NSW GOVERNMENT | Local Land Services

Common native grasses of central west NSW

An identification guide for central west NSW

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This is a revised version of the publication *Common native grasses of the central west catchment*, produced by the former Central West Catchment Management Authority (CMA). The NSW Department of Primary Industries was contracted to compile the former guide.

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The original text was researched and compiled by Harry Rose, Linda Ayres, Carol Rose, Jenene Kidston and Cathy Waters. Special thanks to Bruce Clements, Luke Pope, Ron Hacker and Kathi Hertel for additional comments. Special thanks are given to the people and associations that provided the photos and drawings that appear throughout this guide. Staff from the former Central West CMA who provided input to this publication include: Rob Baun, Bruce Christie, Colleen Farrow, Adam Hook and Alan Welch.

The information contained in this publication is based on knowledge and understanding at the time of revision (June 2015). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Local Land Services or the user's independent adviser.

As this work covers native vegetation, users must consider requirements under current legislation. For further information contact your Local Land Services office or visit www.lls.nsw.gov.au

CHAIRMEN'S FOREWORD

We take great pleasure in presenting you with a revised *Native grasses of central west NSW.*

Contained here is practical information to support land managers across the Central West and Central Tablelands Local Land Services regions.

You will be better able to identify common native grass species on your land and understand their value in grazing management systems.

We have focused on perennial common species with a focus on how to identify and their role in supporting a livestock enterprise.

This resource will support your grazing enterprise and we encourage you to read further.

There are a number of resources at the end of this publication that will further develop your understanding.

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INTRODUCTION

Approximately 403 grass species are found across the Central West Tablelands, Slopes and Plains of NSW, of which more than half (251) are native.

The native grasses, especially perennial species, form an important component of pastures, native grasslands and woodland and forest understoreys. They are a valuable grazing resource and component of biodiversity in the region, as well as providing food and habitat for native animals.

The purpose of this identification guide is to provide a means to recognise some of the more common native perennial species and gain a better understanding of their value within grazing systems and the natural environment.

The guide does not seek to cover all native species in the area, as for many native species there is little or no quality or management data available. Rather, the guide concentrates on perennial grasses that are common and widespread and where some reliable quality or management information is known.

Each grass has notes on its recognition, distribution, forage quality and management. Also listed are grasses that are most likely to be mistaken for, at either the vegetative or flowering stage.

This project is supported by Local Land Services, through funding from the Australian Government's National Landcare Programme.

Perennials, Annuals and Others

It is important to appreciate the range of growth cycles of pasture species to ensure appropriate grazing management is used. Native perennial grasses (i.e. those species that live for two or more years) are the focus of this publication as they form the bulk of any healthy native pasture and provide a number of valuable functions that are not, or only partially, provided by annual grasses (i.e. those that complete their lifecycle within a year).

Perennials

- Perennials use more water than annuals due to their larger and deeper root systems; thereby reducing deep drainage, nitrate losses and acidification rates.
- They have extensive root systems that allow them to persist from year to year.
- They reduce soil erosion by providing year-round ground cover. This is especially important in late summer and autumn when summer annuals have finished, but winter annuals haven't begun.
- They are more adapted to surviving droughts and respond more quickly after breaking rains.
- They provide effective weed competition as they efficiently use light, water and nutrients year-round. Again, this can be especially important in late summer and autumn when many weeds germinate.
- They provide forage in response to small rainfall events that are too small to allow annuals to germinate and grow.

Perennials can grow from buds in the crown of the plant or from seed. When regrowing from buds they have an advantage over annuals as their root system is already in place. However, if the crown of the plant is damaged by overstocking or protracted drought the perennial needs to regenerate from seed. In this situation, perennials are at a disadvantage when compared with more vigorously growing annuals. Some perennials tend to behave as annuals under severe drought conditions, for example Windmill Grass (*Chloris truncata*) and Spear Grass (*Austrostipa species*).

In these situations, such short-lived perennials will tend to expend a greater proportion of their energy producing seed than other more long-lived perennials.

Within a pasture system, perennials can usually be identified by being difficult to pull out of the ground. This is because they produce tillers from persistent crowns, which are strongly rooted to the soil. Annuals, however, do not form a persistent well-rooted crown and are generally easier to pull out.

Annual grasses are often an important and high quality source of forage for livestock across the catchment. Annuals grow from seed when conditions are favourable. This usually requires several days of moist conditions, which is most likely to occur when evaporation rates are low. Annual grasses produce a bulk of growth before setting large numbers of seeds and then dying off.

Ephemeral plants are found predominantly in the Plains of the Central West and have similar characteristics to annuals, but have a shorter life-cycle that may be completed a number of times in any one growing season. Biennial species are longer lived and tend to take two years to complete their life cycle.

C3 and C4 Grasses

The perennial grasses can be classified as either C3 or C4 plants. These terms refer to the different pathways that plants use to capture carbon dioxide during photosynthesis. All species have the more primitive C3 pathway, but the additional C4 pathway evolved in species in the wet and dry tropics. The first product of carbon fixation in C3 plants involves a 3-carbon molecule, whilst C4 plants initially produce a 4-carbon molecule that then enters the C3 cycle. Why are these differences important?

These differences are important because the two pathways are also associated with different growth requirements. C3 plants are adapted to cool season establishment and growth in either wet or dry environments. On the other hand, C4 plants are more adapted to warm or hot seasonal conditions under moist or dry environments. A feature of C3 grasses is their greater tolerance of frost compared to C4 grasses. C3 species also tend to generate less bulk than C4 species; however, feed quality is often higher than C4 grasses. Differences between C3 and C4 species are shown in Table 1.

The presence of both C3 and C4 species can be desirable in a pasture as they can occupy different niches (e.g. C3 species are often more abundant in the shade of trees and on southerly aspects, while C4 species often dominate full-sun conditions and northerly aspects) and thereby provide greater groundcover across a range of conditions. It is not uncommon to find both C3 and C4 species in a paddock on the Central West Slopes and Tablelands. This has advantages in providing a broader spread of production throughout the year for both grazing enterprises and native animals.

In the hot dry environment of the Central West Plains, warm-season C4 grasses usually dominate pastures. However, the presence of both C3 and C4 species provide greater year-round groundcover across a range of conditions, as they can occupy different niches (e.g. C3 species are often more abundant in the shade of trees and in wetter, more fertile areas, while C4 species often dominate full-sun conditions in drier, less fertile areas). A mix of C3 and C4 species also allows pastures to respond to rainfall at any time of the year.

Table 1
Features of C3 and C4 grasses

	C3	C4
Initial molecule formed during photosynthesis	3 carbon	4 carbon
Growth period	Cool season or year-long	Warm season
Light requirements	Lower	Higher
Temperature requirements	Lower	Higher
Moisture requirements	Higher	Lower
Frost sensitivity	Lower	Higher
Feed quality	Higher	Lower
Production	Lower	Higher
Examples	Weeping Grass, Common Wheatgrass, Plains Grass, Rough Corkscrew Grass and Ringed Wallaby Grass	Kangaroo Grass, Red Grass, Neverfail and Wire Grass

Native Pastures

Native pastures are simply grazing environments that are usually dominated by native grasses (occasionally shrubs) and may occur as grasslands or woodlands. These pastures contain native grasses and many other native herbs and shrubs. Even healthy, relatively undisturbed native pastures also commonly have a mix of introduced species, such as annual and perennial grasses, medics, clovers and herbs.

Not all native pastures are the same and include:

- largely undisturbed native swards with few introduced species
- pastures topdressed and oversown with, for example, clovers/medics and superphosphate
- pastures disturbed by ploughing or heavy grazing and containing many introduced species, including weeds
- introduced pastures that have declined and been re-colonised by native species.

The composition, grazing value and conservation value of each pasture type will vary, as will their management; depending on the goals of the manager.

A healthy native pasture may contain up to 100 species, of which 25-30% are typically grasses; the rest consist of lilies, daisies, sedges, rushes and herbs from many other families. Although perennial grasses may not form the majority of the species present, they usually dominate the pasture bulk. Even in a healthy native pasture, introduced species are often present, but form only a minor component of the biomass. In the environment of the Central West Plains some of these perennials will act as annuals in dry years and perennials in wet years (e.g. Windmill Grass). In the spaces between the perennial tussocks an array of shrubs and herbs from many plant families will also grow.

Many areas have mosaics of different dominant native species that are favoured by landscape differences, even within the one paddock. For example, differences in historical land practices, soil conditions, slope, aspect, water run-on / run-off sites, tree density and the presence of boulders and fallen logs all influence the composition of species and which will dominate. Some species have a broad range of adaptation and occupy a number of different environments, whilst others have more specific site requirements. These are detailed in the individual species information sheets. A native pasture with high biodiversity will ensure there are always some species capable of responding to seasonal and site conditions.

The composition of these pastures is not static, but constantly changing in response to changes in climate and management. Pasture composition is also rarely in equilibrium with the conditions created by these factors as pasture changes lag behind climate and management changes. Where long-lived perennials dominate, changes in composition tend to be slower than where annuals dominate.

Native pastures have many different values, the importance of which will vary depending on the structure of the pasture and the goals of the manager. The values include:

- habitat for endangered flora and fauna
- well adapted to the variable Australian climate
- low input requirements compared with exotic counterparts
- provide shelter for stock
- provide drought feed.

Although the original pastures of the Central West Tablelands and Slopes are poorly known, they were most likely a mix of both tall tufted warm-season (C4) and year-long green (C3) perennials, such as Kangaroo Grass (*Themeda triandra*), Wild Sorghum (*Sorghum leiocladum*), Spear Grasses (*Austrostipa species*) and *Poa* species are likely to have dominated. The dominant species would have varied with altitude, rainfall and soil type. Shorter grasses, such as Red Grass (*Bothriochloa macra*), Purple Wiregrass (*Aristida ramosa*), Wallaby Grass (*Rytidosperma species*) and Weeping Grass (*Microlaena stipoides*) were mostly subsidiary species.

Many of the original dominant species of the Central West Tablelands and Slopes were favoured by regular burning and very light, or no, grazing pressure. With the introduction of year-long grazing by cattle and sheep and late winter burning in many areas, pastures composed of shorter warm-season perennials become more common as they are either more resilient to grazing (e.g. Red Grass) or are avoided by stock (e.g. Purple Wiregrass). This also commonly leads to an increase in naturalised cool-season annuals. Where heavy summer grazing and/or fertiliser are used, the abundance of native year-long green perennials (e.g. Wallaby Grass and Weeping Grass) and naturalised cool-season annuals is favoured. Combining heavy year-long grazing and increased soil fertility generally degrades native pastures to dominance by naturalised cool–season annuals, such as Annual Ryegrass, Barley Grass, Capeweed and Paterson's Curse.

These changes can work in the opposite direction to achieve the desired composition if the right management is used, and sufficient plant numbers are present. Long rests and reduced grazing pressure can move a pasture dominated by short year-long green species towards one dominated by taller erect species. Increasing the grazing pressure in winter and not fertilising will tend towards a short warm-season perennial dominated pasture. Achieving these changes, depends on the season (good rains are needed for germination or growth) and timing of the management relative to the desirable and undesirable species. For example, rests from grazing need to coincide with seedling establishment or flowering and seeding of the desired species to be effective.

Most historical changes to pasture composition were not done by design. Now better understanding of the requirements of species can enable management to push composition in a more predictable direction. However, understanding of native species dynamics is far from complete and caution in management is advised.

In some situations, degradation of native pastures has gone too far to permit grazing or fertiliser management to restore the desired pasture composition (e.g. lack of seed bank, change in soil condition, invasion of weeds or other factors). In these cases, seed sowing and/or chemical weed control may be valid options to aid in the re-establishment of native species.

The original composition of the pastures on the Central West Plains is poorly understood as few early botanical records were kept. It is most likely that pastures also consisted of a mix of tufted warm-season (C4) and/or year-long green (C3) species, with taller perennials forming the bulk of the pasture. Warm-season and cool-season annuals were probably less common than today due to competitive shading from the tall perennials. Whilst most species may have been well adapted to regular burning and drought, they were not exposed to regular or heavy grazing and trampling. Despite this, some species appear to be highly persistent under grazing (e.g. Curly Mitchell Grass), while others are sensitive to grazing (e.g. Kangaroo Grass) or are less palatable (e.g. Wire Grass).

