

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.

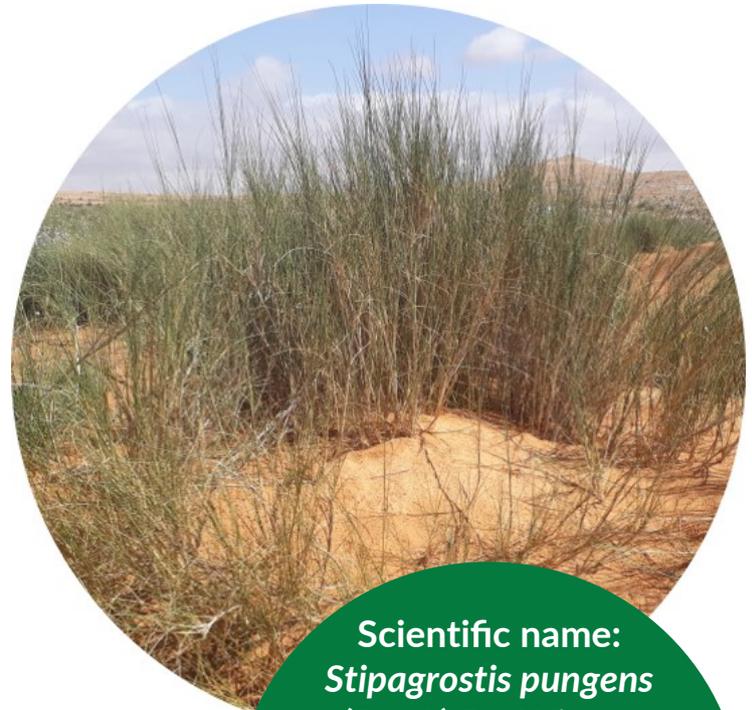
Managing rangelands: promoting and establishing sand dune fixing species

Stipagrostis pungens (Desf.) De Winter:
a xerophytic quicksand- and dune-fixing
species adapted to sandy deserts

Stipagrostis pungens (formerly *Aristida pungens*) is a nebka-forming grass, widely distributed through North Africa and the Sahara on sand dunes. It is extremely drought-resistant and grows in areas with as little as 70 mm of rainfall per year. This well-known and important grazing species is found on semi-stabilized dunes in desert areas.

Benefits:

- Psammophilic perennial plant
- Survives well in sandy deserts and drought habitats
- An important forage, especially during periods of drought
- Stabilizes sandy soil and alleviates desertification
- Enhances the restoration of degraded rangelands



Scientific name:
Stipagrostis pungens
(Desf.) De Winter

Common names:
Sbatt, Drinn

Locations:
Arid regions in North Africa,
tropical West Africa
and West Asia

Stipagrostis pungens is a perennial grass species which belongs to the Poaceae family. It is usually found with several erect culms, grows up to 1.5 m in height, and forms substantial tufts. It is a tall stiff glabrous grass with pungent leaves, and a C4 grass with sclerophyllous, spine-tipped, inrolled leaves, with sunken stomata. The root system extends laterally for a radius of 20 m or more. The roots are covered throughout their length by a sandy sheath, which is penetrated by the root hairs that occur throughout the entire length of the sheath. The piliferous layer of the root cap acts as a mucilage-secreting gland, the action of the mucilage easing the passage of the root tip through the grains of sand. The mucilage has high absorptive properties, concentrating any soil moisture around the sheath, from which it may be taken up by the root hairs.



Stipagrostis pungens growing on the sand dunes, Tataouine, Tunisia



Stipagrostis pungens inflorescences



Sheep grazing *Stipagrostis pungens*, Medenine, Tunisia

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Stipagrostis pungens efficiently obtains water from arid soils, in which the permanent underground water supply lies at a very great depth, and exhibits what may be regarded as a well-marked adaptation to intensely xerophytic conditions. It is almost certainly this adaptation which has enabled the plant to assume a dominant place in the vegetation of sandy deserts. It is an important forage, especially during periods of drought, due to the resistance of the plant; and is appreciated by camels, and to a lesser degree, small ruminants. Culms are woven into mats and baskets, or used for roofing to cover precarious dwellings. *Stipagrostis pungens* is a spontaneous plant used in popular medicine, to treat constipation, stomach ache, indigestion, and wound cicatrization. Aerial parts of this plant have been used for investigating antimicrobial activity. *Stipagrostis pungens* also have a potential role to play in preventing and mitigating the effects of droughts, improving soil fixation, and enhancing the restoration of vegetation and the recuperation of rangelands.

Establishment and management

Vegetal growth mostly takes place in spring, and the reproduction stage extends from late spring to June. It grows where the sand is mobile and adapted to a number of constraints in order to survive.

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It can germinate under highly unfavorable soil moisture conditions (low quantity and or transience), and at depths which may alter greatly. Once it has germinated, a seedling must, in turn, be able to grow sufficiently quickly to become established. Seedlings may have a very fast rate of initial root elongation to compensate for the rapid drainage of water, and remain emergent above sand which tends to bury them. In consequence, the species can maintain the density of its structures after an accumulation of sand, partly through constantly renewed adventitious roots which provide it with water from reserves. Although considered psammophyte, the species tolerates the presence of gypsum in quicksand-covered substrate. The species is found in wadi beds, on sandy mantled soils, and sandy accumulations.

Effective Management

- Seed viability is around 43 months
- The optimal temperature of germination is 25 °C within three days
- The germination rate at 25°C is around 83%
- Germination was completely inhibited below 10 °C
- Well adapted to sandy and gypsum soils
- Survive under lower grazing pressure, but it cannot tolerate high and long disturbances

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.