

2015

# Management of Grassy Weeds in the Eastern Darling Downs

A Best Practice Manual for the identification and management of grassy weeds.  
Produced as part of CLG1205840-550 Enhancing resilience to invasive grass  
weeds on the Eastern Darling Downs.





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**Australian Government**



## THE EASTERN UPLANDS - WHERE WE LIVE

The eastern part of the landscape in the Eastern or Basaltic Uplands is hilly and undulating near the Great Dividing Range gradually flattening out to a more level plain as you move west.

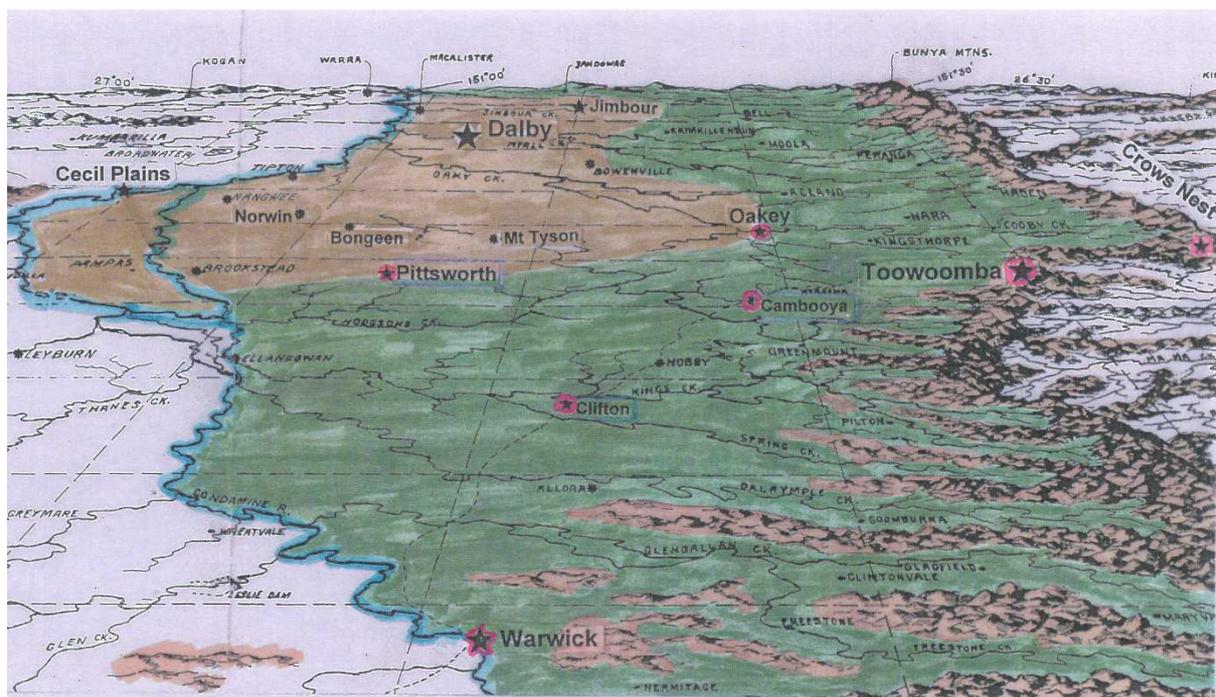
The lower slopes, valleys and plain are a mixture of dark grey and brown cracking clays of good fertility suited to cultivation of crops, forage crops and improved pasture.

Moving up the slopes of hills, soils are shallower clay loams, sometimes sandier and of lower fertility. They are less suited to cultivation, but support a wide range of improved and natural pasture.

The hill country supports open forest of Mountain Coolibah, narrow and broadleaf Ironbark interspersed with patches of remnant Softwood Scrub or Brigalow Belah.

With a subtropical environment and an average annual rainfall of 600 mm, the region is well positioned to support its farming activities. It also favours a range of troublesome weeds, especially some pest grasses that are on Federal and State Declared Weeds lists.

The Cambooya, Clifton and Pittsworth Landcare Districts are part of the Eastern Uplands. The green area on the map below defines the area known as the Eastern Uplands.



## THE IMPACT OF WEEDS

Weeds have a significant impact on the economic, environmental and social activities of the community.

Throughout Queensland, the cost of weeds (both broadleaf and grass weeds) amounts to more than \$600 million a year in;

- Lost production
- Cost of control
- Damage to environmentally significant areas
- Increased cost of infrastructure maintenance
- Compromised biodiversity
- Interference with human and animal health and
- Reduction in the amenity of recreation areas.

There is consequently a strong imperative to prevent the introduction and contain the spread of weeds that threaten ecosystem function and long term sustainability of all our resources.

### Impact of Weeds on Agricultural Productivity and Profitability

- Reduction in the amount of grazing due to competition with native pasture and forage crops
- Reduced livestock production (lost live weight gain, contamination of sheep fleeces)
- Impacts on stock health (eye injury, allergies, toxicity)
- Interrupted stock movement
- Reduced crop yields and contamination of harvested grain
- Reduced land values

### Impact of Weeds on Natural Vegetation Biodiversity

- Competition with and reduction in the abundance of natural plants
- Reduced ground cover and degraded soil health due to erosion (particularly broadleaf weeds)
- Decreased stream bank stability due to erosion (particularly broadleaf weeds)
- Reduction in the habitat for native fauna while providing a habitat for pest animals.
- Increased fuel load and potential for fire

### Impact of Weeds on Society

- Human health problems (allergic reactions, toxicity, beestings)
- Reduced recreational values (pollution of swimming areas, sports grounds, and other areas of recreational enjoyment)
- An altered landscape, leading to spoilt views and reduction in the potential for tourism
- A high economic impact (lost production and cost of control).

A common definition of a weed is “a plant out of place.” This means a plant considered a weed by some can be a useful plant to others. Classic examples of this are grass escapees from improved pasture where they have played an important role in feeding stock. Some of these are Green panic, Rhodes grass and Paspalum.

Landholders don't always react to a weed threat because reclaiming land from a weed invasion is often expensive and time consuming. In addition, this investment is not always recoupable as the productivity of the land may not improve after clearing the weed. It is important to recognise however, that where weeds are declared under Federal, State or Local Legislation, landholders have certain obligations to control the pest in question.

## HOW DO WEEDS INVADE?

As young grass seedlings have difficulty in establishing against adult plant competition, a weed grass may have to wait for its opportunity to invade healthy and vigorously growing vegetation.

Grass weeds are more likely to invade where:

- existing plants are sparse and uncompetitive
- bare ground exists between plants caused by crop row configuration, drought or fertility rundown and
- overgrazing or unnecessary burning has reduced the vigour of existing species causing some to die, opening up gaps in the canopy.

A dormant grass weed seed bank scattered about the pasture from a previous shedding may help facilitate their take-over of a pasture. Open spaces between grass tufts may be colonised by useful grasses but given a level playing field they can be outcompeted by more vigorous weedy grass species.

Weeds can also invade from areas outside of your property. Roadsides are a common reservoir of weedy plant seeds, but roadsides themselves are as much victims of these weeds as are private properties. Inappropriate roadside management (mowing/slashing etc and poor machinery hygiene, travelling livestock, plus water movement) can lead to the introduction of these weeds into roadsides and their subsequent spread to neighbouring property. Such sites are also prone to disturbance by road building/maintenance machinery, leaving them exposed to the risk of infestation.

In the past it has been difficult for landholders to legally apply chemicals onto the roadside. However, in an effort to improve the timeliness of weed management, it is now possible for landholders to apply to Toowoomba Regional Council (TRC) for a permit for roadside weed control. This will make it easier for landholders to comply with their obligations to control Class 1 and 2 weeds on and near their properties and help restrict the spread of weeds that may have economic consequences to their business.

Grass weeds can also spread to cultivation where there has been a change in management practices. The widespread adoption of No Till Farming has seen some grass weeds proliferate in the absence of cultivation. Feathertop Rhodes grass is a prime example and can quickly invade cropping paddocks and out-compete grain crops. Significant investment has been made to research control measures for Feathertop Rhodes grass, without having to revert back to cultivation.

## HOW ARE GRASS WEEDS SPREAD?

Grass weeds are spread from an existing infestation to a new site by a variety of mechanisms. The table below indicates the ways in which grassy weeds can be spread, and the management strategies that can be employed to minimise this spread. Where practical, buffer zones should be established between weedy and clean areas i.e. target the control of a weed on the margins of its infestation to limit its spread to clean areas.

<b>Spread Mechanism</b>	<b>Description</b>	<b>Management Strategy to Minimise Spread</b>
<b>Wind dispersal</b>	Many grass seeds are light enough to become air borne and a strong wind or a swirl of dust from a passing truck could easily relocate them. In other plants the seed heads are designed to roll across the landscape, depositing seed as they go or where they come to rest.	Capacity to control dispersal by wind events is limited; removal of parent plants may reduce risk of seed dispersal.
<b>Water dispersal</b>	Water can spread grass seed following heavy rain events, whereby runoff water flows in natural drainage lines across the landscape. In more severe flood events, grass weeds may be spread across an entire floodplain.	Capacity to control dispersal by water is limited; removal of parent plants may reduce risk of seed dispersal.
<b>Wet weather</b>	During wet weather grass seeds can be found in soil attached to animal hooves and coats, motor vehicles and machinery.	Avoid moving livestock or vehicles through infested sites during wet weather.
<b>Transfer on animal's fur, wool, human clothing.</b>	Some grass seeds are sticky, hairy, and prickly or sharp pointed. All are designed to attach to something and after being moved around by their host, can fall off in a new location. Feral animals like pigs and dogs or native animals like wallabies can also spread grass seed in their fur.	Avoid unnecessary working in or allowing stock to feed or move through pasture where grass weeds are actively flowering and seeding. Quarantine as you would for seed through the animal. Hand pick clothing to remove all attached seeds (burrs and spears) from trousers, socks and footwear.
<b>Through the animal</b>	Many animals eat pasture or hay that contains weed seeds. The viability of these seeds is not always destroyed during the digestive process and after being processed in this manner it can often make them more germinal.	Avoid unnecessary working in or allowing stock to feed or move through pasture where grass weeds are actively flowering and seeding. When moving stock from weedy areas into clean areas, spell stock in a yard or small quarantine paddock for at least 5-10 days. Similarly spell stock entering your property especially if suspected of coming from a weedy area. During the period of restriction it is hoped that weed seed will pass through the animal and be excreted in their dung or simply fall off their bodies. Wool might be an exception. Animal dung and quarantine areas should be closely monitored to detect any grass weed seedling growth and destroy it.

<b>In farm produce</b>	The importation of fodder (hay or grain) can bring with it undesirable grass weed species.	Ensure any fodder, seed, agricultural produce entering your property are free of weed seeds. Insist on being supplied with a Vendor Declaration, specifying potential weed seeds. If you suspect weeds are present, feed the fodder in a designated area, and inspect and treat weeds as they emerge.
<b>Motor vehicles and machinery</b>	Grass seed can collect on motor vehicles moving through weedy areas. It can also collect in the dust that accumulates on machines like slashers and other earthmoving, harvesting and cultivation machinery. The seed may fall off a vehicle or machine as it moves to a new location.	<p>To minimise the spread of weed seed after working in a weedy area motor vehicles and machinery should be thoroughly inspected and cleaned. This includes removal of dust and mud from under mudguards, other nook and cranny recesses, and storages where dust is likely to accumulate. In motor vehicles check the engine bay, radiator, the foot wells inside the cabin and the back of the utility or station wagon. Designate a particular 'clean-down' site on your property. For more information on this topic consult the clean-down procedures given in <a href="https://www.daff.qld.gov.au/_data/assets/pdf_file/0011/58178/IPA-Cleandown-Procedures.pdf">https://www.daff.qld.gov.au/_data/assets/pdf_file/0011/58178/IPA-Cleandown-Procedures.pdf</a></p> <p>Vehicles entering your property should be treated in a similar way. Slasher covers or fans can reduce the opportunity for seed to accumulate on these machines.</p> <p>For plants like Johnson grass, cultivation or planting machinery can break up rhizomes and spread their vegetative fragments to other parts of the field or other areas. Roadside grading could do the same.</p>

## MANAGEMENT OF AN EXISTING WEED INFESTATION

Successful weed management requires us to consider a weed's biology. This will then allow the best options for control to be determined. Understanding the weed and its various control options ensures that money and hard work are not wasted and reduces the risk that surrounding useful vegetation will be accidentally damaged. It is important to always be on the lookout for new or unfamiliar plants, as early detection of a weed and its control could save a massive clean-up operation later.

A successful weed control program will involve the integration of strategies that includes stopping the weed from setting seed, exhausting its seed bank in the soil and where possible killing the plant outright. The strategies you ultimately use will depend on the enterprise you are operating.