Extensive areas of Curly Mitchell Grass and Plains Grass grasslands are known to have occurred on heavier soils in the north and east of the Plains region. Biddiscombe (1953) describes Rough Speargrass (*Austrostipa scabra*) and Plains Grass as common dominants induced by clearing of woodlands in the Trangie area on light and heavy soils, respectively. Other species, such as Kangaroo Grass, Wire Grass, Queensland Bluegrass (*Dichanthium sericeum*) and Curly Windmill Grass (*Enteropogon acicularis*) would also have been prominent.

Extensive clearing of woodlands, the introduction of year-long grazing by livestock and changes in fire frequency and intensity have resulted in a reduction or elimination of species unable to cope with the changed environment.

Overgrazing will reduce the density and basal area of perennials. Initially, taller and more palatable species decline and smaller, shorter-lived and/or less palatable perennials become more common as they are either more resilient to grazing (e.g. Neverfail (*Eragrostis setifolia*) and Windmill Grass) or are avoided by stock (e.g. Wire Grass and Rough Speargrass). With sustained overgrazing, perennial species decline or are lost and are replaced by annuals. Where degradation is in the early stages, adverse changes can often be at least partially reversed. The most important and economic tool for native pasture restoration is grazing management. Where the degradation of native pastures is too severe to utilise grazing management as a tool to restore native pastures (e.g. a diminished soil seed bank, change in soil condition, invasion of weeds or other factors) re-seeding of native pastures may prove the only option.

Sowing Native Pastures

Sowing native pasture species is relatively new in Australia. Large-scale revegetation is prohibited by the cost of seed and/or the availability of species. Added to this, issues of local provenance and seed quality are also important when using seed harvested from wild stands. There are also a number of commercially available cultivars. Exotic pasture species have been bred for high seed yield and high seed retention. However, native species tend to drop their seed over time thus increasing the chance of seed germinating under favourable climatic conditions. This is an adaptive characteristic which may disadvantage domesticated cultivars under field conditions. A number of seed harvesting and sowing techniques have been developed to accommodate the adaptive 'wild' characteristics of native grass seed. These techniques have been reviewed in detail in *Grassed up: guidelines for revegetating with Australian native grasses* (see References and Further Reading list).

Managing Native Pastures

While there is no set recipe for managing native pastures, some basic principles apply to all perennial-based pastures. Management should consider the:

- effect of defoliation on the ability of the plant to withstand drought
- effect of soil cover on the rate of soil erosion
- need for seedling opportunities that allow recruitment and replenishment of soil seed bank
- likely benefit of diversity of species on drought tolerance
- effect of overgrazing on pasture composition
- benefits of periodic resting.

These principles are the same as those for introduced perennial pastures, with the added complicating factor that many more species occur in a native pasture. As with all pastures, the key is to have a flexible system that can be changed as the season, pasture and stock require.

The most important principle is that stocking rates need to be matched to forage availability (this will vary seasonally and between years) and in the short to medium term is more important than the grazing system used. However, under moderate to heavy continuous (or set) stocking, palatable grazing-susceptible species are likely to be lost. Resting pastures at critical times of the year may reduce this deleterious effect; these need to be timed to the growth of the plants and not on a set time basis to aid desirable species. While rotational grazing may reduce grazing selectivity and provide rests for plants, the required fencing and stock movement may not always be practical or cost effective.

Overstocking is one of the major causes of native pasture degradation. When perennial grasses are grazed too short, the leaf area is reduced and plants need to rely on energy stores to regrow. The harder plants are grazed, the more that leaf area and energy stores are reduced. As plants increasingly rely on energy stores to regrow, the recovery time needed between grazing increases and overall production declines. Conversely, not grazing or only lightly stocking perennial grasses allows them to become rank and unpalatable, reducing their grazing value.

Rundown of energy stores due to frequent heavy grazing either directly leads to the death of perennial grasses or weakens them, making them more susceptible to stress. Hence, adequate rests are needed after grazing, especially where reserves may be low or plants are relying heavily on energy reserves (e.g. during and after drought, fire, heavy grazing or coming out of seasonal dormancy).

Fertilisation of native pastures is generally less economic than for introduced pastures, as many native species have a poorer response to increased fertility; some species will decline with elevated fertility and native pastures mostly grow on poorer soils. However, many native pastures need to be modified by farmers for their business to remain economically viable. The lower rainfall and potential pasture production in the Central West Plains generally makes fertilisation of native pastures uneconomic.

There is much data showing that carrying capacities and livestock performance can be greatly improved with legumes plus fertiliser. This is particularly true where C4 species dominate as the feed value and growth in winter is greatly improved. The trick with modification of native pastures for improved production is to maintain natives for stability and year round production and to make the changes gradually over many years to allow for evolution and adaptation of the native system. Where the change is not properly managed, annual grasses and weeds can become dominant, resulting in a loss of perennial ground cover.

Even where well managed, the addition of fertilisers to highly biodiverse native pastures will lead to a loss of biodiversity. These factors need to be weighed up before undertaking a fertiliser program.

Each perennial grass species has its own pattern of seeding, germination and growth and will respond differently to the timing and length of rests, height of grazing, fertiliser, competition and shading. While it is not possible to know the characteristics of every species in a diverse native pasture, understanding the differences of the more common species allows managers to maintain or improve the composition of their pasture by making informed choices about how and when to graze, rest and fertilise pastures to favour desirable species over undesirable species.

For a detailed description of the management of native pastures in the Central West Slopes and Tablelands, read *Managing native pastures for agriculture and conservation* and *Managing Tasmanian native pastures* and in the Central West Plains, read *Best management practices for extensive grazing enterprises*, *A graziers guide to the bimble box country of western New South Wales* and *The glovebox guide to tactical grazing management for the semi-arid woodlands* (see References and Further Reading list).

Nutritional Value

The performance of livestock grazing grasses is directly related to the quantity and quality of grass on offer. While there are many quality characteristics that influence the intake of a grass by livestock, the most useful are digestibility and crude protein. Hence, where available, these figures are provided for individual species.

Digestibility is a measure of the proportion of a grass (on a dry matter basis) that can be utilised by an animal. For example, if an animal eats 10kg of dry matter and 3kg is expelled as dung, then the feed is 70% digestible. Digestibility influences the speed with which a grass passes through the digestive system. Generally, grasses with higher digestibility will be processed more rapidly, allowing stock to eat more and so have higher production. Digestibility is also a useful measure of the quality of a grass as it is directly related to the energy content of a feed; energy being needed for normal body functions.

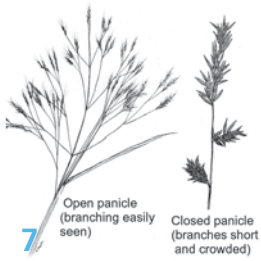
As a general guide: 70-80% digestibility is required for high livestock production; 60-70% digestibility is required for moderate production; and 55-60% digestibility is required to maintain dry stock. Below 55% digestibility, dry stock will lose weight. Digestibility is strongly influenced by the plants stage of growth. Grasses that are green, leafy and actively growing will have a higher digestibility than those that are in head or have hayed off.

Crude protein is an estimate of the total protein present in a grass. Protein forms the building blocks of muscle and its components are used in every system of the body. Crude protein is positively related to the digestibility of a grass and, in general, as crude protein increases, so does livestock performance (e.g. weight gain, milk production, etc).

The forage quality of grasses is very dependent on how the grass is managed. When maintained in the early to late vegetative stage, the quality of a grass is likely to be at the higher end of the digestibility and crude protein values listed for individual species in this guide and at the lower end during late flowering. However, maintaining a species at the vegetative stage only may be detrimental to its persistence.

As a further caution, the quality figures listed in this guide are often based on limited measurements, different plant parts (e.g. some measurements have recorded green leaf, others entire plants) and are usually recorded under different growing conditions, all of which will affect quality data. Native grasses also tend to be very genetically variable due to their wide distribution, which subjects individual plants to different soils, climates and management history. This variability can be significant even at the paddock scale.

GLOSSARY



Allelopathic Effect
Adverse effect that a plant has on another, nearby plants; chemicals excreted into the soil suppress the growth of these plants.

Annual
Plants that complete their lifecycle in less than a year.

Auricle (*see 1*)
Small appendages (often found in pairs) at the junction of leaf blade and leaf sheath of some grasses. Often look like arms wrapped around the stem.

Awn (*see 5*)
Bristle-like appendage attached to the floret or glume.

Biennial
Plants that take up to two growing seasons to complete their lifecycle.

Bract
Modified, usually small leaf, which forms part of a flowerhead or is associated with a flower.

Cool season
Main growth over the cooler months (e.g. Common Wheatgrass).

Digitate (*see 2*)
Branches all radiate from one point, like fingers on a hand.

Floret
A grass flower.

Flowerhead
Same as seed head or inflorescence.

Glume
Bract at the base of a spikelet that may appear very similar to the florets.

Ligule (*see 4*)
A membrane and/or rim of hairs on the inner surface of the junction of the leaf blade and leaf sheath.

Node (*see 3*)
Joint of stem (often swollen), where leaves attach or where stems branch.

Panicle (*see 7*)
A much branched seedhead, which may be contracted or open. In contracted panicles (e.g. Slender Rats Tail Grass) the branching is difficult to see due to the tight clustering of spikelets. In open panicles (e.g. Paddock Lovegrass) the branching is easily seen.


10


8


11


9


12


13

Perennial
Plants that live for more than 2 years.

Photosensitisation
Causing sensitivity to light in animals, often resulting in blistering of hairless or light-coloured areas.

Primary axis of racemes (*see 10*)
A type of seedhead where the branches (racemes) arise along the main axis (e.g. Warrego Summer Grass).

Raceme
A type of seedhead where spikelets are attached to the main axis by short stalks.

Rhizome (*see 8*)
Below ground horizontal stem.

Seedhead
Flowering part of the grass plant. Same as flowerhead and inflorescence.

Spatheate (*see 6*)
A type of seedhead where leaf-like structures are present within the head (e.g. Kangaroo Grass).

Spike (*see 9*)
A type of seedhead where the spikelets are directly attached to the main axis (e.g. Common Wheatgrass).

Spikelet (*see 13*)
The basic unit of the seedhead of grasses. Consists of clusters of one or more florets above (usually) one or two glumes.

Stamen
The male part of the flower that carries the pollen.

Stolon (*see 11*)
Above ground stem (or runner) that grows along the surface of the ground and roots at the nodes.

Tiller
Leafy shoot that makes up a grass tuft.

Tussock (*see 12*)
A large clump or tuft.

Warm season
Main growth during the warmer months; generally a frost sensitive grass (e.g. Red Grass).

Year-long green
Growing year-round, as long as conditions are suitable (e.g. Weeping Grass).

DESCRIPTION OF COMMON GRASSES

Barbed Wire Grass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Cymbopogon refractus***
CATEGORY **C4 Perennial**

Identification tips

- A tufted grass up to 1.2m often with dark nodes
- Leaves are hairless
- Fresh leaves and base of plant can be crushed to give a citrus scent
- Seedheads are thin reddish spatheate panicles 10 – 45cm long. The paired branches bend downward as the plant matures, which give the seedhead a barbed wire appearance
- Flowers summer to early autumn.

Climate and soil requirements

- Found on the lighter lower fertility soils
- On roadsides, native pastures with low disturbance and previous long stocking rates
- Readily frosted with some drought hardiness.

Grazing and nutritional value

- Production and feed quality is low to moderate, especially when in seedhead
- Unresponsive to additions of fertiliser but may decline in abundance.

Management strategies

- Moderately drought tolerant and high frost tolerance
- Has growing points and storage organs above ground and therefore susceptible to increase stocking densities and continual grazing
- Seen in wetter summers when rested from grazing.

Similar plants

- Kangaroo grass *(Themeda triandra)* also has awns in the seedhead but is often more tussocky
- Coolatai grass *(Hyparrhenia hirta)* an introduced species also has awns in the seedhead but are softer to touch.

