

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 forage-grass species

Sewan grass (*Lasiurus indicus*): a promising, drought-tolerant, tussocky perennial grass suitable for pasture development in desert areas

Sewan grass (*Lasiurus indicus*) is native to dry areas of Africa, India, and Pakistan. In India, sewan rangelands occur in the low rainfall (100–150 mm) zone of Bikaner, Jaisalmer, and Barmer districts. It is estimated that there are nearly 6 million ha of sewan grass-dominated, open pasture lands in western Rajasthan.

Popularly known as the king of the desert, sewan grass is remarkably well adapted to the desert. High water-use efficiency enables this native grass to maximize production even in areas of scanty rainfall (100 mm annually) when little water is available. The crown (rhizome), in which food (starch and sucrose) is stored and protected by scaly layers, is highly compressed, which allows the plant to remain dormant for years without moisture.

Benefits:

- Drought resistant grass that can withstand excessive grazing pressure (125-350 mm)
- Found in desert regions following an isohyet of about 250 mm
- Dry forage yields are in the range of 1-3.5 t/DM/ha
- The forage contains 93% dry matter (DM), 4.6% crude protein (CP), 31% crude fiber (CF), 4.5% ash, 2% ether extracts (EE), 54% nitrogen-free extract (NFE), 72% neutral detergent fiber (NDF), and 38% acid detergent fiber (ADF)



Scientific name:
Lasiurus indicus
Henrard

Common names:
Sewan grass (Rajasthan, India),
karea/gorkha/sewan (Pakistan)

Locations:
Native to Africa, India &
Pakistan

Sewan root stocks can lie dormant for years at a stretch, despite recurring droughts, and grow as lush green grass following one or two showers during the monsoon period. Sewan grass can live up to 20 years once well established and protected from heavy grazing. It uses energy efficiently, which permits it to produce more biomass. Sewan grass is the most widely stocked grass and is fed to all domesticated animals as one of the most important sources of nutrients. The climatic conditions prevailing in the sewan rangelands zone are arid, roughly following an isohyet of about 250 mm. Sewan grass can withstand frost, high temperatures (up to 50°C), and strong winds/storms very well. Water use varied from 144 mm in a low rainfall year to 271 mm in a good rainfall year, with a mean of 201 mm. Potential transpiration varied from 203–249 mm during the growing season and soil evaporation from 27–38 mm. Water-use efficiency ranged from 13.24–20.85 kg dry matter/ha/mm. The soils of the sewan rangelands of India are generally light textured and belong to the desert type. Grass grows luxuriously on light sandy soils with a pH of 8.5. In the Thar Desert it is found on sandy plains, inter-dunal plains, low dunes, and hummocks.



Naturally grown *Lasiurus sindicus* pasture at Jaisalmer, Rajasthan



Cows browsing on *Lasiurus sindicus*



Panicle at ripening stage and caryopsis of *Lasiurus sindicus*, 1000 grains have 1.9 g weight

Silvopastoral management

A pasture of sewan grass can be established with seeds, seedlings, or root slips. A seed rate of 6–7 kg/ha is recommended for direct sowing of seed in the field by the broadcast method. Line sowing at 75–100 cm x 50–75 cm is advocated for inter-cropping and high fodder yield. For a uniform distribution of seeds, it is recommended that the seeds be mixed with wet soil in a proportion of 1:5 by volume (seed:soil). The use of seed pellets is better for direct sowing of seed. Seed pellets are prepared by mixing seed, manure, tank silt/clay, and sand in the ratio 1:1:3:1. Water is added to make the mixture homogenous and suitable for pelleting spikelets. Nursery-raised seedlings 45–60 days-old are used for transplanting. Root slips having sufficient rhizome mass are also recommended for pasture establishment. About 16,000–18,000 root slips are required for 1 ha. Sewan grass can be used for direct grazing and cut-and-carry systems. A 30-day cutting interval at a height of 15 cm gives the best dry matter yields. During the establishment year, the grass is harvested once at a height of 10–15 cm. From the second year onward, it may be harvested two to three times depending on the rainfall. The pasture may be maintained for longer by rotational grazing. In natural pastures, grass yields varied from 0.75–1.50 t/ha. The productivity of the grass can be increased to 2–4 t/ha with the application of fertilizers. In general, 40–60 kg/ha nitrogen and 20 kg/ha phosphorus is recommended for a high yield of grass. From the sown pasture at Bikaner (Rajasthan), application of 60 kg N/ha recorded a fresh forage yield of 17.75 t/ha and a dry fodder yield of 5.92 t/ha. Protein content in dry matter also increased from 8.28% to 9.17% with the application of 60 kg N/ha. During normal rainfall conditions with a plant population of 18,000–20,000 per ha, the pasture provides 2 t/ha dry fodder from July to September and 0.5–1.0 t/ha during the lean period (October to April).

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One irrigation (by sprinkler) of 45 mm a month can provide a good quantity of fodder from October to April. The response to irrigation of sewan grass is minimal during the winter months from December to February. The addition of 10 kg N/ha during every other irrigation increases the efficiency of water use and the dry matter yield from 4–5 t/ha, even in the lean period. Low yields and quality of sewan pasture can also be improved by annual seeding of companion legumes, such as *Clitoria ternatea* or *Stylosanthes hamata*. Ruminants use dry matter and organic matter of grass hays more efficiently than horses, but CP and NFE are digested equally well by horses and ruminants. Sewan grass hay is less digestible than buffel grass hay (*Cenchrus ciliaris*) because of its high lignin content (4–8% DM) and low nitrogen level (5–10% DM). Sewan grass hay cannot be used as sole source of nutrients for productive livestock and should be supplemented with a concentrate mixture. This may contain locally available guar seeds or groundnut cake, mesquite pods, de-oiled rice bran, rocket oil cake, or colocynth seed cake, etc. to reach 10–12% CP in DM.

Effective Maintenance

- Established by direct seeding, seedlings, or root slips
- Planting rooted slips after a shower yield better results
- Pasture establishment from seedlings is significantly better than that from rooted slips
- During the establishment year the grass is harvested once at 10–15 cm height and from the second year onward, it may be harvested two to three times
- 40–60 kg/ha nitrogen and 20 kg/ha phosphorus is recommended for a high grass yield
- Once established it can be fed green, grazed, turned into silage, or made into hay
- The pasture may be maintained for longer through rotational grazing

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.