### Strategies for Dealing with a Grassy Weed Infestation in Cropping Paddocks

- Consider what rotation of crops will allow you to best control the weed, keeping in mind what time of the year it is actively growing.
- Incorporate a legume into the rotation where possible, to enable the use of Group A herbicides. Keep in mind the potential for weeds to develop resistance to Group A herbicides, so use this group of herbicides strategically.
- Investigate the opportunity to use residual herbicides to give longer term chemical control.
- Consider the use of "double knock" technology (an initial chemical treatment in the fallow, followed soon after by an application of a Group L product).
- For tall weeds like Johnson grass, wick wiping to prevent seed set has been successful.
- Be vigilant and control outbreaks of weeds when they are first identified using chipping, spot spraying, burning or cultivation of small areas.
- In the fallow, consider cultivation.

For a complete list of Herbicide Groups/Modes of Action refer to [http://www.grdc.com.au/uploads/documents/GRDC\\_HerbicideCard.pdf](http://www.grdc.com.au/uploads/documents/GRDC_HerbicideCard.pdf)

### Strategies for Dealing with a Grassy Weed Infestation in Improved Pasture

- Employ rotational grazing with high stocking rates to ensure all plant species are crash grazed thus avoiding the selective grazing of more palatable species. Note that some species are unpalatable at every growth stage, so grazing may be ineffective.
- Consider a 2-3 year period of cultivation using long season forage sorghum varieties with appropriate pre and in-crop herbicides.
- Follow up with a competitive pasture sown at an above average seeding rate to ensure there are enough grass seedlings to compete strongly with any residual weedy grass seedlings that might also germinate at the same time.

### Strategies for Dealing with a Grassy Weed Infestation in Natural Unimproved Pasture

- Spot spraying with herbicide may be the only practical option.
- Spreading fertiliser may help to reduce the problem of fertility rundown, but may not significantly improve natural pasture growth because most species are used to growing in a lower fertility environment. An exception is Queensland blue grass.
- Applying gypsum to improve soil condition is proving effective in reducing the vigour of African Lovegrass.
- Renovation is generally ineffective and may even assist a grass weed to spread. It's difficult to find a grass competitor to sod seed into a natural pasture that will outperform a weed grass.

## Slashing – some comments

Slashing is a popular method of weed control in pasture, roadside and urban areas as it is cost effective, instant and not labour intensive.

Slashing or mowing is a way of removing unpalatable rank, mature pasture growth and evening up the height of a pasture. It may also be useful in removing the immature seed heads of grass weeds before they have a chance to set seed.

Slashing normal mature pasture should be timed to coincide when regeneration is most likely to occur i.e. before the probability of good rainfall or just after. If mown too low, below 10 cm for example, sensitive natural plants may be damaged as many native grasses make new growth from the lower nodes on their stems.

Slashing in some instances can reduce the vigour of a weed, but slashing on its own doesn't kill weeds. They will regrow and will need re-slashing.

Unfortunately slashing has the potential to spread weed seeds, unless the machine is regularly cleaned between jobs. Machine modifications like a cover or a fan may reduce the risk of weed seed spread by stopping the build-up of trash on the machine.

Many landholders like to slash the roadsides to minimise the spread of weeds onto their properties. It is important if you are in an area with known infestations of Declared Weeds e.g. Chilean Needle grass, that you communicate your management intentions with TRC. As part of their commitment to the Biosecurity Queensland Chilean Needle Grass Management Plan, they have a documented plan which details spraying regimes and it is important to avoid slashing during these times.



Toowoomba Regional Council slasher fitted with a blower

Image: Toowoomba Regional Council

### **Fire – some comments**

Fire is most useful in cleaning up and removing tall, old dry, mature foliage especially where it might be impractical to slash. When used correctly, fire can help suppress weeds, but regular burning can be detrimental causing undesirable ecosystem modification. For example it promotes young grass shoots and may expose more palatable pasture species to selective or overgrazing, causing them to die out.

Burning should be done after rain to ensure the fire is not too hot to minimise the potential damage to non-weedy grass crowns.

On the down side, fire not only stimulates new pasture growth, it can also stimulate weeds to regrow from existing plants and seed. Many weedy grasses are tolerant of fire and it can favour and further their invasion.

Fires are unpredictable and difficult to manage safely and potentially dangerous if they get out of control. For fires over 3x3m, permits are required, with notification of all neighbours or potentially affected parties advisable. Adequate fire-fighting equipment should be on hand to contain the blaze should it get out of control.

### **Frost – some comments**

The foliage of most summer growing grasses remains green until frosted. Although top growth is browned off, the base of the tuft remains undamaged ready for regrowth when the temperature rises and it rains in spring. Weedy grasses follow a similar trend, so it is not practical to rely on frost to control a grassy weed infestation.

## SO... HOW SERIOUS IS THIS WEED?

The management of weeds can be legislated at the Federal, State or Local Government jurisdiction.

At a Federal level, thirty two Weeds of National Significance (WoNS) have been agreed by Australian governments based on their invasiveness, potential for spread and environmental, social and economic impacts. The management of these weeds requires coordination across all levels of government, organisations and individuals with responsibilities in weed control. The grassy weed Chilean Needle Grass, first found at Felton in 1998, is included in the list of WONS weeds.

## THE CATEGORIES OF DECLARED PLANTS IN QUEENSLAND

### What is a declared plant?

Pest plants targeted for control under state legislation are species that have, or could have, serious economic, environmental or social impacts. Pest management legislation aims to protect Queensland's economy, biodiversity and people's lifestyles by:

- preventing the introduction and establishment of new pest plants in Queensland
- preventing the spread of established pest plants into new areas
- reducing the extent of existing infestations where feasible.

Fundamental to the *Land Protection (Pest and Stock Route Management) Act 2002* is the legal responsibility for all landowners to keep their land free of pests. The obligations for landowners are specified in Section 77 of the Act.

### *Section 77 Obligation of landowners*

*(1) A landowner must take reasonable steps, to keep the following free of Class 1 and 2 Pests, unless the owner holds a declared pest permit allowing the pests to be kept on the land-*

- (a) the owners land ;*
- (b) unfenced land comprising part of a road or stock route that adjoins or is within the owner's land;*
- (c) other land that is fenced in with the owner's land;*
- (d) the bed, banks and water of a watercourse on a owner's land;*
- (e) the bed, banks and water to the centre line of a watercourse forming a boundary, or part of a boundary, of the owners land.*

Declared plants are listed under three different categories.

### **Class 1**

A class 1 pest is one that has the potential to become a very serious pest in Queensland in the future. We need to prevent the introduction, possession and sale of these species so they can't escape and become pests.

All landholders are required by law to keep their land free of Class 1 pests. It is a serious offence to introduce, keep, release or sell Class 1 pests without a permit.

### **Reporting Class 1 pests**

Phone 13 25 23 to contact Biosecurity Queensland. Prompt action by everyone will protect our agricultural industries, natural resources and the environment from further degradation by introduced plants.

### **Class 2**

A Class 2 pest is one that has **already spread** over substantial areas of Queensland, but its impact is so serious that we need to try and control it and avoid further spread onto properties that are still free of the pest.

By law, all landholders must try to keep their land free of Class 2 pests and it is an offence to possess, sell or release these pests without a permit.

### **Class 3**

A Class 3 pest is one that is **commonly established** in parts of Queensland. Landholders are not required to control a class 3 declared pest plant on their land unless a pest control notice is issued by a local government because the pest is causing or has the potential to cause a negative impact on an adjacent environmentally significant area.

It is an offence to supply a Class 3 pest. A permit for specific purposes may be issued by Biosecurity Queensland.

### **Local government**

Species not declared under the *Land Protection (Pests and Stock Route Management) Act 2002* may still be declared under local government (council) law and be reflected in the local government area pest management plan.

There are currently no adopted local laws of TRC which pertain to pest management. For a copy of the TRC Pest Management Plan refer to <http://www.toowoombarc.qld.gov.au/docs/environment-and-waste/pest-management-plan/5235-toowoomba-region-pest-management-plan-2014-2018/file>

(Reference: Department of Agriculture, Fisheries and Forestry, Biosecurity Queensland, Fact Sheet, Declared Pest Plants, PP1, October 2013. [www.biosecurity.qld.gov.au](http://www.biosecurity.qld.gov.au)).

## DEVELOPING A SHARPER EYE

To the untrained eye most grasses look much the same before they produce a seed head. However, each grass does have its own set of unique features which can be used to clearly differentiate between species.

Many grasses are self-pollinating (apomixes) which means that the plants in a population of these grasses would all have a similar appearance. An open pollinating grass like African love grass will have many different varietal types within its population, adding another layer of difficulty into the recognition process of a grass in its vegetative stage.

However, recognition of a grass is not impossible. It depends on being familiar with its general appearance and of any distinguishing features.

The next time you travel through your pasture don't let it be just a mixture of different shapes and textures of greens and blues. Stop at intervals and see just how many plants you can identify by name.

To facilitate the ongoing learning process, collect specimens of flowering grasses and forbs, have them correctly identified and file them away for future reference.

The following section details the different parts of a grass and how they can be used to differentiate between species.

## WHAT'S IN A PLANT NAME?

The scientific system of botanical classification divides and subdivides the entire world of plants into a number of orders, classes and families as a convenient way of identification. Each plant included in any family has an individual two part botanical or Latin name as Latin is the universal naming language of science. The first name indicates the genus (or subfamily) the plant belongs to and the second name the species within the genus. Then comes the common name and lastly the names of the cultivars or varieties that occur within the species, for example;

Family: POACEAE (the family to which all grasses belong)

Genus: *Chloris*

Species (sp): *gayana*

Common name: Rhodes grass

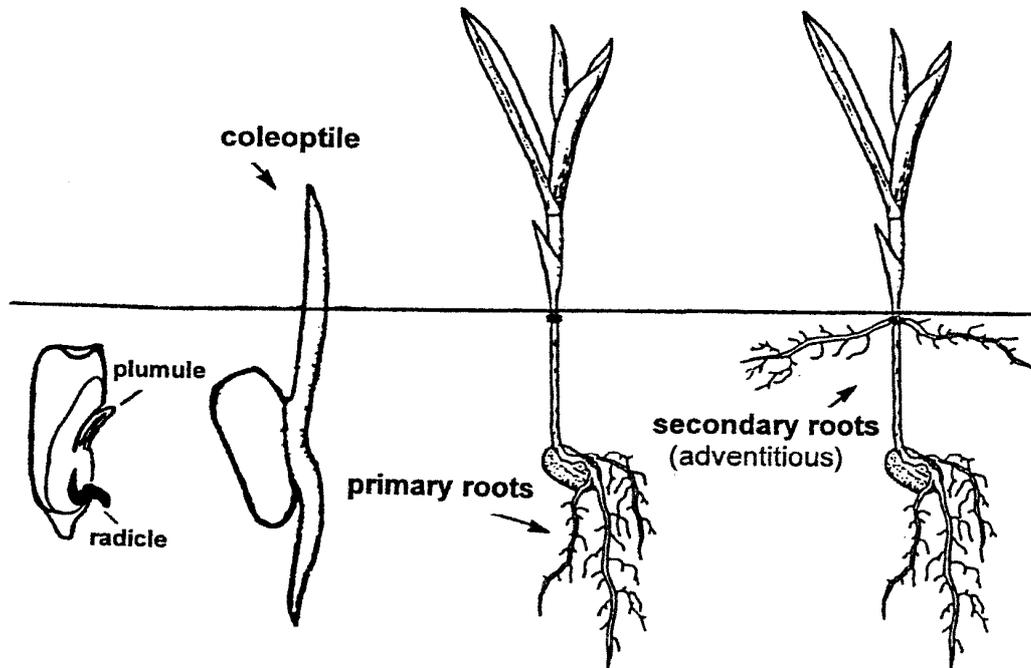
Cultivar (cv): Pioneer.

Rhodes grass (*Chloris gayana*) cv. Pioneer.

Note the botanical name is always written in italics. The genus is spelt starting with a capital letter, while the species name is always started with a lower case letter.

## HOW DOES A GRASS PLANT GROW?

A grass (Monocotyledon) is a plant with one seed leaf, a fibrous root system, and narrow, linear leaves with unbranched veins running parallel to the midrib.



The stem (plumule) develops into a sharp pointed shoot called a coleoptile that pushes up and breaks the soil surface and emerges. The coleoptile then breaks open and allows the grass leaves to emerge.

The root (radicle) grows down to form a primary root system. A grass can only survive for a short time on its primary root before the top outgrows the primary roots ability to support it. In order to survive the grass seedling has to develop a secondary root system. This always forms from a node on the grass seedlings stem at ground level (the sub crown internode). After good rain this expands to form the base (crown) of the grass plant. New root and shoot growth are produced from buds in the crown. A grass always grows a fibrous root system.

Inside a young shoot the growing point produces new leaves. Each leaf is attached to a leaf sheath by a collar. The leaf sheath is attached to the grass stem at a node. In the vegetative stage of growth the nodes and seed stem are immature and cannot be felt. As each leaf grows it emerges from the top of the shoot, it may be either round or folded, and then expands to full size.