1. Spikelet (A Chapman)
2. Plant (F and K Starr)
3. Seedhead (F and K Starr)
4. Plant (F and K Starr)

Blown Grass

COMMONLY FOUND IN	**Tablelands, Slopes and Plains**
SCIENTIFIC NAME	***Lachnagrostis filiformis***
CATEGORY	**C3 Perennial**

Identification tips

- A tall, slim grass up to 70cm in height
- Leaves are ribbed with membranous ligules (up to 2.5 mm long)
- Stems can be flattened in appearance
- Seedheads are open panicles up t 30cm long. The seedhead droop as they mature becoming straw colour and brittle. Often breaking and spreading by the wind
- Spikelets are 2 – 4mm long, sometimes purplish with a twisted awn
- Flowers spring to summer
- Leaves are hairless.

Climate and soil requirements

- Found on moist areas of the landscapes, in drainage lines, around dams and floodplains
- Reasonable salt tolerance
- Low drought and frost tolerance
- Does not handle competition and is often associated with practices that might have caused previous bare ground (eg flooding, drought).

Grazing and nutritional value

- Can produce green feed during summer if conditions are good (eg summer rainfall)
- Young growth is of moderate quality but as the plant matures it becomes lower
- Occasionally toxic to stock.

Management strategies

- The amount of Blown grass is often associated with practices that may have lowered the groundcover previously, especially in the germination period autumn to early winter
- Consider to optimise better quality of growth before it matures.

Similar plants

- The panics *(Panicium spp.)* and lovegrasses *(Eragrostis spp.)* are often confused especially in late summer as the seedheads break and blow in the wind.

1. Flowerhead (H Rose)
2. Lingule (H Rose)
3. Node (H Rose)
4. Flowerhead (H Rose)
5. Spikelet (H Rose)
6. Plant (H Rose)

Box Grass or Knottybutt Grass

COMMONLY FOUND IN	**Slopes and Plains**
SCIENTIFIC NAME	***Paspalidium constrictum***
CATEGORY	**C4 Perennial**

Identification tips

- A tufted, erect to spreading, warm season perennial to 60cm tall and with hairy, thickened, knotted stem bases **(*see 1*)**
- Leaves dull-green to blue-green with a prominent midrib. Stems mostly covered in dense short hairs. Nodes covered with soft fine hairs, with a few long hairs
- Seedhead is a narrow primary axis of racemes to 35cm long, with the branches pressed against the main axis. Each branch ends in a short bristle **(*see 2*)**
- Spikelets have a distinct constriction along their length **(*see 3*)**
- Flowers throughout year, but major flowering is in summer and autumn following rain.

Climate and soil requirements

- Widespread throughout the Plains on lighter soils (sandy loam to clay loam); rarely on clays
- More common on fertile soils where moisture is high
- Usually found under tree canopies and where it is protected from grazing around fallen timber
- Very drought tolerant and slightly frost tolerant.

Grazing and nutritional value

- High grazing value
- Digestibility ranges from 35-56% – from one trial only at Cobar
- Crude protein 11-15.5%.

Management strategies

- Usually only a minor component of pastures
- Dry matter yields are low, but it is highly palatable and regarded as useful forage even after it has hayed off
- On poor soils it forms a slender wiry plant, but forms a dense leafy tussock on moister, more fertile sites
- The bulk of growth is produced in summer and autumn, but it will produce a green pick throughout the year in all but the driest times
- Persists best under rotational grazing. It rapidly regenerates when stock are excluded after heavy grazing, as its buds are below ground level and protected from damage.

Similar plants

- Slender Panic (*Paspalidium gracile*) is common and very difficult to distinguish; nodes are usually hairless or covered with minute soft hairs and the seedheads extend well beyond the leaves
- The spikelets of Warrego Summer Grass (*Paspalidium jubiflorum*) and Bent Summer Grass (*Paspalidium aversum*) don't have constrictions along their length. The latter species has weak and easily compressed stems that often root at the lower nodes. Bent Summer grass tends to grow on creeks and drainage lines and on better soils.

1. Flowering plant (L McWhirter)
2. Seedhead (H Rose)
3. Spikelets (H Rose)

Bunch Wire Grass

COMMONLY FOUND IN Slopes and Plains
SCIENTIFIC NAME *Aristida behriana*
CATEGORY C4 Perennial

Identification tips

- A tussocky grass up to 30cm in height
- Stems are hairless with almost hairless leaves usually inrolled and 1 -2 mm wide
- Seedhead is a spike like panicle often dense and brush-like. It is also known as brush wiregrass
- Seeds have a three branched awn
- Flowers in spring and autumn but can flower in cool years during summer

Climate and soil requirements

- Widespread throughout the Plains on lighter soils (sandy loam to clay loam); rarely on clays
- More common on fertile soils where moisture is high
- Usually found under tree canopies and where it is protected from grazing around fallen timber
- Very drought tolerant and slightly frost tolerant.

Grazing and nutritional value

- Low forage value
- Digestibility and crude protein not recorded for this species. Low to moderate feed quality suspected.

Management strategies

- Can provide good ground cover in poor soils where few other grasses will grow
- Seeds cause damage to the eyes, fleece, hides and flesh of animals.

Similar plants

- There are 21 *Aristida* species within the Central West. Most are difficult to distinguish without expert knowledge
- Spear Grasses (*Austrostipa* species) have seeds with just one awn and tend to be much leafier
- Wiry Panics (*Entolasia* species) are very similar vegetatively, but the seeds lack awns.

1. Flowering plant (H Rose)
2. Flowerhead (H Rose)
3. Flowerhead (H Rose)
4. Flowering plant (NSW Grassy Ecosystems)

Common Wheatgrass

COMMONLY FOUND IN	**Tablelands, Slopes and Plains**
SCIENTIFIC NAME	***Anthosachne scabra* (formerly *Elymus scaber*)**
CATEGORY	**C3 Perennial**

Identification tips

- Loosely tufted, cool season, short-lived perennial to 1m tall
- Leaves typically have a half twist; leaf sheaths are hairy and auricles are present **(*see 1*)**
- Flag leaf (leaf directly below the seed head) is long and sticks out at a right angle
- Seedhead is a narrow spike to 25cm long; spikelets (not/little overlapping) with many awned florets; awns are straight when young and curved when mature **(*see 2*)**
- Flowers late winter to early summer.

Climate and soil requirements

- Found throughout the Central West, it is usually a minor component in open or shaded pastures
- Grows on most soil types; frost and shade tolerant; moderately drought tolerant. Will grow into summer in cool moisture conditions.

Grazing and nutritional value

- Moderate to high grazing value
- Digestibility ranges from 63-90%
- Crude protein 10-36%.

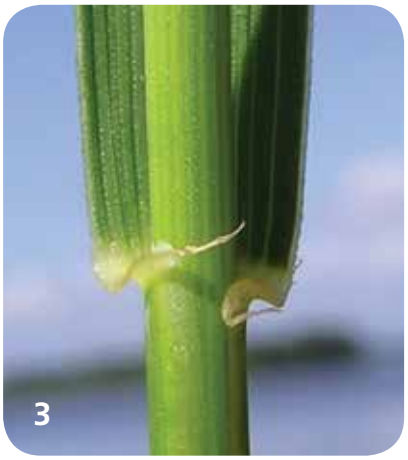
Management strategies

- Produces high quality, palatable green feed in the cooler months on fertile soils in moister areas
- On shallower soils and drier western areas, it tends to have harsher leaves and is of lesser value
- Generally only a short-lived plant, but can recruit well from seed if needed
- Growth is better under increased soil fertility and increased grazing pressure (if not selective)
- Often preferentially grazed, but is avoided after it runs to head in spring
- Rotational grazing to reduce selective grazing and providing strategic rests in spring to allow flowering and seed set will aid persistence
- Seed can be direct drilled at 5-20mm deep using a cone seeder in autumn.

Similar plants

- Soft Brome (*Bromus species*) leaves are very hairy
- Wallaby Grass (*Rytidosperma species*) and Weeping Grass (*Microlaena stipoides*) do not have twisted leaves.

1. Twisted leaves (L McWhirter)
2. Mature seedhead (L McWhirter)
3. Auricles (H Rose)
4. Young plant (L McWhirter)
5. Flowering plant (J Gibbs)



Cotton Panic Grass

COMMONLY FOUND IN Slopes and Plains
SCIENTIFIC NAME *Digitaria brownii*
CATEGORY C4 Perennial

Identification tips

- Tufted, hairy, warm-season perennial, usually 25-45cm high, but sometimes to 80cm **(*see 1*)**
- Numerous slender branched stems, that are usually hairy at their base
- Flat, soft leaves become twisted and crumpled with age and the leaf edges are often wavy
- Seedhead is 6-11cm long with 1-7 (usually 3) erect or spreading branches that normally bear spikelets to their base **(*see 2*)**
- Spikelets on stalks 4-8mm long and covered in silky, brown or purple hairs making the spikelets appear like pieces of cotton wool **(*see 3*)**
- Flowers mostly in summer and early autumn.

Climate and soil requirements

- Widespread in a variety of habits on the Slopes and Plains
- Common on lighter soils and in lightly grazed pastures
- Highly drought tolerant and low to moderate frost tolerance.

Grazing and nutritional value

- Moderate to high grazing value
- Digestibility ranges from 40-70%
- Crude protein 4-14%.

Management strategies

- Desirable summer grass that is readily eaten by stock and of moderate to high quality when young
- Moderately productive, growing rapidly after summer rain
- Plant populations diminish over dry seasons and re-establish in wet seasons, but it needs heavy extended summer rain to establish from seed
- Most common in areas not frequently grazed, but otherwise only found as scattered plants
- Conservatively stock or provide rests periods to maintain populations. Resting pastures following heavy summer rains will aid establishment and promote seed set.

Similar plants

- Needs close inspection of seedheads to distinguish between other species of *Digitaria*
- The base of the seedhead branches are bare for 5-10cm in Finger Panic Grass (*Digitaria coenicola*)
- Spreading Umbrella Grass (*Digitaria divaricatissima*) has long, stiffly-spreading branches and the spikelets are only moderately hairy.

1. Flowering plant (I Toole)
2. Seedhead (H Rose)
3. Spikelets (H Rose)

1


2


3

Curly Mitchell Grass

COMMONLY FOUND IN **Plains**
SCIENTIFIC NAME ***Astrebla lappacea***
CATEGORY **C4 Perennial**

Identification tips

- A densely tufted, warm-season perennial with stout rhizomes and growing 30-90cm tall **(*see 1 and 2*)**
- Leaves tend to curl when hayed-off, hence the name 'Curly' Mitchell Grass
- The rigid, straight or curved, spike-like seedhead (5-30cm long and 5-13mm wide) is usually held amongst the foliage
- Spikelets occur in two rows on one side of the stem and have florets with a central bristle and two long lateral lobes **(*see 3*)**
- Flowers mostly in summer, though episodic.

Climate and soil requirements

- Widespread on the Plains; more common in the northeast on heavy grey cracking clays that can store subsoil moisture over summer
- Very drought tolerant, but low tolerance to frost and flood.

Grazing and nutritional value

- Moderate grazing value
- Digestibility figures are not available
- Crude protein 4.7-10.8%.

Management strategies

- Long-lived, except when subject to severe disturbance, such as overgrazing, heavy trampling, etc
- Not highly nutritious at any stage. Hayed-off material is little more than roughage
- Not particularly palatable during the growing season, but eaten during drier times and provides useful standover feed
- Tolerant of heavy grazing, except during prolonged drought
- Best maintained by moderate grazing as this stimulates tillering and seed production
- Recruitment and establishment are infrequent (e.g. every 15-20 years), so rest pastures when good prolonged summer rains occur to aid seedling establishment
- Seed can be established by sowing into a seedbed or over-sowing and using stock to trample the seed in during wet weather; ideally in Sept/Oct or Jan/Feb when the profile is nearly full.

Similar plants

- Other Mitchell Grasses are less common in the area
- The seedhead of Hoop Mitchell Grass (*Astrebla elymoides*) is only 2-3mm wide
- Barley Mitchell Grass (*Astrebla pectinata*) has a shorter (4-13cm), wider (1-2cm) spike-like seedhead with densely overlapping spikelets.

1. Flowering plant (C Gardiner)
2. Mitchell Grass grassland (C Gardiner)
3. Seedheads (H Rose)

Curly Windmill Grass

COMMONLY FOUND IN Slopes and Plains
SCIENTIFIC NAME *Enteropogon acicularis and E. ramosus*
CATEGORY C4 Perennial

Identification tips

- Tufted, warm-season long-lived perennial to 1m tall **(*see 1*)**
- Seedhead digitate, with long stiff branches arranged in several planes like wheel spokes. Spikelets awned and not blunt-tipped **(*see 2 and 3*)**
- Flowers from spring to autumn in response to rain.

