



Dryland Systems Solutions

Producing More with Less

Pastoral Systems

Managing rangelands: promoting sustainable grass/forage species

Buffel Grass: A resilient, drought-tolerant forage species to alleviate feed shortages and feeding costs.

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.

One of the most drought-tolerant of the commonly sown grasses, *Cenchrus ciliaris* occurs naturally in areas with an average annual rainfall that ranges from 100 mm to approximately 1,000 mm, but most commonly between 300 and 750 mm. The grass does not survive prolonged waterlogging, particularly in the cold season, but can stand up to five days of flooding with negligible adverse effects. Losses of 15-70 percent occur after 20 days of flooding.

This species has a distributional range in areas with average annual temperatures of between 12 and 28°C, and performs best in areas with mean temperatures that exceed 5°C. Optimal growth is incremental with an increase in temperature - and is reached at 35 °C. Some varieties are better adapted to cooler environments than others. Winter survival varies with ecotype, with some surviving in temperatures of -7°C. Tops are killed by frost, but plants mostly recover with the resumption of warmer conditions. The plant is found in areas with full light and is intolerant of shade.

Buffel grass often occurs in the wild on sandy soils, but is also well adapted to deep, freely draining sandy loam, loam, clay loam, and red earth soils. It has a slow initial growth on black cracking clay soils but will grow well once established. This plant requires good fertility, particularly with respect to Nitrogen (N), Phosphorous (P), and Calcium (CA). Phosphorus levels should be over 10 mg/kg and total Nitrogen levels over 0.1 percent.



Scientific name: *Cenchrus ciliaris* L.

Common names: Buffel Grass, Foxtail Buffalo Grass, Blue Buffalo Grass (African), Foxtail Grass (English), Bloubuffelgras (South Africa), or Anjan Grass (India).

Location: Sub-humid and semi-arid tropics and subtropics. Native to many countries in Africa, Asia, and the Middle East.

The optimum soil reaction is pH 7-8, but buffel grass also grows on soils with a pH as low as 5.5. The grass is very sensitive to high levels of soil aluminum and manganese. Apart from soil depth, rooting depth is also limited by high subsoil salinity and low pH (less than 5). The plant has a deep, strong, fibrous root system that is over 2m in depth.

Buffel grass benefits:

- Drought-tolerant: ability to survive in areas with annual rainfall ranging from 100 to 1000 mm
- Ability to endure up to five days of flooding with negligible effects
- Wide distributional range: occurring in areas with average annual temperatures between 12 and 28 °C.
- Crude protein is about 9.6 percent and In Vitro Dry Matter Digestibility (IVDMD) and Crude Protein (CP) digestibility ranges from 50-60 percent.



ICARDA Scientist demonstrates the benefits of indigenous buffel grass to policymakers in the United Arab Emirates.



Buffel grass can be directly grazed by all animal species, including small ruminants, cattle, and camels.



Buffel grass is also cut and presented to animals in the stable, either fresh or dry.

Establishment and management

The grass can be established by direct seeding, transplanting seedlings, or by planting cuttings. Seeds are small: one gram of seeds contains more than 1000 seeds and 120 g of seed is sufficient to sow one hectare. One thousand seeds weigh between 0.98 and 1.12 g, depending on the variety. When direct seeding is used, the land must be well prepared. Since the plant can be slow to establish, grazing may need to be delayed 4-6 months after sowing, and up to 9-12 months, depending on establishment conditions.

This plant is very tolerant of regular cutting or grazing - however it does require frequent fertilization after cutting or grazing. Cutting or grazing should be done frequently, every 8 weeks, as quality declines with age. It is estimated that 25 kg of N/ha must be applied after each harvest. This can be achieved by applying 55 kg of Urea. Other nutrients may be applied based on need (depending on soil type, type of fertilizer, and market prices).

Under irrigation, the forage can be harvested ten times per season in intervals of 35 to 40 days. The crop must be cut close to the ground (5 cm above ground) when approximately 15 percent of the plants are flowering for maximum forage yield and quality. Yields depend on soil fertility and growing conditions, but are mostly in the range of 2-9 t/ha dry matter (DM), and under ideal conditions, up to 24 t/ha DM. Although Buffel grass has a good nutrient balance, other sources of protein may still be required.

Crude protein is about 9.6 percent, and In Vitro Dry Matter Digestibility (IVDMD) and Crude Protein (CP) digestibility ranges from 50-60 percent, depending on age of growth, cultivar, and soil fertility (including fertilizer use). Phosphorus levels are usually higher than in other tropical grasses and range from 0.15-0.65 percent in dry matter.

Effective maintenance:

- Establish by direct seeding, seedlings, or cuttings
- Plant is slow to establish – grazing may need to be delayed by 4 to 6 months, and sowing by 9 to 12 months, depending on conditions
- Requires fertilization after cutting or grazing
- Once established, cutting or grazing should be done frequently, every eight weeks, since quality declines with age.

Rangeland plant factsheets:

This series of flyers is designed to build awareness of sustainable rangeland species among extension workers and those working in the agricultural research and policy sector.

ICARDA's Rangeland Ecology and Management Unit

ICARDA's Rangeland Ecology and Management Unit aims to address the unsustainable use of resources induced by mis-management, the adverse effects 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, and livestock, and the improved management of water resources through close cooperation with farmers and national researchers.



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