Eventually under a stimulus like good rain or a shortening of day length, the growing point stops producing leaves and starts growing a seed head. This is the start of jointing, where the nodes mature to support the weight of the developing seed head. The seed head is pushed out of the top of the shoot by the considerable lengthening of the flower stem between the nodes. The seed head is fully developed when it emerges from the flag leaf or last leaf at the top of the stem where it expands into its normal shape, flowers, produces seed and dies.

## SEEDLING ESTABLISHMENT IN PRACTICE

We live in an environment where the variability of individual rainfalls is high. Native pasture plants have evolved in this environment. After the temperature rises in spring, every rainfall event will encourage a flush of new growth and a quick progression to flowering so they can produce seed before the soil moisture dries out.

Grass seed germination follows a similar trend and will continue to do so after each good summer rainfall event. Hopefully any rain would be heavy enough to wet up the surface soil and join it up with the moisture in the subsoil.

Seeds germinate better if they fall into little depressions (microsites) where a little extra rain water may accumulate and often cover the seed with a fine layer of silt. Accumulated leaf litter on the soil surface will also provide a friendly germination site, provided it remains moist.

A grass seed needs at least 2-3 days in moist soil to germinate, develop a root and establish a seedling. The seedlings primary root is sustained by subsoil moisture until follow up rain promotes the growth of its secondary root system to properly establish the grass seedling.

Most young grass seedlings die because they are small, weak and cannot establish a proper root system. Probable causes are:

- Moisture stress caused when;
  - \* the germinating rain did not link up with subsoil leaving the grass seedling's developing primary root stranded in dry soil.
  - \* the germinating rain evaporated faster than the seed's primary root could grow.
- Follow up rain did not occur to establish a secondary root system. The primary root can only support the growing leaves for a limited time before they outgrow its ability to support them.
- Grass seedlings do not easily establish against the competition from existing adult plants.

### **Dormancy**

Most successful grass species produce large amounts of seed to ensure their survival as seedling death under normal conditions is high.

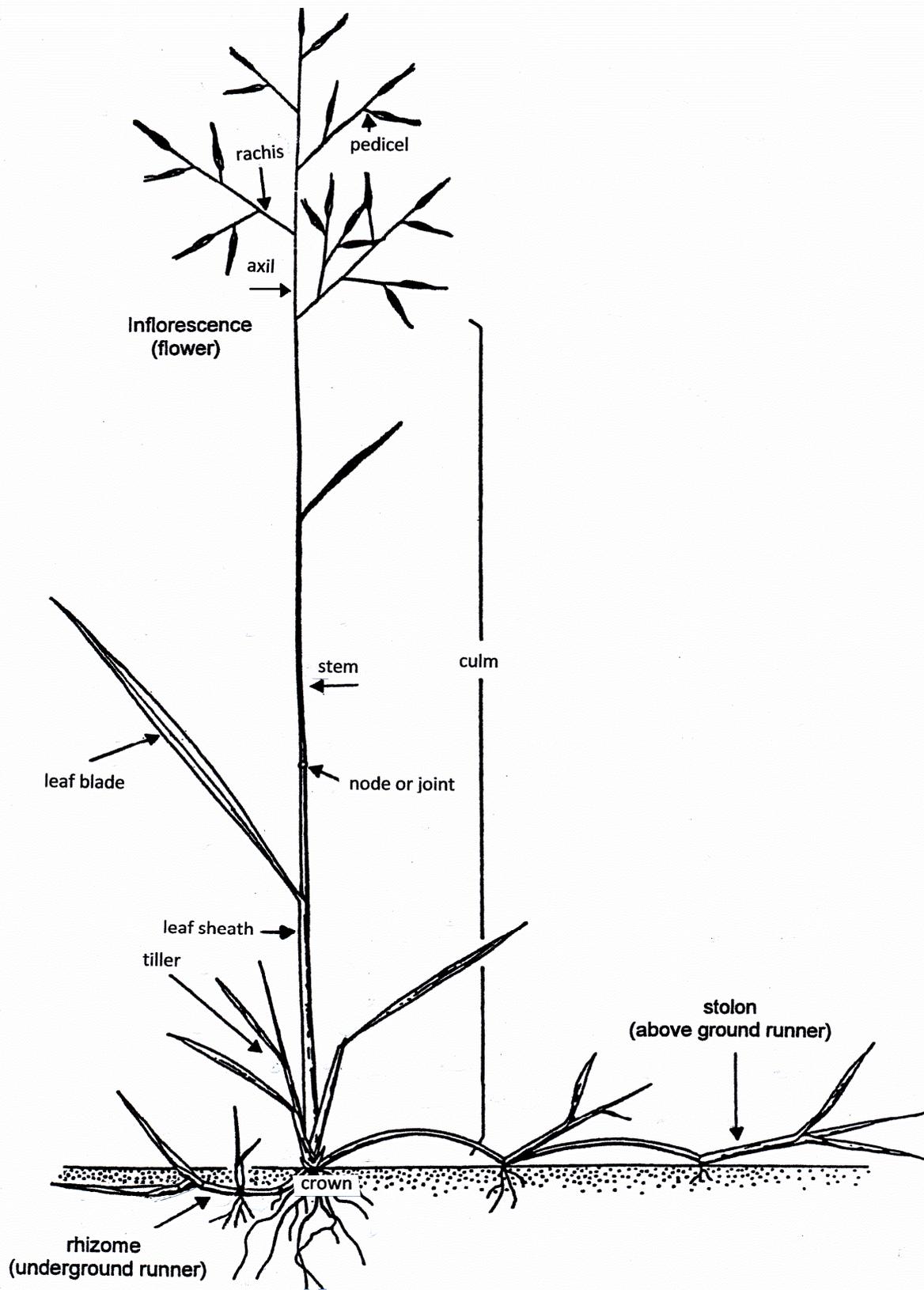
High seed production produces a seed bank that can last for many years. This seed survival property is aided by a process called dormancy, a state of temporary inactivity by the seed. This is usually caused by a blockage of the hole (micropyle) that allows water to enter the seed (imbibe).

Most grass seed has a high level of dormancy when first mature but owing to a process called weathering, repeated seed exposure to variations of water, sun (temperature), oxygen and light, dormancy will gradually break down and allow the seed to germinate. Dormancy ensures that a grass's seed doesn't germinate all at once but spreads it out over many rainfall events with a time frame of months to years.

Buried in soil, grass seed can remain dormant until it is brought to the surface by some soil disturbing event like soil erosion or cultivation.

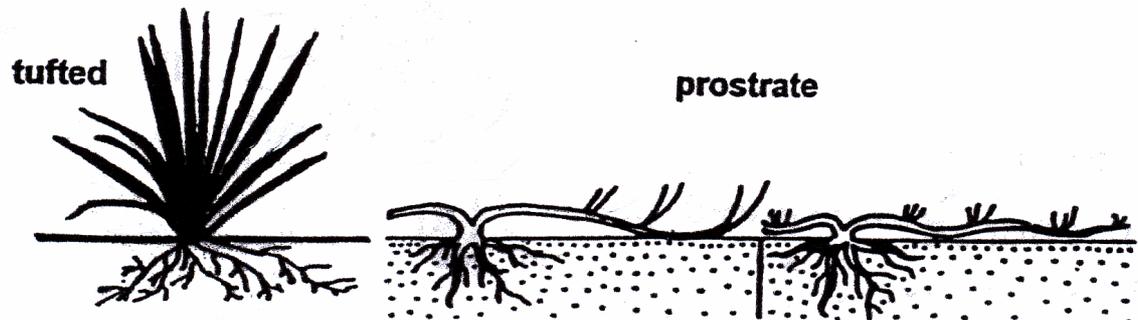
# CHARACTERISTICS FOR GRASS IDENTIFICATION

## General characteristics



## Growth habit

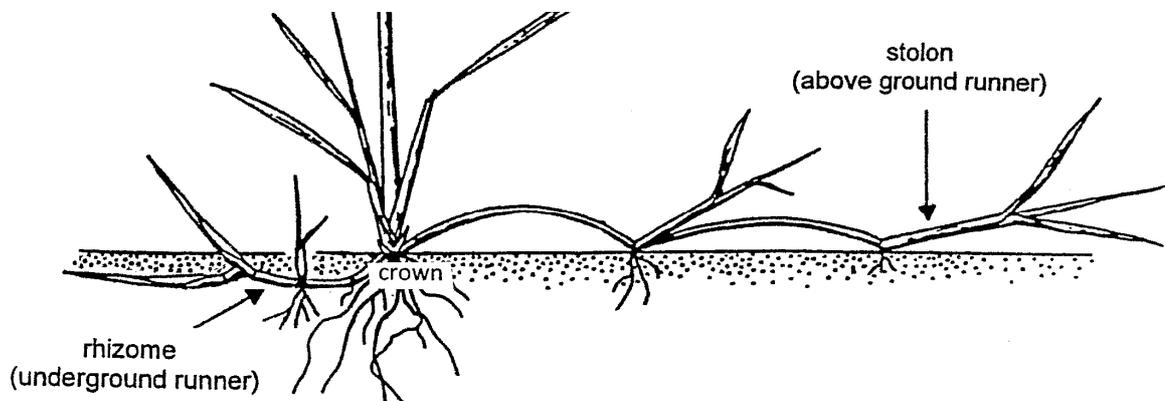
A grass may be an *upright* group of shoots growing from a base or crown of the plant called a tuft or tussock, or *prostrate* with its shoots lying close to or on the ground.



## Stolon and Rhizome

The plant may spread from shoots or runners called *stolons* that grow away from the base of the plant along the surface of the ground. Where the nodes along the stolon touch the ground they can grow roots and develop new plants.

A shoot or underground runner called a *rhizome* grows from the base of the plant and grows away from it just under the soil surface. It can also produce new plants from nodes along its length.



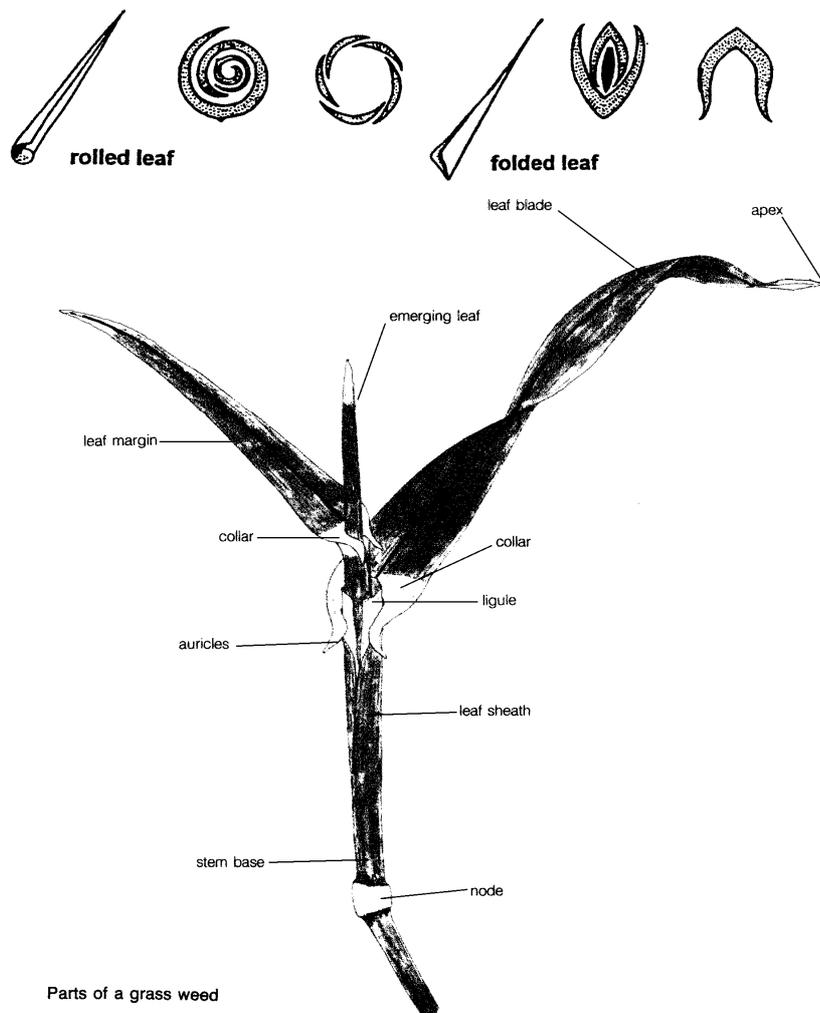
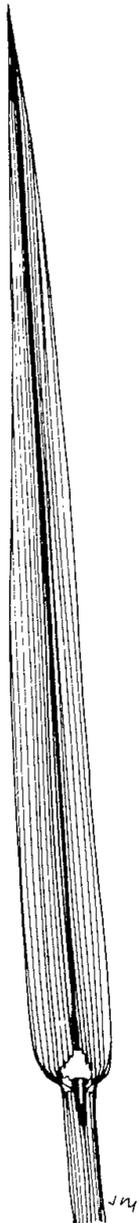
## Leaf

The colour of grass leaves can be distinctive as in different shades of blue or green.