Climate and soil requirements

- One of the most widespread and common species on the Plains; extending onto the Slopes
- Found on all soil types, although more common on red soils and in lightly grazed areas
- High drought, moderate frost and good flood tolerance.

Grazing and nutritional value

- Low to moderate grazing value
- Digestibility ranges from 37-62%
- Crude protein 5-13%.

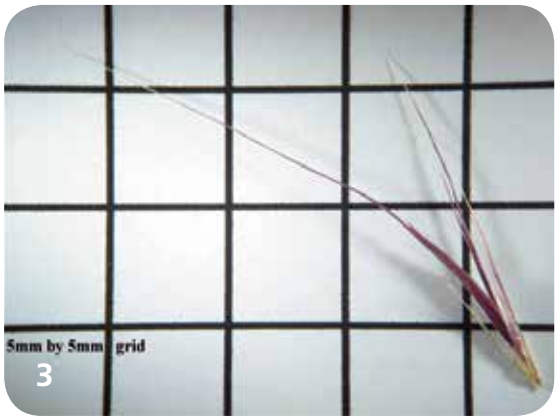
Management strategies

- Produces good growth after rain from spring to autumn
- Young growth is moderately palatable, but flowering plants are harsh and left ungrazed
- Produces some winter growth, but this is ignored by stock if other palatable species are present
- Seedling recruitment is infrequent
- Can increase under light to moderate stocking rates, but is eliminated under heavy stocking
- Rest pastures when there are good prolonged summer rains to aid seedling establishment.

Similar plants

- Both *Enteropogon* species have broadly overlapping distributions. In the past they have been mistakenly combined in the literature, making it difficult to confidently determine the quality and management requirements of each species
- *Enteropogon acicularis* grows to 40cm tall and has hairy stems and leaves. The leaves are rarely twisted and arise from the base of the plant. There are 7-22 branches in the seedhead
- *Enteropogon ramosus* grows 60-100cm tall and is hairless. The leaves are often twisted and arise from branched stems. There are usually 6 branches in the seedhead
- Windmill Grass (*Chloris truncata*) has blunt-tipped spikelets that are black when mature.

1. Flowering plant (K Hertel)
2. Seedhead (CSUVH)
3. Spikelet (CSUVH)



Hairy Panic

COMMONLY FOUND IN	**Tablelands, Slopes and Plains**
SCIENTIFIC NAME	***Panicum effusum***
CATEGORY	**C4 Perennial**

Identification tips

- A tufted, warm season, generally short-lived, perennial to 0.5m high **(*see 1*)**
- Leaves, leaf sheaths and nodes are hairy
- Leaves are dull green, with distinctive long glandular hairs along the leaf margins **(*see 4*)**
- Seedhead is an open panicle, with spikelets commonly paired **(*see 2 and 5*)**
- Germinates in spring and flowers in summer and autumn.

Climate and soil requirements

- Widespread throughout the Central West on a range of soil types from sands to heavy clays
- Found at low to moderate abundance in native pastures, woodlands or disturbed areas (e.g. roadsides) in full sun
- Highly drought tolerant, but sensitive to frost.

Grazing and nutritional value

- Moderate to high grazing value
- Digestibility ranges from 53-71%
- Crude protein 12.4-20%.

Management strategies

- Capable of quickly responding to small rainfall events, it provides palatable and high quality feed up until flowering; mature forage is of reasonable quality
- Can cause photosensitisation (blistering of hairless or light-coloured areas) in sheep within 2-6 weeks after rain if eaten in large quantities or if it forms a major proportion of the animal's diet
- Seedheads are often windblown, piling up against fence-lines **(*see 3*)**
- Does not respond strongly to increased soil fertility and tends to be out competed when fertiliser is applied
- Not very tolerant of heavy grazing, but persists if rested during flowering as it seeds well and regenerates rapidly. Best suited to light grazing pressure.

Similar plants

- There are a number of other native and introduced *Panicum* species, but none have long glandular hairs along the edges of their leaves
- Native Millet (*Panicum decompositum*) forms a large blue-green tussock and the leaves have a distinct whitish midvein. Native Panic (*Panicum buncei*) is a slender perennial to 1.8 meters high. Seedheads are lanced-shaped and often nodding.

1. Flowering plant (I Toole)
2. Seedhead on grazed plant (H Rose)
3. Seedheads blown into piles (K Hertel)
4. Glandular hairs on leaf margins (H Rose)
5. Pairing of spikelets (H Rose)

Kangaroo Grass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Themeda triandra* (formerly *T. australis*)**
CATEGORY **C4 Perennial**

Identification tips

- Tufted, warm season perennial, 60-150cm tall **(*see 1*)**
- Leaves are bluish/green in summer and rusty purple to straw coloured in winter **(*see 2*)**
- Leaves are folded, with long hairs at the leaf-sheath junction; sheath is also hairy
- Seedheads are spatheate and to 50cm long; the large dark-brown and mostly hairless seed has a long black awn **(*see 3 and 4*)**.

Climate and soil requirements

- Widespread on the Tablelands, Slopes and Plains
- Common in relatively undisturbed forests, woodlands and pastures that have not been grazed or only lightly grazed
- Able to colonise a wide range of soil types and is tolerant of acid soils
- Highly drought tolerant, but frost sensitive.

Grazing and nutritional value

- Low to moderate feed quality, but this is highly variable across the region
- Digestibility ranges from 54-75%
- Crude protein 2.8-10.6%.

Management strategies

- A highly variable species that is moderately productive with most growth being produced over spring and summer; many of the more palatable varieties have been grazed out
- Leaves tend to have low phosphorus level and are relatively palatable to cattle, but not sheep
- A well managed stand provides excellent competition against weed invasion
- Although it is frost sensitive, heavy grazing in late summer/autumn can produce new growth that is more frost resistant and will remain green longer into winter **(*see 5*)**
- Abundance declines with increasing phosphorus or nitrogen applications
- Avoid heavy continuous grazing as its buds and storage organs can be depleted, leading to thinning of stands. Heavy grazing just prior to stem elongation can also severely inhibit flowering. However, heavy short-term grazing can be useful in preventing the build-up of dead material, which creates a fire hazard and lowers feed quality
- Its abundance can be encouraged by grazing systems that provide long rests or continuous grazing at low stocking rates
- In conservation areas, the use of cool burns in autumn will promote the grass, although this is not recommended as regular practice on farms
- Seed can be sown by spreading kangaroo grass mulch immediately after harvest in summer. If the mulch is burnt in late winter when the soil is still moist, the seed will germinate as the soil warms up.

Similar plants

- Tall Oatgrass (*Themeda avenacea*) is very similar, but mostly taller (to 2m tall) and the seed is covered in brown hairs. Sporadically distributed in areas with little or no grazing
- Barbed Wire Grass (*Cymbopogon refractus*) has similar foliage, but with a lemon-gingery scent when crushed
- Whisky Grass (*Andropogon virginicus*), in introduced species, lacks long black awns in the seedhead.

1. Ungrazed plant in summer (H Rose)
2. Rusty-purple tinging of leaves (L McWhirter)
3. Seedhead (H Rose)
4. Awned fertile spikelets (H Rose)
5. Frosted plants in winter (K Hertel)

Native Millet

COMMONLY FOUND IN Slope and Plains
SCIENTIFIC NAME *Panicum decompositum*
CATEGORY C4 Perennial

Identification tips

- A densely tufted, warm-season, sometimes short-lived, perennial to 145cm tall **(*see 1*)**
- Leaves blue-green with a distinct whitish midvein and a keel underneath
- Seedhead is an open panicle to 40cm long and with, more or less, paired unawned spikelets; breaks off and blows away when mature **(*see 2*)**
- Flowers in summer and autumn.

Climate and soil requirements

- Widespread and common on the Plains and extending onto the Slopes; often in disturbed or wetter areas; rarely forms dominant stands
- Occurs on a range of soil types, but especially heavy clays and alluvial soils
- Drought and flooding tolerant, but frost sensitive.

Grazing and nutritional value

- Moderate to high grazing value
- No digestibility figures are available
- Crude protein 2.2-10.6%.

Management strategies

- Regarded as an important and valuable forage of the floodplains
- Hays-off in winter, but quickly regrows in spring. Produces a good bulk of highly palatable feed after heavy summer rains or flooding
- Can withstand heavy grazing, but overstocking has led to its disappearance in some areas. Its presence on sandy soils is usually a sign of light stocking, but on clay soils it is usually a sign of overstocking
- Persists best under rotational grazing, using moderate grazing pressure (less than 40% utilisation) to prevent plants becoming tall, rank and less palatable. This can be difficult to achieve in good summers when an excess of feed is most likely to be produced
- Establishes easily from seed, which is spread when seedheads break off at maturity and are blown around; seedheads and can pile up against obstructions and form a fire risk.

Similar plants

- Hairy Panic (*Panicum effusum*) has dull-green leaves, with distinctive long glandular hairs along the leaf margins.

1. Flowering plant (H Rose)
2. Seedhead (L Turton)
3. Ligule (H Rose)

Neverfail

COMMONLY FOUND IN	**Plains**
SCIENTIFIC NAME	***Eragrostis setifolia***
CATEGORY	**C4 Perennial**

Identification tips

- A tussocky warm-season rhizomatous perennial growing to 60cm high, with a swollen and slightly-hairy base **(*see 1 and 2*)**
- Leaves normally rolled, especially when dry
- Seedhead is an open panicle to 16cm long. Spikelets have 9-36 small unawned florets
- Flowers in response to rain throughout the year, but more common in spring and autumn.
- Also known as Bristly love-grass.

Climate and soil requirements

- Widespread and relatively common species on the Plains
- Often more abundant in moister areas, such as on the edges of bores, swamps and in water run-on areas
- Occurs on a variety of soil types; common on clayey soils and periodically flooded sandy loams
- Moderately drought tolerant, but frost sensitive.

Grazing and nutritional value

- Moderate grazing value
- No digestibility figures are available
- Crude protein 3-8%.

Management strategies

- Moderately palatable and readily grazed when young, but ignored when mature if other feed is available
- Tolerant of heavy grazing and may become the dominant species in overgrazed pastures
- Dies back during prolonged dry periods, but readily re-shoots with rain
- Extensive fibrous root system is valuable for erosion control
- Use moderate grazing pressure for production and persistence.

Similar plants

- Purple Lovegrass (*Eragrostis lacunaria*) and Weeping Lovegrass (*Eragrostis parviflora*) lack swollen stem bases and rhizomes
- Stink Grass (*Eragrostis cilianensis*) has a brown ring below the lower nodes of the seedhead.

1. Herbarium specime (CSUVH)
2. Flowering plant (I Toole)

Paddock Lovegrass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Eragrostis leptostachya***
CATEGORY **C4 Perennial**

Identification tips

- A tufted, warm season, perennial to 90cm tall **(*see 1*)**
- Seedhead is an open panicle, which is more than twice as long as broad. Branches and spikelets diverge approximately at right angles, giving a rather rigid appearance **(*see 2*)**
- Spikelets have many small, unawned florets; below each spikelet is a yellow gland
- The yellow gland can pick it out from other species **(*see 4*)**
- Flowers from late spring to autumn.

Climate and soil requirements

- Widespread on the central tablelands and slopes on a wide range of soil types
- Mostly found in woodlands and native pastures, in both disturbed and undisturbed areas
- Moderately drought tolerant and less frost sensitive than many other warm season grasses.

Grazing and nutritional value

- Moderate grazing value
- Digestibility of whole plants range from 41-63%, with green leaf 56-69%
- Crude protein of whole plants 3-10%, with green leaf up to 15%.

Management strategies

- Produces moderate amounts of leafy palatable feed
- Displays increased growth and abundance under improved fertility if large competitive grasses are not present. Becomes leafier with better fertility
- Shows increased growth in response to grazing as this tends to prevent larger grasses shading it out
- Persists best under light to moderate stocking and fertiliser rates, but use strategic heavier grazing pressure to keep pastures from becoming too tall.
- Resting during flowering will aid persistence.

