrow, branched, geniculate, and feathery below the bend.

*Stipa tenacissima* has an overall low palatability to sheep and goats, but has a high economic value as a raw material for paper, cordage and baskets.



*Stipa tenacissima* spikes*Stipa tenacissima* plant community  
(Tataouine, Tunisia, spring 2017)*Stipa tenacissima* plant community  
(high plateau of Oujda, Morocco)

Certain characteristics of *Stipa tenacissima*, like its resistance to long drought periods, the protection of soil against erosion, its resprouting ability, and its ecological amplitude (soils, climates, slopes) make it a very valuable species with a view to using it in restoration programs.

## Establishment and management

Growing of *Stipa tenacissima* requires two seasons (fall and spring) to complete the plant's life cycle, while the other two seasons (winter and summer) are latent. Tufts are in full vegetative phase in fall, when most leaves are mature, and the younger ones start to develop and lengthen. In winter the growth halts due to cold and most leaves remain young. In spring, the season of inflorescence, flowering and fruiting generally occur from May to June. Seeds disperse by wind (anemochory) before the summer starts. The weight of caryopsis (the seeds dispersed from the floret) is about 10 mg.

Requirements for germination and establishment of *Stipa tenacissima* are dependent on environmental and biotic factors. Most significantly, water availability and temperature can promote or inhibit the germination process. Germination can only occur with the first autumn rains and when soil temperatures have dropped below 20 °C.

Regardless of the environmental conditions, seedling emergence will be limited by the survival of seeds and the available seeds in the soil.

Protection of *Stipa tenacissima* steppes promotes the establishment of a seed bank and can help to restore ecosystems and to improve their long-term resilience to environmental variability and change. Due to the resources accumulated by *Stipa tenacissima*, the establishment of biological soil crusts and vascular plants can be facilitated. On the other hand, the use of local seed provenance of *Stipa tenacissima* is generally recognized as the best practice in biodiversity conservation and restoration. Drought is a major obstacle to its regeneration, but when conditions are favorable, the species adapts a strategy to germinate quickly.

### Effective Management

- Sustainability can be achieved by means of the rational use of *Stipa tenacissima* steppes
- Temperatures between 10 °C and 20 °C are optimal for germination
- The germination rate increases with decreasing water stress
- An increase in salinity reduces the rate of germination

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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.