All grass leaves are linear in shape and have a thick vein called a midrib running unbranched down the centre of the leaf from the collar to the tip. Smaller veins unbranched run parallel each side of the midrib. Each leaf blade is attached at the collar to a leaf sheath which is attached to a node.

A leaf may:

- be wide or narrow
- be rolled or folded (most noticeable at the top of the shoot as the leaf emerges)
- be soft or coarse
- be smooth (*glabrous*) or hairy (*hirsute*). The hairs can be found on different parts of the leaf and may be of different texture, soft, coarse, fluffy
- have different auricles and ligules
- have hairs on the nodes at the base of the leaf sheath.



Parts of a grass weed

## Seed head

The seed head with its flower and seed is the most distinctly identifiable part of a grass plant. Grass seed heads can be grouped according to their architecture, e.g. shape, and the arrangement of flowers and seeds. Identification can often be made with reasonable accuracy simply by gaining knowledge of general seed head shapes. Each grass has its own unique flower colour, shape size and arrangement.

General seed head shapes (Reference Flora of South Eastern Queensland, Vol 3, page 31).

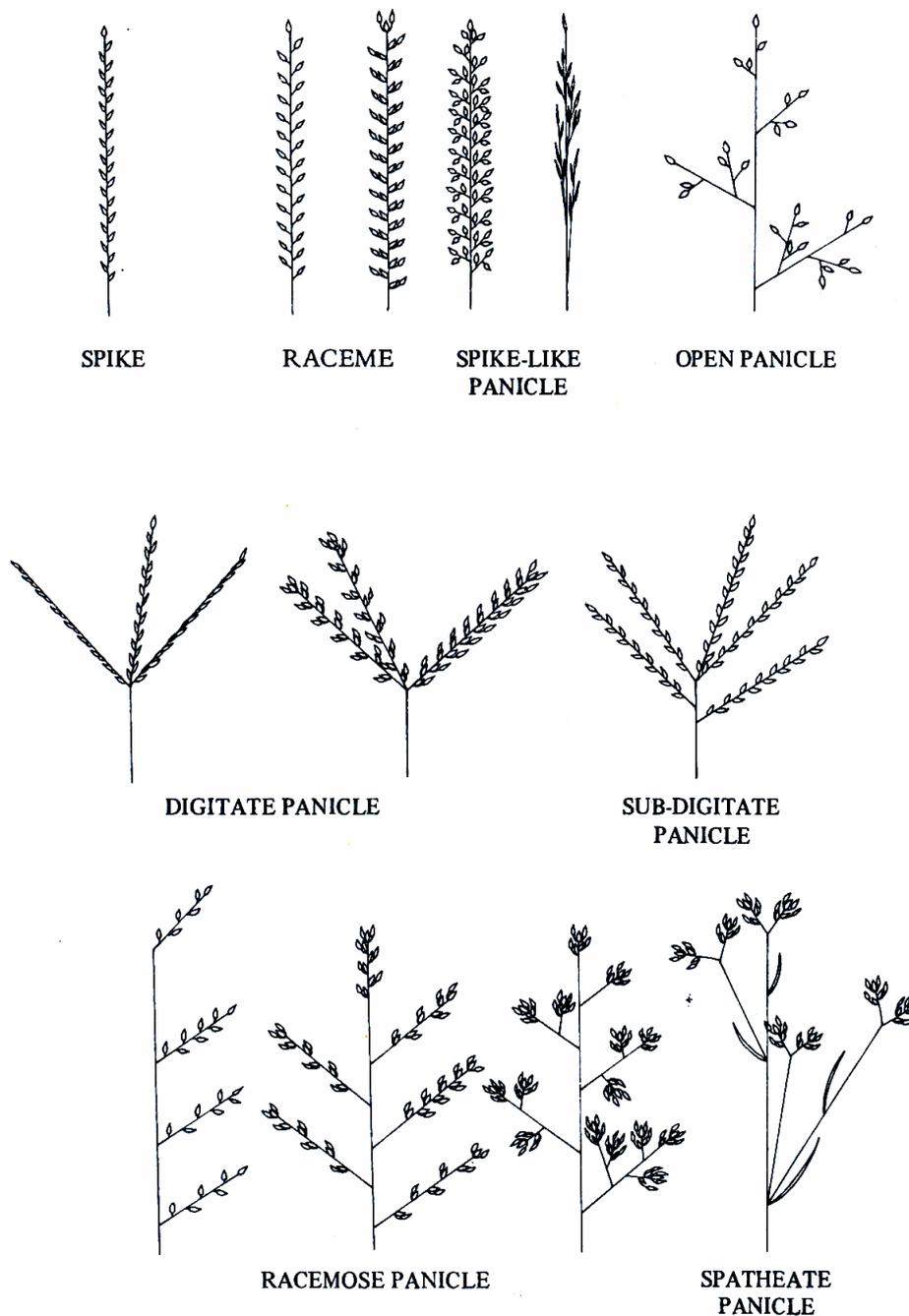
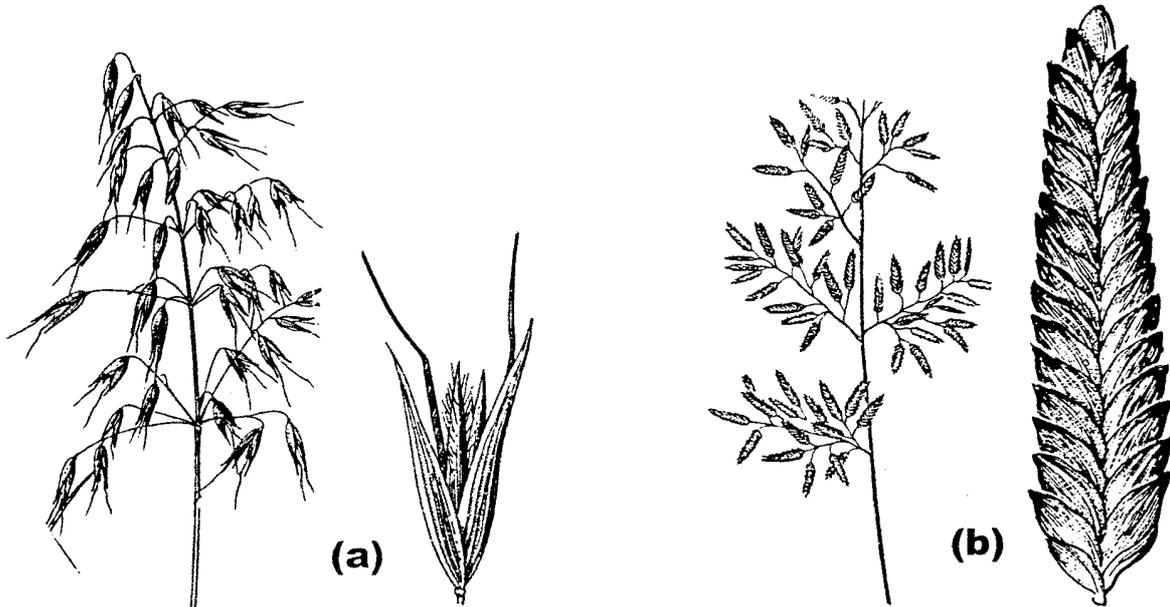
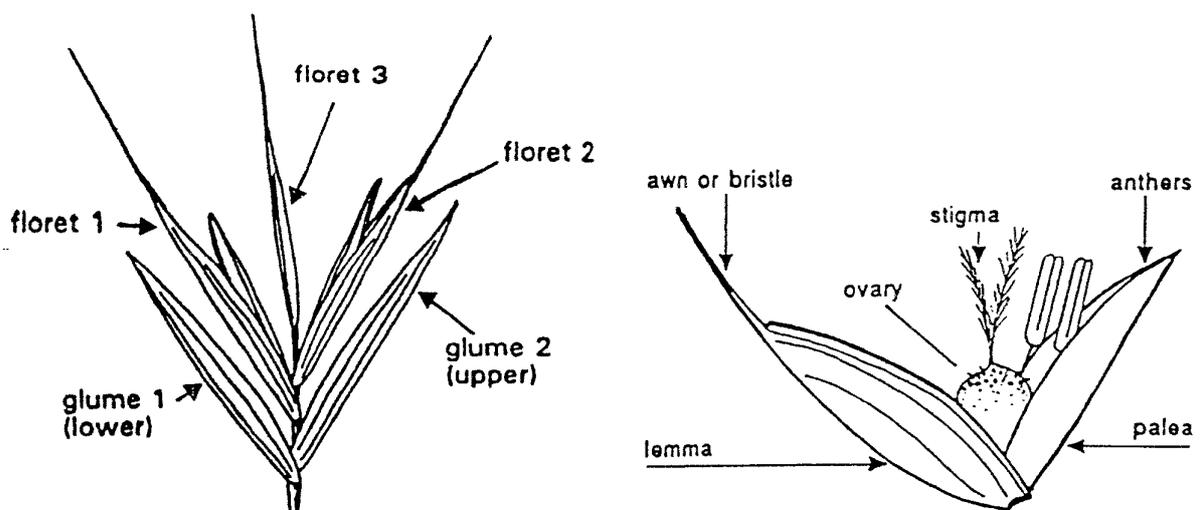


Figure 3 Stylized inflorescence types

In a *spike* the florets or *spikelets* are borne close to the seed stem.  
 A *raceme* is where the individual flowers along the spike are borne on short stalks or pedicels.  
 In a *panicle* the seed head has branches (*rachis*) that may subdivide into smaller stalks (*pedicel*) that support flowers grouped together (a) singly or (b) in spikes.



The individual spikelets or group of spikelets are protected before they open by outer husks called glumes. When the glumes open they expose the flowers enclosed by two more husks, a palea (upper) and a lemma (lower). A flower consists of anthers, stigmas and an ovary that forms the seed.

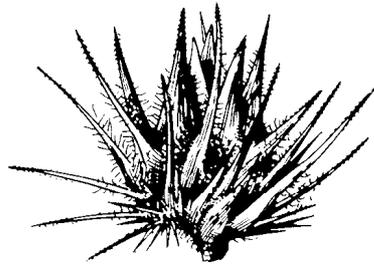


### Seed (Cariopsis)

Like flowers grass seeds each have their own identifiable features. Some seed have spines and prickly awns or hairs that aid adhering qualities. Others may be small or large, round oval or teardrop shaped. Rhodes grass seed are like grains of small sand and are seldom seen outside the glumes that protect them.



Spears



Spines

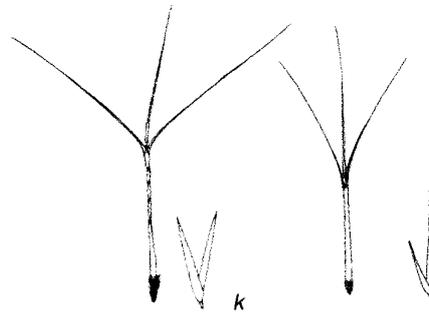


Prickly awns

Sometimes to distinguish individual species of grass within a genus, identification may require examination of the floral parts with a hand lens or a microscope. Some botanical knowledge may be needed for this. For example the only visible taxonomic difference between two grasses may be the length of a lower glume on a spikelet.



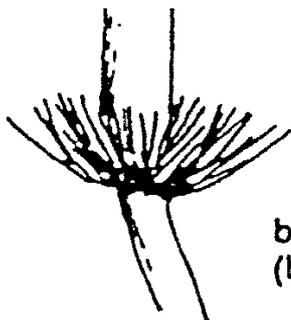
Chloris type seed that shows the the glumes surrounding the seed, they are usually quite flat on top.