Similar plants

- There are many other *Eragrostis* species in the region, which can be very difficult to distinguish. Not all of these are as valuable for grazing, as many are more frost susceptible and carry a lower green leaf percentage
- Browns Lovegrass (*Eragrostis brownii*) has an open panicle with over lapping or shortly spaced spikelets that are held close to the branches. Very common along roadsides and in disturbed pastures.

1. Flowering plant (H Rose)
2. Widely diverging spikelets and branches in the seedhead (H Rose)
3. Plant (M Keys)
4. Yellow glands (H Rose)

Plains Grass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Austrostipa aristiglumis***
CATEGORY **C3 Perennial**

Identification tips

- Warm season native perennial grass growing in tufts up to 2m tall **(*see 1*)**
- Leaves are up to 6mm wide and 40cm long, rolled in the sheath. The sheath and leaves are ribbed and generally hairless
- It has a stiff membranous ligule and thickened auricles
- Seedhead is an open panicle to 55cm long, with spreading, whorled branches **(*see 2*)**
- Large spikelets have a twice-bent 3-4cm long awn **(*see 3 and 5*)**
- Flowers in spring and summer.

Climate and soil requirements

- Common on heavy clay soils, it prefers good moisture, high fertility, and neutral to alkaline soils
- The Slopes form the eastern edge of its distribution within the region, becoming more common on the plains
- Particularly frost sensitive but drought tolerant.

Grazing and nutritional value

- Low to moderate grazing value
- Digestibility ranges from 39.5-59.1%, but old hayed-off material is as little as 30.0%
- Crude protein 3.8-12.2%.

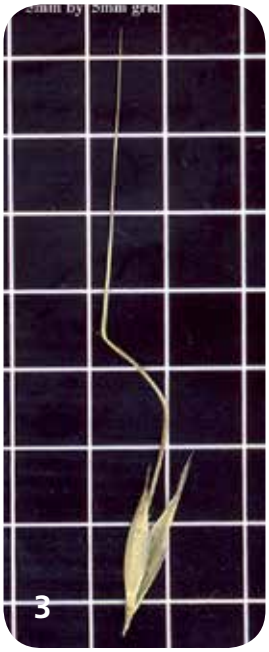
Management strategies

- Provides a competitive perennial pasture which is resilient to weed invasion **(*see 4*)**
- Provides moderate quality feed for livestock when vegetative; low quality when flowering
- More readily grazed by cattle than sheep
- Seeds can cause injury to stock, especially sheep. Heavy grazing or slashing at flowering will reduce seed contamination, but may reduce the populations over time
- Tolerates heavy grazing over summer and autumn, but occasionally resting at flowering will aid persistence.

Similar plants

- Tall Speargrass (*Austrostipa bigeniculata*) is very similar, but has an awn 4-5.5cm long
- Other tall *Austrostipa* species have a similar appearance.

1. Flowering plant (H Rose)
2. Old seedhead (H Rose)
3. Mature spikelet showing twice-bent awn (CSUVH)
4. Plains Grass habitat (J Kidston)
5. Immature spikelet (J Kidston)



Plume Grass

COMMONLY FOUND IN	**Tablelands, Slopes and Plains**
SCIENTIFIC NAME	***Dichelachne spp***
CATEGORY	**C3 Perennial**

Identification tips

- A tall loosely tufted grasses 80 - 150cm tall
- Leaves are narrow and rough to tough
- Seedheads are can be contracted to loose panicles often 6 – 25cm long.
- Spikelets have one nearly-hairless floret that has a twisted and bent awn arising from just below the tip of the lemma
- Flowers late winter to summer
- A number of different Plumegrasses are found in the area. Longhair Plume *(D. crinita)* is often a very tall plant and long seedheads. Loose Plumegrass (*D. inaequiglumis*) and Shorthair Plumegrass (*D. micrantha*) are shorter in height and have shorter awns.
- *D. crinita* – thick seedhead and long awns
- *D. micrantha* – slender seedhead and short awns
- *D. inaequiglumis* – relatively open seedhead; tablelands only

Climate and soil requirements

- Most commonly found in native and naturalised areas and on roadside with less disturbance.

Grazing and nutritional value

- Digestibility little information available
- Moderate to high grazing value
- Crude protein little information available.

Management strategies

- Moderately drought tolerant and high frost tolerance
- Seedling recruitment in the wetter years
- Provides green material in winter and early spring. However, it produces little leaf material
- Will respond to increased fertility
- Mixed results with different grazing regimes.

Similar plants

- Speargrasses have hairy florets with a sharp callus and an awn that arise at the apex of the lemma.

1. *Dichelachne crinita* plant (H Rose)
2. *Dichelachne inaequiglumis* flowerhead (H Rose)
3. *Dichelachne crinita* head (H Rose)
4. *Dichelachne micrantha* flowerhead (H Rose)

Poa Tussock

COMMONLY FOUND IN	**Tablelands and Slopes**
SCIENTIFIC NAME	***Poa labillardierei***
CATEGORY	**C3 Perennial**

Identification tips

- Coarse, densely tufted, year-long green, perennial grass to 120cm high **(*see 1*)**
- Stems round, roughened below seedhead
- Leaves to 80cm long and 3.5mm wide, rough on the lower surface and dull green or greyish green in colour
- Seedhead is an open panicle to 25cm long, with erect or loosely spreading branches **(*see 2*)**
- Florets are shortly hairy and often have a pinkish tinge **(*see 3 and 4*)**
- Flowers most of the year.

Climate and soil requirements

- Most common on the tablelands and higher altitude Slopes, but found in diminishing abundance further westward in sheltered areas
- Prefers moister areas, such as river flats, drainage lines and gullies, especially where soil fertility is moderate to high; highly frost tolerant. Scattered on hillsides where it is protected by boulders.

Grazing and nutritional value

- Low grazing value
- Digestibility ranges from 42-69%
- Crude protein 4-12%.

Management strategies

- Provides shelter for lambs and lambing ewes and is valuable for preventing soil erosion along gully lines
- Can have a very high growth rate, though even new growth is only ever of moderate feed value
- Mature plants have a mass of old leafy material and are not readily grazed. Because of this, it can become highly invasive under light set stocking. However, the new growth of plants that have been burnt or kept short are more readily grazed
- Can be effectively managed by stocking cattle at high densities with protein supplementation and can form a useful maintenance drought feed.

Similar plants

- There are a number of other *Poa* species, which can be difficult to distinguish, but most are associated with drier habitats and are smaller in stature
- Snow Grass (*Poa sieberiana*) is a smaller plant with long fine leaves
- Serrated Tussock (*Nassella trichotoma*) leaves are so tightly rolled that they roll in the fingers like a needle and the seedhead has long awns.

1. Flowering plant (J Kidston)
2. Seedheads (D Eddy)
3. Fresh spikelets (J Miles/M Campbell)
4. Spikelet (CSUVH)

Purple Wiregrass

COMMONLY FOUND IN **Tablelands and Slopes**
SCIENTIFIC NAME ***Aristida ramosa***
CATEGORY **C4 Perennial**

Identification tips

- Tufted, warm-season perennial to 1.2m high **(*see 1*)**
- Stems tend to be wiry, often branched and with very little leaf **(*see 2*)**
- Seedhead is a purple coloured, spike-like panicle to 30cm long, with the branches loosely pressed against the main axis **(*see 3*)**
- Seeds have a three-branched awn **(*see 4*)**
- Flowers from late spring to mid summer.

Climate and soil requirements

- Common on the Central Tablelands and Slopes, extending to parts of the plains
- Grows on lighter textured, low fertility, acid country, often on very drought prone soil; in some areas it can become the dominant grass due to overgrazing of more desirable species
- More common where ground cover is reduced
- Highly drought tolerant, but frost sensitive.

Grazing and nutritional value

- Low forage value
- Digestibility ranges from 22-55%
- Crude protein 2-6%.

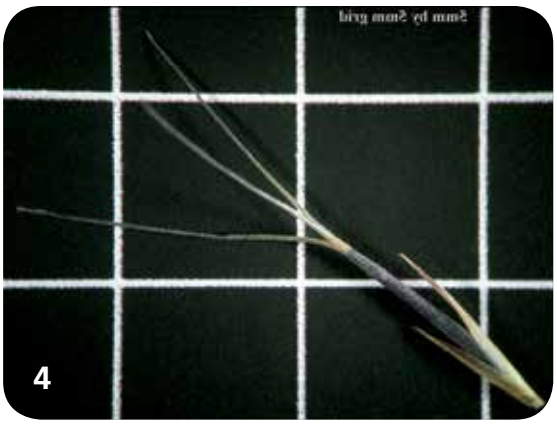
Management strategies

- Provides ground cover even on the poorest soils where few other grasses will grow and can be an indicator of soils less suitable for agricultural production
- Often an indicator of overgrazed pastures as it is only palatable when it is very young. Overgrazing reduces or eliminates more desirable species, allowing purple wiregrass to increase in abundance
- Unpalatable and low yielding, it produces little leaf and what leaf is produced is readily shed during times of stress
- Seeds cause damage to the eyes, fleece, hides and flesh of animals
- Has little or no response to elevated fertility. Application of superphosphate and clover can increase its palatability and a decrease in abundance
- Manage to allow other, more desirable species (if present) to flower, set seed and recover from grazing. For example, burn or slash wire grass late in the first winter to increase its leaf production, then heavily stock over late spring and summer to suppress its growth and seed set. Rest from late autumn to late spring to allow cool season and/or year-long green perennials to grow and set seed.

Similar plants

- There are over 20 *Aristida* species within central west NSW. Most are difficult to distinguish without expert knowledge
- Spear Grasses (*Austrostipa species*) have seeds with just one awn and tend to be much leafier
- Wiry Panics (*Entolasia species*) are very similar vegetatively, but the seeds lack awns.

1. Flowering plant (H Rose)
2. Wiry habit (CSUVH)
3. Seedhead (H Rose)
4. Spikelet (CSUVH)



Queensland Bluegrass

COMMONLY FOUND IN **Plains**
SCIENTIFIC NAME ***Dichanthium sericeum***
CATEGORY **C4 Perennial**

Identification tips

- Tufted warm season, perennial to 80cm tall **(*see 1 and 3*)**
- Stem nodes have a prominent ring of hairs **(*see 4*)**
- Seedhead is subdigitate, to 7cm long and with 2-4 erect branches pressed together
- Spikelets are paired and hairy, with the lower awned. Spikelets occur to the base of the branches (i.e. no bare branch bases) **(*see 2*)**
- Flowers from late spring to autumn.

Climate and soil requirements

- Widespread and common on the Plains and Slopes and extending to the lower Tablelands
- More common on clay soils and sites that receive extra summer moisture, such as water run-on and flood areas
- Abundance varies from year to year; restricted to more favourable sites in dry years, but can become abundant following a series of wet summers
- Moderate drought tolerance, but low frost tolerance.

Grazing and nutritional value

- Moderate grazing value
- Digestibility ranges from 38-62%
- Crude protein 2-7%.

Management strategies

- Highly palatable and nutritious when young and actively growing; stalky and low quality at flowering
- Possibly more suited to cattle enterprises as it appears to be less palatable to sheep, allowing it to become tall and rank
- Growth responds well to increased fertility
- Declines under set stocking systems as cattle selectively graze it (sheep less so); better suited to rotational grazing
- Will easily re-establish from seed, so spell during flowering and seed set to increase or maintain populations.

Similar plants

- The seedhead branches of Red Grasses (*Bothriochloa species*) are bare for a very short distance at their base and the stem nodes are hairless
- Slender bluegrass *(Dichanthium setosum)* is an occasional plant in woodlands. It has purplish seedheads with 1-3 branches. Its habit tends to be slightly smaller with larger spikelets.

1. Flowering plant from the Plains (I Toole)
2. Seedhead (H Rose)
3. Dense stand along roadside (H Rose)
4. Hairy node (H Rose)

Red Grass

COMMONLY FOUND IN	**Tablelands, Slopes and Plains**
SCIENTIFIC NAME	***Bothriochloa macra and B. decipiens***
CATEGORY	**C4 Perennial**

Identification tips

- Tufted, warm season perennial grass to 1m tall **(*see 1 and 2*)**
- Leaves generally grow quite flat to the ground, especially when grazed
- Leaves and stems often reddish or purplish, especially after frost. Nodes are red and hairless
- Seedhead consists of 2-4 erect branches (3-8cm long) pressed close together. Seeds are awned **(*see 3 and 4*)**
- Flowers in summer and autumn.

