Mitchell grasses

Scientific name(s)

Astrebla lappacea
Astrebla elymoides
Astrebla pectinata
Astrebla squarrosa

Strengths

- Mitchell grasses are tolerant of heavy grazing and are renowned for their capacity to respond well following heavy grazing, provided summer rainfall is reasonable.
- Drought dormancy allows survival during extended dry periods and able to extract soil moisture from relatively dry soil.

Limitations

- Mitchell grasses are generally restricted to alkaline clay soils with summer dominant rainfall.

Plant description

Plant: Long lived (>30 years), dense tufted perennial tussock grasses with up to 60 cm crown diameter. It posses a dual root system whereby the shallow root system can utilise smaller falls of rain (40-50 mm) and a deep (>200 cm) root system which can access moisture in the subsoil. Plant height varies from 50 cm for both Curly and Hoop Mitchell, through 80 cm for Barley Mitchell up to 100 cm for Bull Mitchell.

Stems:
Curly Mitchell: stems thin and palatable with approximately liveweight maintenance levels when green, but drying to below maintenance
Hoop Mitchell: stems thin and palatable with approximately liveweight maintenance levels when green, but drying to below maintenance
Barley Mitchell: stems coarse but still palatable with approximately liveweight maintenance levels when green, but drying to below maintenance
Bull Mitchell: stems coarse and relatively unpalatable with low digestibility and metabolisable energy

Leaves:
Curly Mitchell: Mostly hairless and curl distinctly as plant hays off. Good feed value when green, drying to approximately liveweight maintenance levels.
Hoop Mitchell: Hairless and do not curl as the plant hays off. Good feed value when green, drying to approximately liveweight maintenance levels.
Barley Mitchell: Sparse covering of long, thin hairs on the upper surface where the leaf joins the stem. Good feed value when green, drying to approximately liveweight maintenance levels.
Bull Mitchell: Hairless with a distinct, whitish mid-vein on the upper surface. Reasonable feed value when green, drying to slightly below liveweight maintenance levels.

Seedhead:
Curly Mitchell: Long and curve over slightly or may be short and straight depending on growing conditions.
Hoop Mitchell: Long and narrow and hoops (weeps) towards the ground when mature.
Barley Mitchell: Short and straight and held on a long stalk which grows erect above the foliage
Bull Mitchell: Short and straight and held on a long stalk which grows erect above the foliage.

Seeds:
Curly Mitchell: Wide (greater than 4 mm), bristly and loosely arranged along the seed head in an alternate pattern.
Hoop Mitchell: Narrow (less than 4 mm) and lay hard against the seed head.

Barley Mitchell: Seeds are wide (greater than 4 mm) and are packed tightly in 2 distinct rows against the straight seed head.
Bull Mitchell: Seeds are wide (greater than 4 mm) and prickly with long silky hairs at the base.

Pasture type and use

Mitchell grasses are the dominant species in the extensive, natural Mitchell grassland pasture systems which occupy approximately 450 000 km2 of semi-arid and arid northern Australia. Within these grasslands, the 4 species of Mitchell grass tend to occupy different habitats with Curly Mitchell being most common in central Queensland while Barley Mitchell common in drier habitats: Hoop Mitchell is often found in wetter, low lying habitats while Bull Mitchell is especially common in flooded country and lower lying moister areas.
Although one or more of the four Mitchell grasses species dominate these pastures, a wide range of ephemeral grasses and forbs occur in the spaces between the Mitchell grass tussocks. These ephemeral species vary widely depending on geographical location, recent rainfall trends and grazing history. These grasslands are used for extensive grazing of cattle and sheep. Highly variable rainfall is a feature of these grasslands and the occurrence of drought is widespread.

Where it grows

Rainfall

Between 250 and 550 mm annually where summer rainfall is dominant.

Soils

Restricted to alkaline, cracking clays

Temperature

Well adapted to high summer temperatures around 35^0C. Does make limited growth following effective winter rainfall but no growth occurs below 15^0C as it is a tropical species (C4)

Establishment

Companion species

Occurs naturally with a wide range of both perennial and annual grasses and forbs.

Sowing/planting rates as single species

Natural seedling recruitment of 1 - 5 seedling/m2 occurs in some years although exceptional seedling recruitment up to 30 seedlings/m2 has been recorded under specific seasonal conditions.

Sowing/planting rates in mixtures

Some artificial re-sowing has been undertaken but is usually restricted by limited availability and or price of suitable seed with sowing rates usually less than 1kg/ha

Sowing time

Seed would be best sown in November - December while the success of any artificial reseeding will depend on seasonal rainfall following sowing.

Inoculation

Not applicable

Fertiliser

No fertiliser is used.

Management

Maintenance fertliser

Nil

Grazing/cutting

Plants are vulnerable to heavy defoliation during the period of active growth.

Seed production

Seed production can be increased by strategic defoliation prior to the wet season (grazing, burning or slashing).

Ability to spread

Limited natural spread under normal conditions. Successful re-establishment, particularly following severe drought, does occur.

Weed potential

Nil

Major pests

Nil

Major diseases

Nil

Herbicide susceptibility

Similar to other grasses for glyphosate

Animal production

Feeding value

High animal productivity from these pastures derives from the rich array of ephemeral grasses and forbs species which livestock actively selected when they are available in the pasture. The key value of Mitchell grass is to provide bulk during the dry (non-growing) winter season.

Palatability

Sheep and cattle select the more palatable ephemeral grasses and forbs which are available soon after rainfall, with sheep avoiding Mitchell grass in the early wet season. Cattle select Mitchell grass as a component of their diet even in the early wet season to provide bulk to complement the smaller pasture plants. Once the availability of these ephemeral species in the pasture has been reduced, livestock selectively graze Mitchell grass which often comprises the major component of livestock diets. Where more than one of the four Mitchell grass species is present, Curly Mitchell is the most palatable while Bull Mitchell is the least palatable.

Production potential

Observed DM yields are variable depending on rainfall and stocking rate but annual production can be as high as 2500 kg/ha. The proportion of this total yield that is Mitchell grass can be >90% where stocking rates are low and rainfall high while this proportion can be as low as 10% following drought.

Livestock disorders/toxicity

None known from the plant. However, a fungus can establish under humid conditions which leads to black soil blindness in cattle (Shivas et al. 1997).

Cultivars

Cultivar	Seed source/Information
Yanda Curly Mitchell grass (*Astrebla lappacea*) Φ	Native Seeds Pty Ltd
Turanti Barley grass (*Astrebla pectinata*) Φ	Native Seeds Pty Ltd

Φ Denotes that this variety is protected by Plant Breeder's Rights Australia

Further information

Orr, D. M. and Holmes, W. E. (1984) Mitchell grasslands. In Management of Australia's Rangelands ed. G. N. Harrington, A. D. Wilson and M. D. Young, pp. 241-54. Melbourne: CSIRO.

Orr, D. M. (1998) A life cycle approach to the population ecology of two tropical grasses in Queensland, Australia. In Population biology of grasses ed. G. P. Cheplick, pp.366-89, Cambridge University Press.

D. G. Phelps and J. Milson (1999) Mitchell grass -Identifying the four species Agdex 323/30
Shivas, R. G., A. A. Mitchell, et al. (1997). "Corallocytostroma ornicopreoides sp. nov., an unusual toxic fungus on Astrebla and Dichanthium in north-western Australia." Mycological Research 101(7): 849-852.

Acknowledgements

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