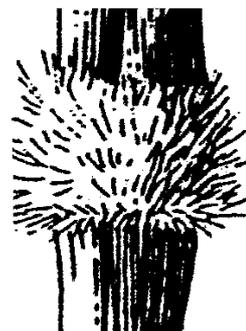
Two species of *Aristida* showing different glume sizes

### Stem (*culm*)

The nodes or joints on the stem can be bearded (hairy) or smooth.



bearded node  
(ballet skirt)



## HOW TO PREPARE A PLANT FOR IDENTIFICATION

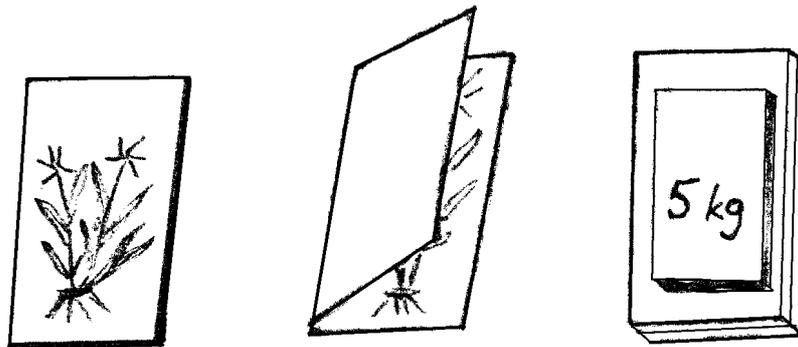
Collecting a plant for identification for the majority of people is a spur of the moment decision, and as there has been no forward planning, there is usually limited means to preserve the specimen once taken. Quite often the specimen ends up in the back of a utility or car or in the foot well on the passenger's side. It could remain there for several hours or days before it is re-found, by which time it could be a crumbling mess. Surprisingly, this is not the best way to present a plant for identification. Following are some guidelines based on the Queensland Herbarium's guide to collecting plant specimens. ([www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/collecting-manual.pdf](http://www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/collecting-manual.pdf))

- 1 Find a specimen that will represent the weed population.
- 2 For the POACEAE or grass family, where practical, collect the whole plant. The flower or seed head is the most identifiable part of a grass, but there are other parts of a grass that can assist with identification. So always include shoots, complete stems, and a portion of the intact root system, especially if rhizomes or runners are present. Some grasses have hairy nodes or hair at many different places on their leaves.
- 3 If possible collect enough plant material to prepare two specimens, one for identification and one to retain for your records.
- 4 If you collect more than one plant specimen, make sure you clearly label each one.
- 5 At the time of taking the specimen, record the latitude and longitude of the site using a GPS unit. Take a note of landmarks and mark your position later on a map and record the grid reference. If none of these are available a common road map of the area may be a useful alternative to establish a specimen's location.
- 6 At the time of taking the specimen, record all the details of its habitat – soil type, landform, vegetation and associated species, and individual specimen data – height, form, presence of rhizomes, stem sap, colour of new growth and flowers and abundance of the plant.
- 7 To stop a collected specimen from drying out too much, place them between the pages of an old newspaper and then place the newspaper under the vehicle's floor mat in the passenger's foot well.
- 8 It is important to press a plant specimen as soon as practical after collection to prevent it crumbling or being damaged by microorganisms.

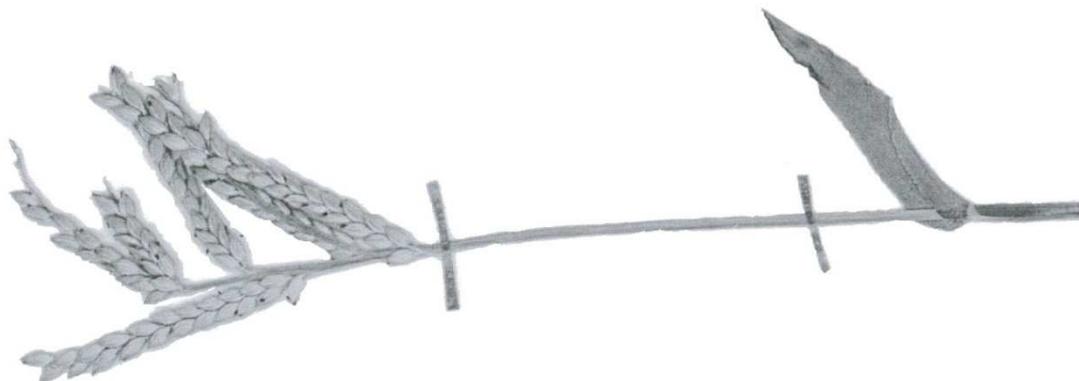
There are several methods to press a specimen. Flatten it out between solid sheets of cardboard (A4 size). Alternatively place the specimen in an A4 manila folder and place that between sheets of corrugated cardboard. If cardboard isn't available, placing the plant specimen in the centre of a newspaper and closing it would suffice. When laying the specimen out, make sure it displays all the relevant parts. Check the drying specimens regularly to make sure they are drying in the way you want. In the early drying stage you can adjust the specimen while the foliage is still slightly moist and pliable.

It is important to pay attention to this detail as it will determine how the finished specimen will look. If a grass plant is too big, cut it in half and press both halves separately. Unnecessary plant material can be removed before pressing.

Apply as much weight as possible to the top of the cardboard or newspaper to squash the specimen flat. A heavy book, or a bucket of water, are suitable weights. The cardboard or newspaper will absorb any sap squeezed out of the grass. If there is more than one specimen, make a stack before applying weight.



- 9 Pressing and drying a specimen will take a week or more inside a building. Hold specimens in place in a manila folder with small pieces of sticky tape over the stem of the plant, in places where it could be easily removed. Do not apply sticky tape all over the plant specimen especially the seed head, as sometimes the plant has to be removed from its packaging for closer examination under a microscope and sticky tape can easily rip a dry specimen apart.



- 10 Use sticky tape to hold the manila folder together. If you suspect it to be a serious weed, seal all the edges of the manila folder with sticky tape to prevent any seed that might fall from the seed head from escaping.
- 11 On the outside of the manila folder write the specimen number and the collectors name and attach to it a completed Queensland Herbarium cover sheet ([www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/specimens-cover-sheet.pdf](http://www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/specimens-cover-sheet.pdf)). The field data that accompanies the specimen is as important as the specimen.

- 12      Ensure you practice good hygiene during all stages of the collection, pressing and drying process to ensure that you don't unwittingly disperse seed by careless handling of the seed head. Remember the plants may have a mixture of flowers and mature seed in their heads. Dispose of unwanted plant material in a responsible way.

**Note**

- It is always useful to too carry a few old newspapers in your vehicle to prevent samples from drying too quickly.
- Submitting a mature seed head (if the seed has shed) is not ideal, but can still be beneficial for identification.
- If a plant looks like it could be a bad weed, it could be wise to destroy it before receiving back its identification.



Photo: DAF Queensland



Photo: Biosecurity Queensland

## Invasive Grass Weeds of the Eastern Darling Downs



Photo: Biosecurity Queensland



Photo: National Weeds Strategy



Photo: Cambooya Landcare



Photo: fireflyforest.com

## Chilean needle grass (*Nassella neesiana*)

### **Origin**

A native of South Africa, most likely introduced as a contaminant of pasture seed, that has become a major pest grass weed in Victoria and NSW where it can take over pasture land and form a monoculture.

Because of its invasive nature and damaging seeds Chilean needle grass is declared as a Class 1 pest plant in Queensland under the *Land Protection (Pest and Stock Route Management) Act 2002*. It is also a Weed of National Significance, so is a high priority for eradication.

### **Local significance**

The first confirmed sighting of Chilean needle grass in Queensland occurred at Felton in 1998. It is thought to have originated from the Clifton Show Grounds; potentially introduced with fodder. Since then, the weed has been found sporadically along roads and water courses throughout the TRC region, including some parkland in Toowoomba.

### **Impact**

Chilean needle grass will displace desirable pasture species, reducing biodiversity and reducing pasture productivity by as much as 50% when severe. The long, sharp seeds are able to penetrate animal hides leading to downgrades of meat, wool, skins and hides. It can also contaminate farm produce like hay.

### **Description**

Chilean needle grass is a tufted perennial grass that forms dense clumps. It seems to have a preference for growing on light to medium clay soils. The plant has the ability to flower year round, but mid-summer is usually its most prolific period. When flowering, the foliage can grow up to 1.5 metres tall. Flowers are distinctive, produced in open, long branched, drooping panicles with each branch producing one seed. The glumes encasing the young flowers display a purple–red colour. Chilean needle grass has a unique ability to produce seed at three different sites on the plant; ‘panicle’ seeds on the main seed head, ‘stem’ seeds from self-fertilised flowers in mid-stem and ‘basal’ seeds at the crown of the plant. It can produce up to 20,000 seeds/m<sup>2</sup> and the seedlings have a high survival rate.



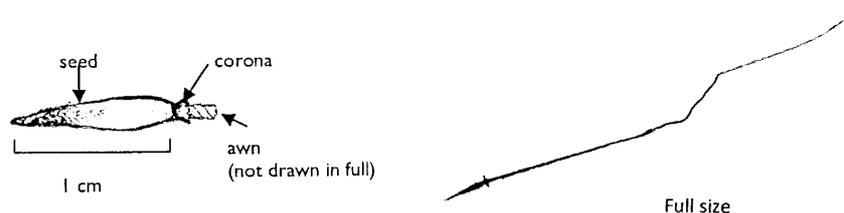
Photo: Biosecurity Queensland



Photo: Biosecurity Queensland

### **Other distinctive features**

The upper surface of the leaf blade has short stiff hairs and small tufts of hair at the leaf collar with no prominent auricle. The seed has a sharp pointed tip, a long bent awn and under a lens the seed has a reddish crown or corona where the seed joins the awn.



### **Habitat**

It has the potential to invade all types of land, pasture, cultivation, roadsides and areas of urban habitation like sporting facilities. To date it has only spread slowly, but so far in this area it has only shown a preference for clayey soils.

### **Feed value**

Although grazed when young, the feed quality is poor and like all spear seeded grasses the spears can injure animals and downgrade the quality of animal products, especially sheep.

### **Dispersal**

Chilean needle grass seed has little ability to spread on the wind, travelling only a few metres. However it is easily spread by adhering to machinery and equipment, livestock and humans. Seeds are also spread easily in water. Making hay from an infested pasture has been an important source of species dispersal in our region.

### **Control**

The key to successful management of Chilean needle grass is early detection and destruction of new infestations before they have the chance to build up a large seed bank. It is tolerant to heavy grazing, drought and periodic inundation. In pastures, the use of rotational grazing to reduce seeding and weaken its competitiveness may help to improve the effectiveness of herbicides. Target application, spot, wick wipe or boom spray with a registered chemical. Slashing and cultivation (forage crop) used in conjunction with herbicide can also improve control. Time any slashing to occur outside the main flowering period, but this will not control basal seed set. Fire can assist detection of the extent and nature of an infestation, as it highlights the size of the tufts, especially in natural pasture where the terrain is difficult.

The herbicide *flupropanate* is registered for Chilean needle grass control. A range of minor use permits are available to enable the use of *glyphosate* and *fluazifop-P*. Always check registration status, product label and withholding periods prior to use of any chemical.

### **Useful resources**

[https://www.daff.qld.gov.au/data/assets/pdf\\_file/0013/63301/IPA-Chilean-Needle-Grass-PP103.pdf.pdf](https://www.daff.qld.gov.au/data/assets/pdf_file/0013/63301/IPA-Chilean-Needle-Grass-PP103.pdf.pdf)

[http://www.weeds.org.au/WoNS/Chileanneedlegrass/docs/83\\_CNG\\_management\\_brochure\\_2008.pdf](http://www.weeds.org.au/WoNS/Chileanneedlegrass/docs/83_CNG_management_brochure_2008.pdf)

## Rat's tail grass (*Sporobolus* sp.)

### Origin

The species was originally introduced as contaminants in pasture seed and have now adapted well to large areas of eastern Australia.

Five species of introduced *Sporobolus* grasses are declared Class 2 pest plants in Queensland under the *Land Protection (Pest and Stock Route Management) Act 2002*. Although botanically different, all damage pasture and cultivation in similar manner. They are:

- Giant rat's tail grass (*S. pyramidalis* and *S. natalensis*)
- American rat's tail grass (*S. jacquemontii*)
- Giant Parramatta grass (*S. fertilis*)
- Parramatta grass (*S. africanus*).



Photo: Biosecurity Queensland

### Local significance

Giant rat's tail grass (*S. natalensis*) has been identified in the East Greenmount area for the first time in 2015. Up until now it has been confined to the north of the TRC region near Yarraman and Crows Nest, but can also be found in the Scenic Rim and Lockyer Valley Council areas. Parramatta grass has also been recorded across the district.

### Impact

Giant rat's tail is highly invasive and the coarse foliage is unpalatable to livestock. Dense infestation can lead to livestock health and productivity issues, including loosening of teeth and reduced live weight gains. The dry unpalatable biomass can also become a serious fire hazard.

### Description

Giant rat's tail grass is a tufted, summer growing perennial, growing up to 1.7 metres tall when flowering. It has coarse foliage when compared with other native *Sporobolus* species, which are shorter and have less dense seed heads. The leaves may be folded when they emerge. With maturity, the size of their tufts should make them easily recognisable. The seed head can be up to 45 cm long and 3 cm wide. The seed head shape changes from a rat's tail when young to an elongated pyramid shape at maturity.



### Habitat

The grass is adapted to a wide variety of soils and situations, pasture, cultivation, roadside, urban and industrial areas. Ecoclimatic modelling proposes that Giant rat's tail has the potential to spread over 60% of Queensland.

### Feed value

The coarse foliage of weedy *Sporobolus* sp. at all stages of growth makes them unpalatable to stock. Because of this, the more palatable grasses may be preferentially grazed from the pasture allowing the weed to take over.

### **Dispersal**

Seed is spread in the manure and on fur and hooves of livestock, by native and feral animals, on vehicles and machinery and in fodder. Parramatta grass has sticky seed when mature. Seed dormancy can be as long as 10 years.

### **Control**

*Sporobolus* species are difficult to control by normal grazing and cultural practises. Where possible a vigorous pasture should be maintained to ensure strong competition against the weed and reduce the invasion threat. Try not to let soil fertility rundown as *Sporobolus* grow well on low fertility soils. Always start control measures in an area of low infestation and move towards higher infestations. Follow integrated control strategies, using herbicide and cultural methods, combined with good property hygiene.