Climate and soil requirements

- Widespread and common on the Central Tablelands and Slopes, less common on the plains except after heavy rain or flooding
- Wide tolerance of soil types and fertility types, except for very acid soils (pHca<4.2). Restricted to run-on and clay soils in drier areas in Plains
- Highly drought tolerant, but frost sensitive.

Grazing and nutritional value

- Moderate grazing value, but low when frosted
- Digestibility ranges from 48-69% for *B. macra*
- Crude protein 4-15% for *B. macra.*

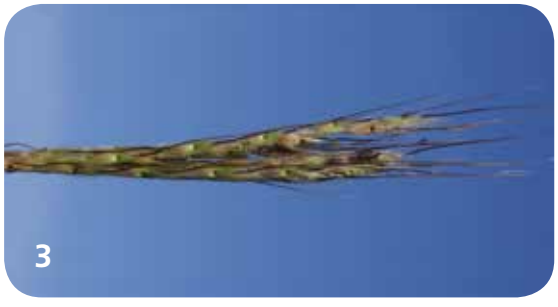
Management strategies

- Tolerates disturbance; one of the commonest species in pasture cropping paddocks and one of the first native plants to return to drought affected sown pastures
- A valuable coloniser of degraded areas and useful for stabilizing waterways
- Can produce a large amount of material, the majority of which is stem. However, it can provide quality feed after summer rain and is best utilized at this time
- Responsive to fertiliser and increased grazing pressure, but grows well in unfertilised areas
- Best kept green and leafy as it has a high stem to leaf ratio when flowering and stock tend to avoid it once it goes to seed; rotational grazing helps maintain larger plants
- Maintain heavier grazing from late winter to mid spring to avoid clover and annual grass dominance in spring or red grass populations can thin out dramatically
- To increase density, allow to seed in summer and rest pastures in late summer to aid seed germination if conditions are suitable
- Seed can be sown by spreading seed-bearing hay or broadcasting and harrowing in spring or early autumn.

Similar plants

- Both Red Grass species are very similar and the fine details of the spikelets are needed to distinguish them. *Bothriochloa decipiens* (also known as Pitted Bluegrass) is most common on the Plains and decreases eastwards; it only occasionally occurs on the Slopes and Tablelands. *Bothriochloa macra* is most common on the Tablelands and decreases in abundance westwards onto the Plains
- Kangaroo Grass (*Themeda triandra*) is vegetatively similar, but has folded new leaves and a spatheate seedhead
- Queensland Bluegrass (*Dichanthium sericeum*) has much hairier seedheads and hairy stem nodes
- Silky Browntop (*Eulalia aurea*) seedheads are covered in dense, reddish-brown hairs.

1. Flowering plant (H Rose)
2. Plants frosted in winter (K Hertel)
3. Seedhead (H Rose)
4. Bare branch bases in seedhead (H Rose)



Rough Speargrass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Austrostipa scabra* (formerly *Stipa scabra*)**
CATEGORY **C3 Perennial**

Identification tips

- Tufted, year-long green perennial to 80cm tall **(*see 1*)**
- Leaves are very fine, long, rolled and usually rough to touch
- Seedhead is a moderately contracted or open panicle to 30cm long **(*see 2*)**
- Spikelet is 10-15mm long, sharp pointed and with a long scythe-shaped awn **(*see 3*)**
- Flowers from spring to autumn.

Climate and soil requirements

- Widespread throughout the Central West, but most common on the Slopes
- Occurs on rocky outcrops, westerly aspects and lighter textured well-drained soils
- Commonest where there is low ground cover and little soil depth
- Highly drought and frost tolerant.

Grazing and nutritional value

- Low to moderate grazing value
- Digestibility of green leaf is usually <60%
- Crude protein 3–17%.

Management strategies

- Productive in early spring and summer, but develops a high percentage of dead leaf, at which stage it has low palatability and quality
- Palatable only when young
- The seed is sharp and can penetrate fleeces and skin or cause eye damage
- Suited to lightly stocked situations. Resting at flowering will aid persistence at higher stocking rates
- Heavy grazing or slashing at early flowering will reduce seed contamination, but may reduce the populations over time
- Has little response to fertiliser and tends to decline under super and clover application due to increased competition.

Similar plants

- *Austrostipa scabra* subspecies falcata has commonly been referred to as *Stipa falcata* in the literature (e.g. Cunningham et al 2003). Many references to *Stipa variabilis* were also referring to *Austrostipa scabra*
- Plume Grasses (*Dichelachne micrantha* and *D. crinita*) have dense seedheads and broader leaves
- Snow Grass (*Poa sieberiana*) is vegetatively similar, but does not have awns in the seedhead
- Serrated Tussock (*Nassella trichotoma*) can look very similar when not in flower; but has rolled leaves, a small, membranous ligule and pink, fluffy seedhead
- Chilean Needle Grass (*Nassella neesiana*) can look similar, especially when in flower, but has a tiny ring of tissue topped by short hairs between the seed and awn.

1. Growth habit (H Rose)
2. Flowering plant (H Rose)
3. Scythe-shaped awns (J Toole)
4. Floret (H Rose)

Silky Browntop

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Eulalia aurea* (formerly *Eulalia fulva*)**
CATEGORY **C4 Perennial**

Identification tips

- Dense, warm-season, tussocky perennial to 90cm tall, with short rhizomes **(*see 1 and 2*)**
- Nodes often with short hairs and a denser tuft of long hairs directly below the seedhead
- Leaves are blue green with a white mid vein; turning purplish-red at maturity
- Seedhead is sub/digitate, consisting of 3-6 erect, silky, reddish-brown branches **(*see 3*)**
- Awned spikelets are paired and both alike
- Flowers most of the year.

Climate and soil requirements

- Common on the Slopes and Plains
- Found in moist areas on flats and along creeks; moderate drought tolerance; low frost tolerance.

Grazing and nutritional value

- Low to moderate grazing value
- Digestibility has not been recorded
- Crude protein has not been recorded
- Moderate feed quality when it is young, declines as it matures.

Management strategies

- Moderate feed quality and palatability when it is young, deteriorating with maturity
- Produces good growth after summer rains
- Responds to improved fertility
- Decreases under moderate to high set stocking
- Persists better under rotational grazing; dense stands have returned after changing from set to rotational stocking
- Rest stands during wet summers to aid establishment as seedlings have poor survival unless conditions remain moist for an extended period.

Similar plants

- Seedhead looks vaguely like Red Grass (*Bothriochloa macra*) or Queensland Bluegrass (*Dichanthium sericeum*); but neither has silky brown seedheads and their paired spikelets are not alike
- Wild Sorghum *(Sorghum leiocladum)* seedheads are panicles with rust-brown to purplish-brown branches. Nodes are hairy.

1. Flowering plants (J Kidston)
2. Growth habit (J Kidston)
3. Seedhead (H Rose)

Silvertop Wallaby Grass

COMMONLY FOUND IN **Tablelands and Slopes**
SCIENTIFIC NAME ***Rytidosperma pallidum* (formerly *Joycea pallida*)**
CATEGORY **C3 Perennial**

Identification tips

- A large, erect, year-long green, perennial tussock to 1.8m tall **(*see 1*)**
- Leaves are long, fine, grey-green and often rolled and hairy; ligule is a hairy rim 1-6mm long
- Seedhead is an open panicle to 35cm long; prominent orange-red anthers are exposed at flowering **(*see 2 and 3*)**
- Flowers from late spring to summer.

Climate and soil requirements

- Widespread throughout the Central Tablelands and Higher Slopes
- Common in drier areas and sometimes dominant in grassy open forests and woodlands; often a relic species where woodland has been cleared
- Mostly found on skeletal to shallow, infertile, sedimentary soils.

Grazing and nutritional value

- Low to moderate feed quality
- Digestibility not measured
- Crude protein not measured.

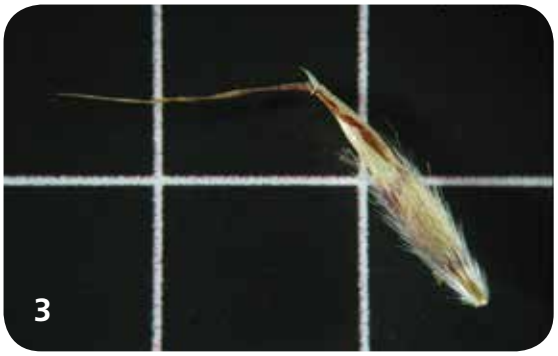
Management strategies

- Forms a valuable summer feed in harsher environments if kept short and green
- Generally avoided by stock due to its tough leaves and the high proportion of dead leaves in the tussock
- It is an important 'indicator' species of light, infertile soils that need special management
- A valuable species for protection against erosion on slopes and ridges
- Conservatively graze to maintain populations, as it will often rapidly decline if frequently defoliated.

Similar plants

- Other Wallaby Grasses (*Rytidosperma* species) lack orange-red anthers and generally form smaller tussocks.

1. Flowering plant (D Eddy)
2. Seedhead (D Eddy)
3. Spikelet (CSUVH)
4. Orange-red anthers (H Rose)



Slender Bamboo Grass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Austrostipa verticillata***
CATEGORY **C3 Perennial**

Identification tips

- Stout, tufted and erect, year-long green perennial to 2m tall **(*see 1 and 2*)**
- Cane-like stems arise from short rhizomes; erect at first then weep at maturity; often branched at nodes **(*see 4*)**
- Seedhead a contracted to open panicle, 15–60cm long
- Small spikelets (3-4mm long) have short hairs and a single long (3-5cm) awn that is weakly once or twice bent; seed is sharply pointed **(*see 3*)**
- Flowers most of the year (spring to autumn).

Climate and soil requirements

- Widespread, common in moist areas; often on red soils and deep sands
- Highly drought tolerant.

Grazing and nutritional value

- Low feed quality
- Digestibility not measured
- Crude protein not measured.

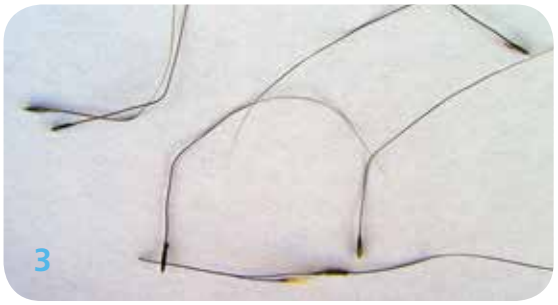
Management strategies

- Palatable and good quality when in leaf, but becomes very stemmy, unpalatable and low feed value at stem elongation. Mature plants are not grazed
- Fine, sharp seeds can cause irritation and injury to grazing animals, especially sheep, piercing eyes and lips and binding around legs; can create conditions suitable for blow-fly strike
- Need to maintain short and leafy (but can be difficult to do so) using moderate stocking rates or slashing; will decline in abundance with high set stocking rates.

Similar plants

- Stout Bamboo Grass (*Austrostipa ramosissima*) is very similar, but is larger (to 2m high) and has hairless spikelets.

1. Habit (J Kidston)
2. Plant (H Rose)
3. Seeds (H Rose)
4. Branching nodes (H Rose)



Slender Rats Tail Grass

COMMONLY FOUND IN Tablelands and Slopes
SCIENTIFIC NAME *Sporobolus creber*
CATEGORY C4 Perennial

Identification tips

- Tufted, warm season perennial grass to 80cm tall **(*see 1 and 3*)**
- Leaves are pale green, largely hairless, quite tough and waxy. Ligule has a hairy rim
- Seedhead is a long, narrow, spike-like panicle to 40cm long. The short branches are pressed against the main stem and the main stem is visible along much of its length **(*see 2*)**
- Flowers from spring to summer.

Climate and soil requirements

- Most common on the Slopes and lower Tablelands, but also extending onto the plains
- Tends to be more prevalent in years with good summer rain
- Found on different soil types depending on moisture availability. In higher rainfall areas it is more common on lighter, well drained soils. In drier areas, it is more common along sandy creek-lines or on heavy clays of the plains
- Generally found in native pastures or sown pastures that have reverted back to native species and is very quick to colonise bare patches
- Moderate drought tolerance, but frost sensitive.
- Also known in some areas as Parramatta grass.

Grazing and nutritional value

- Moderate grazing value
- No nutritional figures available. Those given are for the extremely similar S. elongatus
- Digestibility ranges from 47-63%
- Crude protein 4.8-12.4%.

Management strategies

- Usually a minor component of pastures. However, on lighter textured, low fertility soils it can become abundant in good rainfall years (usually where it is set stocked)
- A mostly summer/autumn growing species that frosts off during winter. The amount of green leaf carried is usually low and very dependent on summer rainfall
- Low to moderate yielding and shows little response to increased fertility
- It has moderate palatability and digestibility when young and leafy, but rapidly produces stout, fibrous stems during the growing season that makes it unpalatable
- Favoured by set stocking if more desirable species are present, as it will be sparingly grazed by stock. As stocking rates increase, it will also become more abundant as ground cover diminishes.

Similar plants

- Slender Rats Tail Grass (*Sporobolus elongatus*) is much less common on the Tablelands and Slopes. Its seedhead has longer branches that conceal most of the upper half of the main stem
- African Parramatta grass *(Sporobolus africanus)* and Giant Parramatta grass *(Sporobolus fertilis)* both introduced species. Their stems bases can are often be flattened and leaves can be tough.

1. Mature frosted plants (H Rose)
2. Seedhead (bent to aid photography) (H Rose)
3. Young plant (Anon)

Snow Grass

COMMONLY FOUND IN Tablelands and Slopes
SCIENTIFIC NAME *Poa sieberiana*
CATEGORY C3 Perennial

Identification tips

- A densely tufted, year-long green perennial to 80cm tall **(*see 1 and 2*)**
- Leaves are long and fine, green to grey-green, rough to the touch and lack a ligule
- Seedhead is pyramid-shaped open panicle to 18cm long, varying from green to purple in colour **(*see 3 and 4*)**
- Flowers from spring to early summer.

Climate and soil requirements

- Widespread in many situations; often in woodlands and forests
- More common on well drained mid to upper slopes than in drainage lines
- High drought tolerance.

Grazing and nutritional value

- Low to moderate grazing value
- Digestibility ranges from 42-69%
- Crude protein 4-12.5%.

Management strategies

- Highly productive and leafy species that produces good quantities of green leaf over winter and early spring
- Grazing value is often limited due to its propensity to become rank and unpalatable
- Will increase in abundance if allowed to become rank and other species are heavily grazed
- Tends to decrease under management that retains a high proportion of green material, for example, heavy rotational grazing
- May require supplementation with slashing or an occasional cool burn to reduce the percentage of dead leaf.

Similar plants

- Poa Tussock (*Poa labillardierei*) forms a larger tussock with leaves to 3.5mm wide. Usually found on more fertile soils with good moisture
- Rough Speargrass (*Austrostipa scabra*) is vegetatively very similar, but has awns in the seedhead
- Serrated Tussock (*Nassella trichotoma*) is also vegetatively very similar, but has a papery ligule and awns in the seedhead.

1. Flowering plant (H Rose)
2. Habit (H Rose)
3. Seedhead (H Rose)
4. Purple tinging of spikelets (CSUVH)

Tall Oat Grass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Themeda avenacea***
CATEGORY **C4 Perennial**

Identification tips

- A tall tufted grass to 200cm tall and with a hairy base
- Stems are hairless, red nodes
- Leaves arise from hairy sheaths. The membranous ligules fringed with hairs
- Seedheads are spatheate. Fertile spikelets are thickly covered with brown hairs and wans are 4 – 10cm long
- Flowers summer and late autumn.

Climate and soil requirements

- Found in Central West slopes and plains
- Tends to be in wetter areas such as drainage lines and depressions. Often in box and gum woodlands, which are infrequently grazed
- Often on sandy loans to clay loams, less likely on heavy clays.

Grazing and nutritional value

- Young plants are grazed and are of moderate feed value. However, as the plant matures it becomes relatively lower quality feed
- Digestibility not measured
- Crude Protein not measured.

Management strategies

- Avoid heavy continuous grazing as its buds and storage organs can be depleted, leading to thinning of stands
- Heavy grazing just prior to stem elongation can also severely inhibit flowering
- However, heavy short-term grazing can be useful in preventing the build-up of dead material, which creates a fire hazard and lowers feed quality
- Its abundance can be encouraged by grazing systems that provide long rests or continuous grazing at low stocking rates
- Abundance declines with increasing phosphorus
- Soil disturbance (eg ploughing) will reduce stand.

Similar plants

- Kangaroo grass *(Themeda triandra)* is very similar, but often shorter in height and more tussocky
- Barbed Wire Grass *(Cymbopogon refractus)* has similar foliage, but with a lemon-gingery scent when crushed
- Coolatai grass *(Hyparrhenia hirta)* is an introduced grass to 1.2m high, with paired branches in the seedhead.

1. Flowerhead (H Rose)
2. Spikelet (H Rose)
3. Plant (C Rose)
4. Plant (H Rose)

Tall Speargrasses

COMMONLY FOUND IN Tablelands and Slopes
SCIENTIFIC NAME *Austrostipa bigeniculata* and *A. rudis*
CATEGORY C3 Perennial

Identification tips

- Erect, year-long green, perennial, grasses, growing in dense clumps to 1.5m high
- Leaves tufted at the base; long and narrow, smooth and rather stiff
- Seedhead is a somewhat-narrow open panicle to 25-50cm long
- Large spikelets have a single seed, with an awn (4.5-9cm long) that is abruptly twice-bent
- Flowers from late spring to mid summer.

Climate and soil requirements

- Largely confined to the south-eastern portion of the Central West, especially higher altitude tablelands
- Found on a range of soil types, from low fertility course sedimentary soils (granite/sandstone) to heavier, more fertile basalts. However, the presence of remnant grassland is probably more important than soil type.

Grazing and nutritional value

- Low to moderate grazing value
- No digestibility or crude protein figures are available.

Management strategies

- Fairly coarse and not readily eaten until more palatable species have been grazed. More readily grazed by cattle than sheep
- Seeds freely and can quickly recolonise disturbed site and degraded pastures
- Seeds can cause injury to stock, especially sheep
- Responds to fertility, but usually not fertilised due to its occurrence in remnant grasslands
- Best suited to lightly stocked situations. Resting at flowering will aid persistence at higher stocking rates
- Heavy grazing or slashing at flowering will reduce seed contamination, but may reduce the populations over time.

Similar plants

- Tall Speargrass (*Austrostipa bigeniculata*) grows to 1.2m tall and has an awn 4-5.5cm long. It is found on a range of soils types, but is most common on heavier, more fertile soils. Of moderate grazing value, it seems to be one of the most persistent grasses in areas of African Lovegrass (*Eragrostis curvula*) infestations
- Tall Speargrass (*Austrostipa rudis*) grows to 1.5m tall and has an awn up to 9cm long. It is found on low fertility sandstones and granites. Of low grazing value, it declines under set stocking and is largely absent from pastures unless lightly stocked
- Chilean Needle Grass (*Nassella neesiana*) has a raised crown of tissue surrounding the base of the awn on the seed.

1. A. bigeniculata flowering plant (H Rose)
2. A. bigeniculata seedhead (H Rose)
3. A. pubescens flowering plant (H Rose)
4. A. pubescens seedhead (H Rose)

Tall Windmill Grass

COMMONLY FOUND IN Slopes and Plains
SCIENTIFIC NAME *Chloris ventricosa*
CATEGORY C4 Perennial

Identification tips

- Erect, warm season, stoloniferous, perennial grass to 1m tall **(*see 1*)**
- Leaves are hairless, 4-10cm long, narrow and usually flat; ligules have short hairs
- The windmill-like digitate seedhead has 3–5 limp pale-green to purplish-black branches that are 4–10cm long **(*see 2*)**
- Spikelets have a blunt apex and the awns are shorter than the spikelet **(*see 3*)**
- Flowers from summer to autumn.

Climate and soil requirements

- Widespread and locally abundant in open woodlands on the Slopes and Plains; also found along roadsides
- Most common on red loamy soils in moister run-on and partly shaded areas
- Moderately drought tolerant, but low frost tolerance.

Grazing and nutritional value

- Low to moderate grazing value
- Digestibility ranges from 33-72%
- Crude protein 8-15%.

Management strategies

- Has a low annual production, but produces most of this very rapidly following summer rains
- Acts as a useful soil stabiliser due to its stoloniferous habit
- Readily grazed by cattle prior to flowering during summer
- Can withstand regular defoliation and has increased production under moderate grazing pressure
- Rotational grazing or resting following good summer rains aids establishment, persistence and spread.

Similar plants

- Curly Windmill Grasses (*Enteropogon species*) and Slender Windmill Grass (*Chloris divaricata*) spikelets have pointed apices
- Rhodes Grass (*Chloris gayana*) has 2 whorls of branches in the seedhead; occasional only
- Windmill Grass (*Chloris truncata*) is common and has 6-9 branches in the seedhead, each 4-20cm long; mature spikelets are black.

1. Plants joined by thick stolons (H Rose)
2. Drooping seedheads (H Rose)
3. Spikelets (H Rose)

Wallaby Grasses

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Rytidosperma* species**
CATEGORY **C3 Perennial**

Identification tips

- Fine leaved, tufted, year-long green, perennial grasses 20cm to 1m tall **(*see 1*)**
- Leaves variable, hairless or hairy and flat or rolled, but generally long, narrow and with a hairy fringe at the junction of the leaf blade and leaf sheath
- Seedhead is a loosely contracted panicle. Spikelets are green with pink tinges along the edges of the glumes in early flowering, becoming fluffy white when mature **(*see 2 and 3*)**
- Florets with an awn arising between two lateral lobes and various arrangements of hairs over the back **(*see 4*)**
- Flowers in late spring and autumn in response to rain
- Leaves grey-green to dark green and often hairy. All species have a hairy fringe at the junction of the leaf blade and leaf sheath **(*see 5*).**

Climate and soil requirements

- Widespread from the Tablelands to the Plains, but is approaching the northern limit of its distribution in the Central West
- Many different species occur across the Central West region; different species are adapted to specific soil types and conditions from very hard shallow soils to more fertile areas
- Generally do not tolerate waterlogging, but are very tolerant of soil acidity and aluminium
- Drought and frost tolerant.

Grazing and nutritional value

- Low to high grazing value
- Digestibility ranges from 45-82%
- Crude protein 10.1-25%.

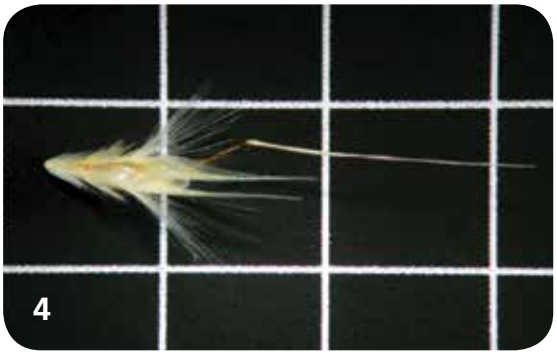
Management strategies

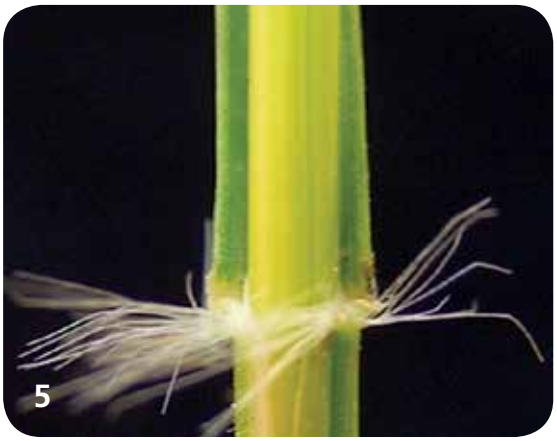
- Feed value is dependant on the species and location; plants growing on very shallow poor soils show little response to fertiliser and often form low quality, unproductive plants. In more fertile areas, plants respond to fertiliser and tend to produce larger quantities of higher quality feed
- Species on more fertile soils mostly increase with increased (to quite high) grazing pressure as their buds and storage organs are at or below ground level and frequent defoliation removes shading from taller plants. Species on infertile soils are generally only suited to light grazing pressure
- Most growth occurs in late winter and spring. Produces little forage after summer rain, but is more likely to do so if plants have been grazed short
- Persists unless very heavily and continuously grazed and will tend to decline if not grazed for a long period
- Does not tolerate heavy shading in early spring, so maintain grazing pressure to avoid dominance by sub clover and other annuals
- Abundance increases with increased (to quite high) grazing pressure as it is very tolerant of grazing and trampling and frequent defoliation removes shading from taller plants
- Maintain moderate grazing in late winter and spring to reduce competition from medics and clovers
- Seeds prolifically unless heavily grazed, so spelling to aid seed set is generally not required. However, reducing stocking pressure or resting the pasture following good rains in spring or autumn will aid seedling establishment
- Seed can be sown in spring by broadcasting onto disturbed surfaces, followed by light harrows in spring or autumn. Coverage should be no greater than 3mm, with reliable moisture and low weed burdens being essential.