The herbicides *flupropanate* and *glyphosate* are registered for Giant rat's tail grass control. Always check registration status and product label prior to use.

### **Useful resources**

Bray, S., & Officer, D. (2007). *Weedy Sporobolus Grasses : best practice manual*. Brisbane: Queensland Department of Primary Industries and Fisheries.

[https://www.daff.qld.gov.au/data/assets/pdf\\_file/0010/69616/IPA-Giant-Rats-Tail-Grass-PP48.pdf](https://www.daff.qld.gov.au/data/assets/pdf_file/0010/69616/IPA-Giant-Rats-Tail-Grass-PP48.pdf)



Photo: Cambooya Landcare

## **African lovegrass (*Eragrostis curvula*)**

### ***Origin***

A native of South Africa, most likely introduced as a contaminant of pasture seed.

As the grass is open pollinated, there exist many different plant types within a community of the grass. Selections of the better types, e.g. cv. Consol, have been used in improved pasture and as a soil stabiliser in erosion control situations in south-east Queensland. From here the grass has become a widespread weed of grazing lands and has become naturalised in all Australian states on medium clay to acidic, red and sandy soils.



Photo: Biosecurity Queensland

African lovegrass is not a declared plant in Queensland, but some Councils may declare it under local government law and be reflected in the local government area pest management plan. It is not declared in the TRC region.

### ***Local significance***

African lovegrass is found commonly throughout the region. In some areas it has moved from along roadsides and railway lines to be the dominant grass in a pasture. There is very little evidence that African lovegrass has proved valuable as a pasture grass for stock anywhere in Australia, but there are numerous situations where it is a serious weed. Eradication is an unrealistic option at this stage and control of further spread seems the only possibility.

### ***Impact***

Due to the aggressive nature of African lovegrass and its capacity to produce large quantities of seed, it can quickly invade pastures, especially those that may be sparse or overgrazed. Cattle grazing African lovegrass dominant pastures can have depressed reproductive capacity. A dense monoculture of African lovegrass can create a large fuel load and potential fire risk in addition to completely smothering native species regeneration.

### ***Description***

A densely tufted, summer growing, perennial grass that can grow to a height of 1.2 metres when flowering. The plant is normally erect, but the whole plant can often adopt a weeping habit. The seed head is a loose panicle, at first closed, but then its branches spread open. Small stalks off the branches end in a cluster of flattened little spikes, each composed of small spikelets grouped tightly together in an alternate pattern.

A distinguishing feature of African lovegrass is that the basal leaf sheaths surrounding the crown have prominent veins, with fine silky hairs between them. Old tussocks of African lovegrass also dieback in the centre.

### ***Habitat***

African lovegrass will readily invade disturbed areas, roadsides, urban areas and pasture where the spatial arrangement of existing species is poor.

### **Fodder value**

If managed intensively in small paddocks with the appropriate stocking rate, the young growth of African lovegrass can make a nutritious productive pasture species. It does set seed quickly however, and the resulting tussock and fibrous mature foliage has low digestibility and is largely avoided by stock.

### **Dispersal**

The grass produces large quantities of seed that are easily spread by farm machinery and animals. Viable African lovegrass seeds have been collected in the faeces of cattle, 10 days after their consumption.

### **Control**

Control of African lovegrass is not easy and requires an integrated control program. Practicing good hygiene to prevent infestation and detecting new infestations early and controlling them, are very important. Individual plants can be chipped out and seed heads bagged to prevent spread, ensuring you remove the crown as well. Heavy grazing of established weedy areas will reduce seed production, however grazing should be avoided when the plant is seeding, to prevent seed spread. If grazing during seed set is unavoidable, rest cattle for more than 10 days in a confined area. Mechanical practices like slashing and cultivation should be carried out carefully as they could spread seed and open new growth sites. Avoid slashing roadsides or paddocks when plants are in seed. If cultivation is required, over-sow and fertilise the area to encourage the establishment of desirable species. Where possible maintain a healthy pasture to minimise bare ground as lovegrass can quickly colonise these areas.

Herbicides registered for African lovegrass control are *glyphosate*, *atrazine*, *flupropanate*. Foliar applications of herbicide should be applied when the plant is green and actively growing. Residual herbicides are best applied from July to December, as this will help stop seed set in the following summer.

Roller wiping is being used successfully by Landholders in the Bega Valley NSW to manage medium to large populations of African lovegrass. Roller Wiping involves using a ground or hydraulic driven roller towed by a vehicle (4-wheel bike, ATV or light tractor). The rollers are wetted periodically with glyphosate while being towed over the pasture. The method takes advantage of the lower palatability of African lovegrass relative to other pasture species. The roller can be set at a height that minimises herbicide contact with more palatable pasture pastures, which are often shorter in stature. The roller, held on a towing frame or 3-point linkage, is pulled at approximately walking speed, though faster speeds are possible in light infestations.

### **Useful resources**

[https://www.daff.qld.gov.au/\\_data/assets/pdf\\_file/0011/69284/IPA-African-Lovegrass-PP63.pdf](https://www.daff.qld.gov.au/_data/assets/pdf_file/0011/69284/IPA-African-Lovegrass-PP63.pdf)

<http://umccc.org.au/files/algfactsheet-v25.pdf>

[http://www.begavalley.nsw.gov.au/cp\\_content/resources/African Lovegrass A4 Brochure V7\(1\).pdf](http://www.begavalley.nsw.gov.au/cp_content/resources/African_Lovegrass_A4_Brochure_V7(1).pdf)

## Coolatai grass (*Hyparrinia hirta*)

### **Origin**

A native of Africa, the Mediterranean, the Middle East and south Asia. Although naturalised in Australia for a long time it did not become a serious weed problem until after the 1950s and 1960s when a range of new plant material was introduced by government agencies in an effort to find a hardy perennial grass that would survive heavy grazing and grow in a winter dominant rainfall zone. No one foresaw the weed problem it has become.

Coolatai grass is a declared Class 3 pest plant in NSW, but is not declared in Queensland.



Photo: Les Tanner

### **Local significance**

Coolatai grass is found in the eastern areas of our region, predominantly along state owned roads in the maintenance line.

### **Impact**

Coolatai grass is an invasive tussock forming grass that is relatively tolerant to drought, fire and herbicides. It will quickly dominate pastures with less than 70% ground cover but is also able to invade undisturbed native ecosystems. Tall rank grass is very low in digestibility and will be avoided by livestock. A dense dry sward will also pose a fire risk.

### **Description**

It is a densely tufted, slightly rhizomatous, summer growing, perennial, that can reach a height of 1.2 metres when flowering. The seed head is a panicle consisting of paired racemes containing 5-8 spikelets. There are two other species of *Hyparrhenia* in Australia. A simple way of differentiating between them is.

- Thatch grass (*H. rufa*) an introduced grass from Africa, has reddish brown hair on the spikelets in its raceme pair which is up to ten spikelets long.
- Tambooki grass (*H. filipendula*) a native grass and Coolatai grass have whitish grey hairs on their spikelets, but the raceme pairs of Tambooki grass are smaller and contain only 1-3 spikelets per raceme.

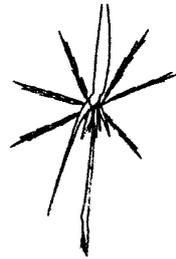


Photo: Holbrook Landcare

There are two grasses that might be confused with *Hyparrhenia* species in their vegetative stage, Barbedwire grass (*Cymbopogon refractus*) and Kangaroo grass (*Themeda triandra*). As these grasses mature the different architecture of their seed heads soon becomes apparent.



Coolatai



Barbedwire



Kangaroo

### **Habitat**

Coolatai grass is most likely to be found growing on the lighter clay and sandy soils of the area. Most noticeable along roadsides and other disturbed areas, it is also capable of invading pasture if the ground cover is low.

### **Feed value**

If managed correctly the young growth of Coolatai grass can make it a nutritious productive pasture species, capable of maintaining dry stock. Mature growth is coarse, woody, of no feed value and is ignored by stock.

### **Dispersal**

The seeds of Coolatai grass are sticky and shed quickly, so spread easily on the coats of livestock. They are easily transferred by machinery and due to their light seed can be spread by wind gusts resulting from passing vehicles. Compared with other grasses the volume of seed set is low as only 4-10% of the florets produce viable seed.

### **Control**

As young foliage is good fodder, continuous grazing will help reduce seed head maturity but it has little effect on reducing plant numbers. Burning and slashing are useful in removing rank growth but again have little effect on controlling the tussock of the grass, which is tolerant of fire. Maintaining a vigorous competitive pasture will slow the risk of invasion. In areas suited to cropping 2-3 years of crop will control Coolatai grass.

Coolatai grass is tolerant of most commonly used herbicides. In conjunction with good management strategies, the herbicides *glyphosate* and *flupropanate* may have some effect. Regardless of application method, up to three applications of glyphosate in the same growing season will be required. The repeat application should be timed for when there is sufficient regrowth of young leaves.

### **Useful resources**

<http://weeds.dpi.nsw.gov.au/Weeds/Details/179>

## Feathertop Rhodes grass (*Chloris virgata*)

### **Origin**

A native of tropical America that has become naturalised in Australia. It is common on roadsides, creek banks, fence lines and around farm buildings, but it has now become a serious weed problem in cropping systems that minimise tillage. Although growing in pasture it has not shown a tendency to spread rapidly in this situation. It is not a declared plant in Queensland.

### **Local significance**

Feathertop Rhodes grass is not a major concern in the area at this stage, but has the potential to spread rapidly in no-till cropping paddocks if it is let set seed.



Photo: DAF Queensland

### **Impact**

Feathertop Rhodes is highly aggressive in a no-till cropping situation if it has been allowed to set seed in a previous season. It is very adaptable and will attempt to set seed within weeks of germinating. It is not very susceptible to glyphosate, especially after the tillering stage, so infestations require a systems approach for control.

### **Description**

A hairless, tufted, summer growing, perennial grass up to 1.2 metres when flowering. Main flowering period summer to autumn. Under good growing conditions the plant can produce short runners. The seed head is the most distinctive part of the plant. It contains an average of 12 spikes all arising from a similar point at the top of the top of the seed head. The branches open slightly but tend to remain upright. Spikelets along the spikes develop long white hairs giving the seed head a fluffy look.

### **Habitat**

It prefers to grow on lighter clay and sandy soils, but it can grow on heavier soils in cultivation.

### **Feed value**

It is not particularly palatable so is not regarded as being a useful pasture species.

### **Dispersal**

Seed is generally dropped near the mother plant from where it can be spread in water. There is a 6-10 week dormancy in Feathertop Rhodes grass seeds. Seeds left on or near the soil surface (as in a No Till farming system) will remain viable for up to 12 months. Burial of the seed to between 5 and 10cm deep will render the seed unviable.

### **Control**

Being an annual plant, the best strategy to control the spread of Feathertop Rhodes grass is to stop the plant from setting seed.

A competitive pasture is good means of restricting Feathertop Rhodes grass from spreading as it is less likely to establish in areas with good ground cover.

Feathertop Rhodes grass is not highly susceptible to *glyphosate*. The overuse use of *glyphosate* is not recommended as it can cause the weed to become resistant to the chemical. Instead a repeat spray 7-14 days after the first with a chemical like *paraquat* may achieve a more effective result. In a cropping situation, sequencing of crops to allow alternative chemistry to be used (for example Group A chemicals in sunflowers) should be considered. Use all available strategies (spot spraying, localised tillage, localised burning) to control small infestations before they become a widespread problem. When the infestation is large, cultivation to bury the seed to a depth of 10cm followed by 12 months fallow may be the most effective control method.

***Useful resources***

Feathertop Rhodes grass, a GRDC Weed Smart fact sheet, September 2013. [www.weedsmart.org.au](http://www.weedsmart.org.au)

Feathertop Rhodes grass: A weed best management guide.

[www.daff.qld.gov.au/\\_data/assets/pdf\\_file/0010/51040/Feathertop-rhodes-grass.pdf](http://www.daff.qld.gov.au/_data/assets/pdf_file/0010/51040/Feathertop-rhodes-grass.pdf)

## Johnson grass (*Sorghum halepense*)

### **Origin**

Introduced to Australia from the Mediterranean as a pasture plant, but is now regarded as a weed because the plant has the potential to cause prussic acid (HCN) poisoning in stock.

### **Local Significance**

Johnson grass is widely spread throughout paddocks and on roadsides through the district.

### **Impact**

Johnson grass can cause prussic acid poisoning in livestock, particularly when its growth is stunted due to dry conditions or frost. It can be a significant contaminant of harvested grain leading to delivery refusals.

### **Description**

A perennial, summer growing grass whose stems grow from an extensive, tightly arranged network of white or reddish scaly underground stems or rhizomes. The leafy seed stems are stout, erect, 1-2 metres high when flowering. The seed head is a typical sorghum shape, a large multi-branched open panicle. Main flowering period summer to autumn.

### **Habitat**

Johnson grass is adapted to a wide range of soils, but shows a preference for heavier clay soils. The plant is a common weed of cultivation, forage crops like Lucerne and disturbed areas along roadsides. As Johnson grass is open pollinated like most sorghums and crosses with other forage sorghums, it might now be difficult to find a purebred stand of Johnson grass.

It has the potential to invade pasture but so far hasn't become a major problem in this situation. A few scattered plants should not cause any problem as they would normally be well grazed.

### **Feed value**

The plant is nutritious like other fodder sorghums but it does have a high prussic acid risk rating which means at times, it could be toxic to grazing stock. The most dangerous times to graze Johnson grass is when shoots are young, below 10 cm or foliage is stunted or wilted from dry weather or frost.

Hungry stock are more likely to get a toxic dose of prussic acid, than those that are used to grazing the grass because they eat their fill in a very short space of time to satisfy their appetite.

### **Dispersal**

Johnson grass is mainly spread by seed in contaminated farm produce. The size of the seed is very large compared with the size of most grass seeds. It is also spread by the movement of rhizomes with farm and maintenance machinery.



Photo: NSW DPI



Photo: NSW DPI

### **Control**

In a crop situation herbicides and cultivation are effective in controlling Johnson grass. Repeated cultivation during a summer fallow can be used to break up underground root systems and bring as many of the disconnected rhizome pieces to the soil surface where they can either grow new shoots to be killed by cultivation, herbicide or dehydration. It is important to apply knockdown herbicides like *glyphosate* when there is sufficient growth to get translocation to the rhizomes. Consider using crop rotations that allow for the use of residual herbicides or alternative grass specific chemistry.

Clean implements like chisel ploughs to prevent transporting rhizome pieces to clean paddocks.

Along roadsides mowing or slashing is useful in preventing the grass from seeding. It reduces plant vigour increasing the competitive ability of companion species like paspalum or Queensland bluegrass. After slashing the grass is susceptible to repeated spraying with *glyphosate* needed to kill rhizome regrowth. *Glyphosate* is also a good option where slashing is impractical because the terrain is either too steep or uneven.

### **Useful resources**

<http://weeds.dpi.nsw.gov.au/Weeds/Details/74>



## White foxtail grass (*Pennisetum villosum*)

### **Origin**

A native of tropical Africa, it was used as an ornamental in gardens from where it has escaped.

### **Local significance**

White foxtail is prolific throughout the town of Clifton and on some surrounding farms.

### **Impact**

White foxtail is a prolific seeder and is unpalatable to stock, so can become a very invasive weed in a pasture situation.

### **Description**

A densely tufted, rhizomatous, summer growing, perennial grass, that forms spreading patches in a pasture situation. Flowering late summer to autumn, the grass produces a large number of seed heads, its most noticeable feature. The seed head is a dense spike (cylinder) 2-12 cm long and to 2cm wide. Light green or white bristly hairs are produced from the base of spikelets along the spike giving the seed head a brush like appearance.

Seasonal conditions appear to seriously influence the plants growth pattern as one season it may be abundant, the next sparse.

### **Habitat**

Growing on a wide variety of soils it freely establishes on bare ground in pasture, but is most noticeable in disturbed urban areas, roadsides, footpaths, playing fields, etc.

### **Feed value**

White foxtail grass is a weed of pasture because nothing eats its coarse green foliage.

### **Dispersal**

White foxtail is spread mainly by wind, because its fluffy seed is easily airborne. It has a vigorous rhizome system that also contributes to weed spread.

### **Control**

Spot spraying with *glyphosate* is effective in halting plant growth.



Photo: National Weeds Strategy



Photo: National Weeds Strategy



## Red Natal grass (*Melinis repens*)

### **Origin**

A native of South Africa, now naturalised in southern Queensland.

### **Local significance**

Red Natal is seen throughout the district along roadsides and especially at roadside cuttings.

### **Impact**

Red Natal grass is unpalatable but generally only invades low fertility disturbed areas. Improving fertility in a pasture situation will see Red Natal outcompeted by more vigorous pasture species.



Photo: fireflyforest.com

### **Description**

An open tufted, summer growing, perennial grass. Initially some of the seed stems grow along the ground before straitening up. Where their lower nodes touch the soil they root down and start new plants. The seed head between 0.3-1.2 metres high depending on location, is a branched panicle whose spikelets are covered with white, pinky purple, silky hairs that give the seed head it fluffy appearance.

### **Habitat**

Red Natal grass grows well on light clay and sandier soils. It is common in disturbed areas along roadsides, waste areas, and old crop areas. It may grow in rundown degraded pasture where competition from other grasses is low due to poor fertility.

### **Feed value**

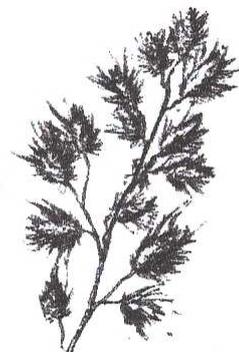
It has little forage bulk or feed value and is not readily eaten by stock.

### **Dispersal**

Seed is spread by normal ways with no special mechanisms to assist this process.

### **Control**

Red Natal grass is easily killed by cultivation and will soon vanish naturally from a well-managed, vigorous pasture. Chemical control is usually unwarranted.



## **Pale pigeon grass (*Setaria pumila*)**

### ***Origin***

A native of warmer parts of Asia and Africa.

### ***Local significance***

Found in many pastures as an introduced species.

### ***Impact***

Valued as a pasture plant. Interferes with the naturalness of native pastures and grasslands.

### ***Description***

A tufted, summer growing, annual grass. Seed head is a dense spike like panicle. Spikelets are clustered together with a bristle below each spikelet.



Photo: Atlas of Living Australia

There are two subspecies *S. pumila* subsp. *padide-fusca* and *S. pumila* subsp. *pumila*.

### ***Habitat***

Weeds of disturbed areas and cultivation on light soils.

### ***Feed value***

Palatable to stock when young.

### ***Dispersal***

Seed is spread by natural ways with no special mechanisms to assist this process.

### ***Control***

Normally unwarranted.

## **Paspalum grass (*Paspalum dilatatum*)**

### **Origin**

A native of South America it has now become naturalised in southern Queensland and most parts of Australia.

### **Local significance**

Frequently found along roadsides and in pastures.

### **Impact**

Can be a useful pasture plant. Interferes with the naturalness of native pastures and grasslands.



Photo: Atlas of Living Australia

### **Description**

A clump forming, summer growing, perennial grass. The clumps may gradually expand from rhizome growth. It can be found growing on clay to sandy soil. Normally and upright plant the leafy stems may flatten out under the influence of regular grazing or mowing. Flowering late spring to autumn, the seed head about 40 cm tall, consists of an erect nodding panicle with an average of 3-7 drooping spikes arising from different points along the seed head stem.

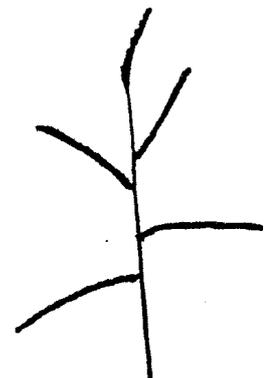
### **Habitat**

Paspalum can be found in all types of pasture often mixed with white clover. It can withstand heavy grazing. It can be a weed of roadsides, drainage lines and irrigation channels, and disturbed urban areas where it can create a serious problem in footpaths, lawns and sports fields.

Paspalum tolerates waterlogging, but not prolonged flooding. Its solid root system gives the plant a tolerance of frost and drought.

### **Feed value**

In the right place paspalum can be a nutritious palatable pasture grass to most stock. If left uncut or ungrazed some of the flowers can be infected with a fungus causing them to turn orange or black and extrude a sticky secretion. The ergots (the fruiting part of the fungus) have been known to poison grazing stock if eaten in large amounts. The stickiness makes the grass unpleasant to ride or walk through.



### **Dispersal**

Seed is spread by all the normal ways with no special mechanisms to assist this process.

### **Control**

The grass is susceptible to the herbicide *glyphosate* used as recommended by the manufacturer.

## Green panic grass (*Megathyrus maximus* var. *pubiglumis* cv. Petrie)

(Syn: *Panicum maximum* var. *trichoglume* cv. Petrie)

### Origin

A native of South Africa. This species of guinea grass was introduced as an improved pasture plant, it is now naturalised in southern Queensland and most parts of Australia.

### Local significance

Commonly found along roadsides.

### Impact

Highly valued as a palatable and adaptable pasture plant. Can add to the fuel load of native timbered vegetation thus increasing its fire-proneness.

### Description

A tufted, summer growing, perennial. Unlike other guinea grass species it has soft light green leaves, sometimes turning yellow green if soil nitrogen levels are low. Up to 1.5 m high at flowering, its seed head is an open many branched panicle with its lower branches whorled. Each branch has many fine branchlets each bearing single spikelets whose glumes are covered in short soft hair.



Photo: Atlas of Living Australia

### Habitat

Green panic grows well on fertile, friable clay soils. It dislikes sands, hard setting and cracking clay soils. Apart from being a common component of improved pasture green panic can be found growing along roadsides and many other disturbed and urban areas.

Green panic is shade tolerant and one of the few grasses that can make productive growth in the shade area under trees in a pasture. Even though frost kills its foliage the grass has a remarkable ability to yield a "green pick" if mild weather follows winter rainfall. Green panic is intolerant of waterlogging or flooding.

### Feed value

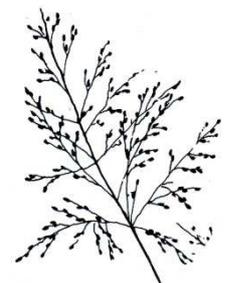
The grass is an important pasture plant, productive, nutritious and palatable to a wide range of stock, dairy, beef and horse.

### Dispersal

Seed is spread by all the normal ways with no special mechanisms to assist the process.

### Control

Green panic can be easily removed from an average pasture by overgrazing as it is selectively grazed. Green panic is not a serious weed of cultivation, but is susceptible to *glyphosate* if it needs to be removed.



## **Prairie grass (*Bromis catharticus*)**

(Syn: *Bromus unioloides*)

### ***Origin***

A native of South America originally introduced as a winter pasture grass. The first commercial cultivar to be sown in winter pasture on the Darling Downs was Preibe's Perennial Prairie, which has now become naturalised in the area.

### ***Local significance***

Frequently found along roadsides and in pastures.

### ***Impact***

This weed is considered a potential environmental weed in urban areas and ungrazed natural pasture.

### ***Description***

An erect tufted, winter spring, annual or short lived perennial grass. Leaves are pale green and could be slightly hairy with a distinct ligule at the top of each leaf sheath. Lower leaf sheath could be hairy. It produces an open pyramidal panicle type seed head with short branches in well space whorls along its length. Branchlets end in flat spear shaped spikes each bearing 6-12 alternatively arranged spikelets tipped with short awns.

### ***Habitat***

Prairie likes to grow on fertile well drained light clay to clay soils.

### ***Feed value***

The seed germinates in autumn and provides good quality nutritious feed to stock during winter and spring. It rarely occurs in abundance in dryland pasture and soon disappears as it is a very palatable grass with both leaf and seed heads eaten by stock.

### ***Dispersal***

Reproduces entirely from seed.

### ***Control***

A minor pest of cultivation, but control measures are generally not needed in a pasture.

### **Note**

There are now many different commercial cultivars of prairie grass available for winter forage production.

### ***Useful resources***

Prairie grass fact sheet. [http://keys.lucidcentral.org/keys/v3/pastures/Html/Prairie\\_grass.htm](http://keys.lucidcentral.org/keys/v3/pastures/Html/Prairie_grass.htm)



Photo: esacademic.com

## Rhodes grass (*Chloris gayana*)

### **Origin**

Introduced from South Africa around 1900 as a pasture grass. The original cultivar was Pioneer, which was widely planted in improved pasture, has now become naturalised in most of southern Queensland.

### **Local significance**

Widespread across the region.

### **Impact**

Highly valued as stock feed, especially for horses but being an introduced species, its presence does interfere with a natural pasture.



Photo: Atlas of Living Australia

### **Description**

A tufted, summer growing, perennial with both upright and spreading stems forming runners that can quickly cover bare ground. Where the nodes on these stems touch the ground they can take root and produce new plants. Flowering in summer and autumn with seed stem up to 1 metre high. At the top of the seed stem flowers are borne on 6-12 dull brown finger like spikes which open outward. A few seed heads may have a whorl of spikes just below the main group. Spikelets along the spike are closely grouped together, but are not hairy as they are in Feathertop Rhodes grass.

### **Habitat**

Most common in pasture on medium clay to sandy soils. Outside of pasture Rhodes grass can often be seen growing along roadsides and other disturbed and waste areas.

### **Feed value**

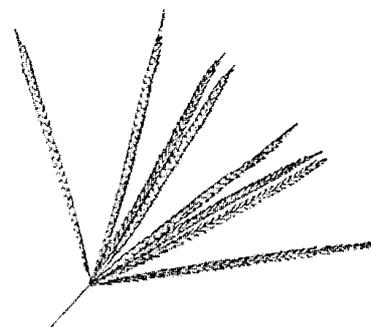
Rhodes grass is a palatable, nutritious pasture plant that has been widely used in improved pastures. Its low oxalate concentration makes it a good horse feed.