Similar plants

- Correct identification of each of the Wallaby Grass species requires expert knowledge
- Silvertop Wallaby Grass (*Rytidosperma pallidum*) has prominent orange-red anthers in the seedhead and forms a tussock to 1.8m tall.

1. Plants with mature seedheads (G Brookes)
2. Immature seedhead (H Rose)
3. Mature seedhead (H Rose)
4. Floret (CSUVH)
5. Hairy fringe at top of leaf sheath (H Rose)





Warrego Summer Grass

COMMONLY FOUND IN Slopes and Plains
SCIENTIFIC NAME *Paspalidium jubiflorum*
CATEGORY C4 Perennial

Identification tips

- Leafy, warm season, tussocky perennial 30-130cm high, arising from short rhizomes **(*see 1 and 2*)**
- Leaves are green to blue-green with a whitish midrib
- Seedhead is a narrow spike-like panicle 10-50cm long, with short, often widely-spaced branches that are pressed against the main axis **(*see 4*)**
- Spikelets (2.5-3mm long) are arranged in 2 rows along branches that end in a short bristle **(*see 3*)**
- Flowers from summer to autumn.

Climate and soil requirements

- Uncommon at higher altitudes, it is mostly found on the Slopes and Plains in the Central West
- Found on a range of soil types, but is most productive on heavier soils on lower slope sites. In drier western area, it is mainly confined to streams and in/around swamps.

Grazing and nutritional value

- Moderate to high grazing value
- No digestibility figures are available
- Crude protein 11-15.5%.

Management strategies

- Palatable and useful forage, even when hayed off due to frost or dry spells. Favoured by livestock, especially cattle
- Seed is reportedly spread in cattle dung
- Potentially useful for the stabilization of waterways following earthworks or erosion
- Resting during summer flowering will allow stands to thicken up
- If a soil seed bank is present, rest in spring to early summer following good rains to encourage seedling establishment
- Seed can be sown by broadcasting, followed by harrows in early spring.

Similar plants

- Box Grass (*Paspalidium constrictum*) and Slender Panic (*Paspalidium gracile*) have spikelets with distinct constrictions along their length
- Bent Summer Grass (*Paspalidium aversum*) has weak and easily compressed stems that often root at the lower nodes
- Most other *Paspalidium* species that occur in the Central West are less than 100cm tall and have spikelets less than 2.5mm long.

1. Flowering plants (K Hertel)
2. Young plants (K Hertel)
3. Spikelets (J Kidston)
4. Seedhead (J Kidston)

Water Couch

COMMONLY FOUND IN	**Tablelands, Slopes and Plains**
SCIENTIFIC NAME	***Paspalum distichum***
CATEGORY	**C4 Perennial**

Identification tips

- Warm season, mat forming perennial grass, 5-50cm tall, spreading by rhizomes and stolons **(*see 1*)**
- Seedheads consist of two erect branches 2-7cm long, forming a v-shape with hairs at the junction **(*see 2*)**
- Spikelets minutely hairy, occurring in two rows along the branches **(*see 3*)**
- Flowers late spring to autumn.

Climate and soil requirements

- Found throughout the Central West
- Prefers heavy clay soils, in or near still or slow flowing fresh water, such as along river and creek banks, around swamp margins and dams; can withstand dry periods.

Grazing and nutritional value

- High grazing value
- Digestibility of green leaf ranges from 57-72%
- Crude protein 8.5-11%.

Management strategies

- Grows rapidly when conditions are moist if temperatures are above 20°C
- Sensitive to frost, although the effect is reduced if surface water is present
- Both stem and leaves provide high quality, palatable feed
- Useful coloniser and stabiliser of waterways, but may cause blockages of drainage channels if not managed
- Resistant to stock grazing and trampling, but is sensitive to shading. Performs best if kept short to reduce competition from taller species. Use short-term grazing to reduce pugging
- Seedheads rarely infected by an 'ergot' fungus that could poison stock
- Seed can be sown, but most often planted using sprigs in late spring and summer. Sprigs can grow at up to 30cm a week during summer. Can also be spread by using seed bearing hay.

Similar plants

- Couch (*Cynodon dactylon*) is vegetatively similar, but grows in drier areas and has a windmill type seedhead
- Mud Grass (*Pseudoraphis spinescens*) is vegetatively similar and grows in wet habitats. However its seedhead is an open panicle.

1. Water couch growing in dam edge (H Rose)
2. Seedhead (H Rose)
3. Minute hairs on spikelets (H Rose)

Weeping Grass

COMMONLY FOUND IN **Tablelands and Slopes**
SCIENTIFIC NAME ***Microlaena stipoides***
CATEGORY **C3 Perennial**

Identification tips

- Year-long-green perennial up to 60cm high, but often much shorter; short rhizomes present **(*see 1, 2 and 3*)**
- Lime green or blue green leaves, with a boat shaped tip and often a notch near the tip. Small hairy auricles **(*see 5*)**
- Seedhead (to 15cm long) is fine and weeping **(*see 4*)**
- Each spikelet has two straight green awns to 20mm long **(*see 6*)**
- Flowers from late spring to autumn.

Climate and soil requirements

- Widespread and common in damp or semi shaded areas on the Central Tablelands and Slopes; relatively uncommon in the Plains
- Can become dominant in some pastures or shaded areas, especially where rainfall is higher. Where rainfall is lower (<650mm), it is only found in moist areas
- Occurs on low to high fertility soils with a pHCa<5.5. In natural stands it tends to become more abundant down to pHCa=3.9. Tolerant of high soil aluminium and drought.

Grazing and nutritional value

- High grazing value
- Digestibility ranges from 56-80%
- Crude protein 11.3-26.9%.

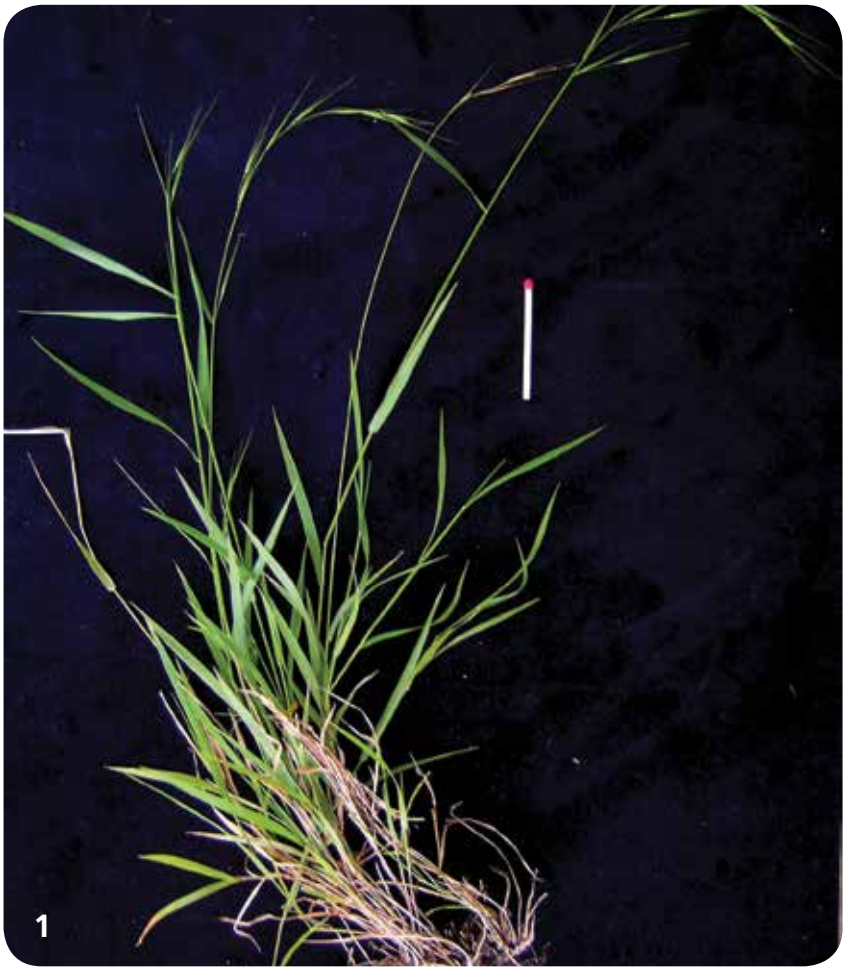
Management strategies

- High quality species that produces most feed from spring to autumn; winter growth is slow in cold areas
- Tolerant of moderate to heavy grazing pressure and should be kept short to maintain quality, especially over summer. However, heavy grazing in spring may reduce summer growth
- Will tolerate heavy shading from annuals in spring
- Responds strongly to increased soil fertility and the use of legumes, but needs to be kept short in autumn to allow clover establishment
- Rotationally graze for better leaf production and to allow seed set in spring and/or autumn
- Seed can be sown by broadcasting, mulching and using a 'Crocodile' planter in spring or autumn.

Similar plants

- Common Wheatgrass (*Anthosachne scabra*) and Silver Grass (*Vulpia* species) have similar seedheads, but don't have two straight awns per spikelet.

1. **Flowering plant** (H Rose)
2. **Foliage** (D Eddy)
3. **Weeping grass paddock** (D Eddy)
4. **Weeping seedhead** (H Rose)
5. **Notched tip of leaf** (H Rose)
6. **Spikelet** (H Rose)



Windmill Grass

COMMONLY FOUND IN **Tablelands, Slopes and Plains**
SCIENTIFIC NAME ***Chloris truncata***
CATEGORY **C4 Perennial**

Identification tips

- A short-lived, warm season, prostrate perennial to usually less than 50cm tall; often stoloniferous **(*see 1 and 2*)**
- Leaves are short, pale green or blue green, with an abrupt taper at the tip (boat shaped); new leaves are folded
- Seedhead is digitate, with 6-9 spikes (to 20cm long) that radiate like the vanes of a windmill **(*see 3*)**
- Spikelets are truncate (blunt tipped), black when mature and with an awn that is longer than the spikelet
- Flowers from late winter to summer.

Climate and soil requirements

- Widespread and common on most soil types on the Plains, Slopes and lower Tablelands
- Acts as a annual in dry years, but as a biennial or perennial in years with effective spring and summer rains
- Often seen growing and seeding in bare or disturbed areas after summer rainfall
- Often abundant in heavily grazed areas, high fertility areas (such as sheep camps) and it is moderately drought and salt tolerant.

Grazing and nutritional value

- Low to moderate grazing value
- Digestibility ranges from 35-68%
- Crude protein 7-12%.

Management strategies

- A useful coloniser of bare or degraded areas, germinating after spring and summer rains
- Most feed is produced in spring and summer, but leaves are fibrous and not very palatable; must be kept green and leafy to maintain quality
- Growth increases with improved fertility, but it will often decline in abundance due to shading from other species unless pastures are sparse or are kept short
- Moderate to heavy grazing pressure in late spring and summer increases the abundance of windmill grass by increasing bare ground and reducing competition
- Probably best grazed by sheep, as it grows close to the ground
- Can be sown by broadcasting onto the surface around early October when the soil has good moisture. If soil moisture is low, it can induce dormancy in the seed.

Similar plants

- Tall Chloris (*Chloris ventricosa*) grows to 1m tall, with 3-5 somewhat limp branches digitately arranged in the seedhead and awns that are shorter than the spikelet
- Curly Windmill Grasses (*Enteropogon ramosus and E. acicularis*) do not have truncate spikelets
- Couch (*Cynodon dactylon*) is a mat-forming grass with unawned seeds.

1. Flowering plant (H Rose)
2. Spikelets (H Rose)
3. Seedhead (H Rose)
4. Windmill Grass paddock (H Rose)

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