### **Dispersal**

Seed is spread by all the natural ways with no special mechanisms to assist this process.

### **Control**

Rhodes grass is difficult to establish on heavy clay soils. In a weed situation the grass may be controlled with the herbicide *glyphosate* used as recommended by the manufacturer.



### **Note**

Commercial cultivars that have superseded Pioneer are Katambora, Callide, Finecut and Topcut.

## **Eleusine or Goose grass (*Eleusine tristachya*)**

### ***Origin***

A native of South America, it is now widespread in southern Queensland. It should not be confused with a close weedy relative Crow's-foot grass (*Eleusine indica*).

### ***Local significance***

Found sporadically across the region.

### ***Impact***

Interferes with the naturalness of a pasture and can be a problem in built up areas.



Photo: Atlas of Living Australia

### ***Description***

A low open tufted, summer growing, annual grass. Young shoots are flat with folded leaves. Flowering summer to autumn, the seed stem is short 5-15 cm depending on location, with 2-3 short spikes arising from its top. The spikelets are crowded together in two parallel rows on the lower side of each spike

### ***Habitat***

Growing on a wide range of soils from clays to sands, it normally is a minor weed of habitation, usually growing in disturbed areas, roadsides, footpaths, sporting fields and natural pasture.

### ***Feed value***

Reported as being of average feed value, but as its foliage is coarse it is usually only eaten by stock when little other forage is available.

### ***Dispersal***

Seed is spread by all the natural ways with no special mechanisms to assist this process.

### ***Control***

Usually unwarranted.

## GLOSSARY

- Adventitious:** Roots arising from the stem.
- Annual:** A plant that completes its lifecycle within one year.
- Anther:** The part of the stamen in the seed that contains the pollen.
- Apomixis:** A seed that is produced asexually without pollen.
- Ascending:** Curved or bending upwards into an erect position.
- Auricle:** Are ear like appendage that arises from the base of the leaf at the collar. In some grasses they are large enough to fold around the stem.
- Awn:** A bristle like part of an appendage.
- Axis:** The central stem of a spike or inflorescence.
- Biodiversity:** The variety of different plant and animal life within an ecosystem.
- Bract:** A leaf like or scaly structure subtending (lie below) a flower.
- Bristle:** A short stiff straight hair.
- Ciliate:** Bordered by short hair.
- Collar:** A band of plant material that joins the grass's leaf sheath to the leaf blade.
- Coleoptile:** The tubular sheath covering the young grass seedling's first leaf for a short time between germination and emergence.
- Crown:** The base of a grass tuft.
- Digitate:** Branching from the same point.
- Dormancy:** The temporary suspension of a grass seeds germination.
- Ecosystem:** A community of organisms interacting with each other plus the environment in which they live.
- Environmental weed:** A plant that invades and degrades our natural bushland, cultivation, wetlands and waterways.
- Family:** A taxonomic group of related (genera) plants, e.g. Poaceae, the family to which every grass belongs.
- Genus:** A unit of classification, comprising one species of a group of closely related species.
- Germination:** The development process whereby a dormant seed takes up moisture (imbibes) that starts it growing into a seedling.
- Glabrous:** Devoid of hair (hairless).
- Glume:** A bract enclosing the flower or spikelet.
- Hirsute:** Covered with long hairs.
- Imbibe:** The name for the process of a seed taking up moisture.
- Inflorescence:** A flower or a group of flowers.
- Internode:** The portion of the stem between two nodes.
- Lamina:** The expanded portion of a leaf blade.
- Lemma:** The lowermost of the two bract like scales enclosing the spikelet (flower) of a grass.
- Ligule:** A small membranous or ciliate (bordered by long hair) appendage at the summit (top) of the leaf sheath where it joins the collar.
- Micropyle:** The aperture or hole in the coat of a seed that allows it to take up water (imbibe).
- Midrib:** The central most prominent vein of a leaf.
- Native plant:** One that is indigenous to Australia and has not been introduced from another country.
- Node:** The joint on a stem from which a leaf grows.
- Palea:** The upper (inner) of two bracts enclosing the flower of a grass.

- Panicle:** An inflorescence in which the axis is divided into branches bearing spikelets (flowers).
- Pedicle:** The stalk of a flower.
- Perennial:** A plant that persists for more than one year.
- Plumule:** The bud of the embryo that develops into the coleoptile.
- Poaceae:** The plant family to which all grasses belong.
- Prostrate:** Lying flat on the ground.
- Prickle:** A sharp outgrowth on the skin of a seed detachable without tearing or damaging the lower layer.
- Primary root:** The first root produced by the seed.
- Raceme:** An unbranched inflorescence bearing stalked (pedicel) flowers along the individual axis.
- Rachis:** The main axis of an inflorescence. A slender prostrate stem having a bud (seed head).
- Radiate:** Spreading from a central point.
- Radicle:** The rudimentary (first) root of the embryo (seed).
- Rhizome:** A root like stem structure growing horizontally just below the soil surface that has buds (nodes) along its length that make new plants. .
- Runner:** A slender prostrate stem that runs over the surface of the ground having buds (nodes) along its length that root down a make new plants.
- Scabrous:** Rough to the touch.
- Secondary root:** An adventitious (arising from the stem) root that grows from the sub crown internode.
- Species:** A category of plant classification that describes a group of individuals that share similar genetic and physical characteristics and can potentially interbreed among themselves.
- Spike:** An unbranched inflorescence with stalk less flowers along its axis.
- Spikelet:** One or more flowers or florets within a common pair of glumes.
- Sub crown internode:** The node at the base of the stem at ground level that grows roots to form the base or crown of a young grass plant.
- Synonym (Syn):** A name that means the same as another name.

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Every effort has been made to acknowledge the source of images and information.

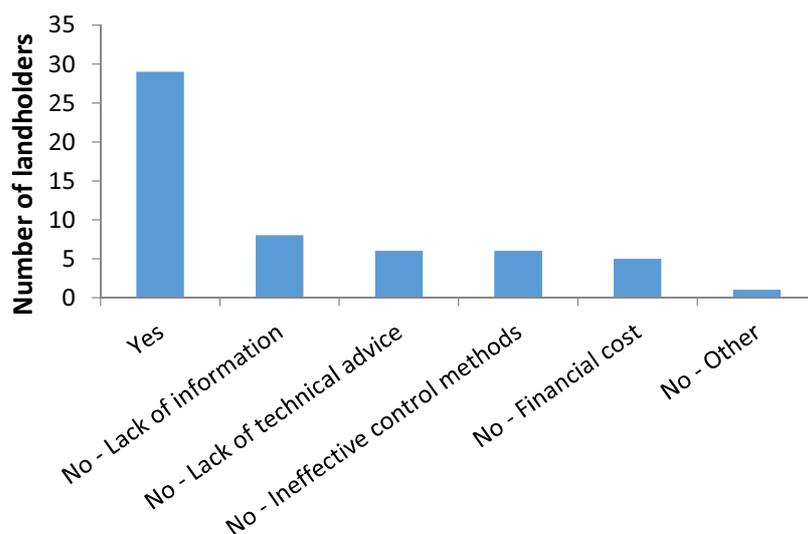
## Enhancing resilience to invasive grass weeds on the eastern Darling Downs - Landholder Survey -

### Overview:

A survey of landholders on the eastern Darling Downs was conducted between April and May 2014 to determine which grass weeds were present and of concern on landholders' properties, and how these are currently being managed. The survey questionnaire was mailed to 500 local landholders and also available online. A total of 43 landholders responded (8 online and 35 returning the survey form).

### Outcomes:

General management: Landholders generally indicated that they have enough resources available to make appropriate decisions to manage grass weeds on their properties (Figure 1). However, for those who disagreed, **lack of information** and/or **lack of technical advice** were important factors limiting their ability to make appropriate decisions about grass weed management. Only **50%** of landholders indicated that they practice weed hygiene techniques and only **7%** of landholders indicated that they coordinate weed control efforts with neighbours or Council. So, while landholders generally seem to be confident in managing existing grass weeds on their own properties, the results of this survey indicate that there is potential to enhance the proactive management of grass weeds in the region.



**Figure 1:** Responses to the question asking whether landholders believe they have enough resources available to make appropriate decision to manage grass weeds on their property.

Species specific data: Landholders appear to be most concerned about the presence and control of Johnson grass (*Sorghum halepense*) and white foxtail grass (*Cenchrus longisetus*) on their properties. Most respondents generally reported that grass weeds have a negative but 'not significant' impact on productivity. Landholders reported using a variety of management techniques for grass weeds including manual control, chemical, mowing/slashing and stock management, with chemical treatment being somewhat more common for most species. Most respondents found their grass management techniques to be effective; however, respondents indicated that management of Johnson grass and Rhodes grass (*Chloris gayana*) was less effective or consistent.

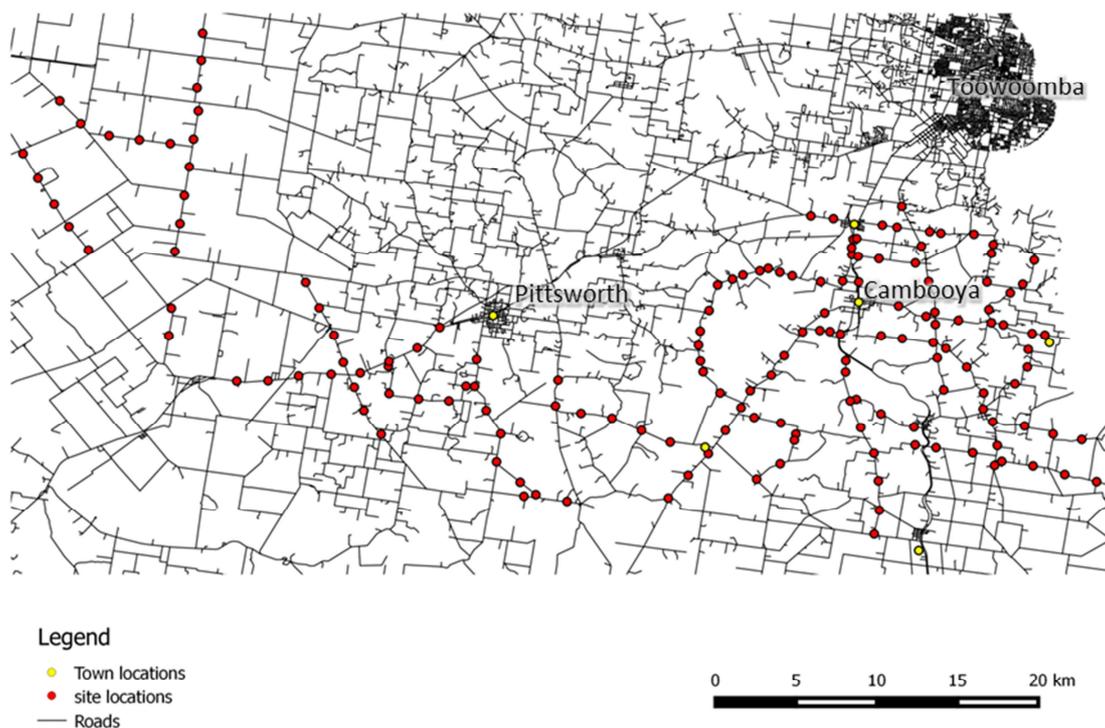
Please contact [cambooylandcare@gmail.com](mailto:cambooylandcare@gmail.com) for further information on this survey.

## Enhancing resilience to invasive grass weeds on the eastern Darling Downs - Roadside Survey -

### Overview:

A survey was carried out in April 2014 to determine the presence and extent of grass weeds along roadsides in the Eastern Darling Downs. 164 sites were sampled across approximately 280 km of roadsides throughout the former Cambooya and Pittsworth Shires (Figure 1). At each site, the abundance (% cover) of non-native grass species and the following factors were recorded:

- Location within the road reserve (road edge, drainage line, fence line);
- Site type (crest, slope or flat);
- Road class (State road, major local government road or minor local government road);
- Road type (surfaced or gravel);
- Roadside management (mown/slashed or not);
- Adjacent landuse (e.g. grazing, cropping, residential etc); and
- Level of roadside disturbance (0-3).



**Figure 1.** Roadside survey sites

### Results:

The most common grass weed species found in the roadside survey were Rhodes grass (*Chloris gayana*), paspalum (*Paspalum dilatatum*), Johnson grass (*Sorghum halepense*) and African lovegrass (*Eragrostis curvula*) (Table 1).

Other grass weed species of concern that were recorded in the survey included Coolatai grass, white foxtail grass and Chilean needle grass.

**Table 1.** Grass weed species recorded in the roadside survey and their relative abundance.

Common name	Scientific name	Number of sites	Average % cover*
Rhodes grass	<i>Chloris gayana</i>	116	14.7
Paspalum	<i>Paspalum dilatatum</i>	110	10.2
Johnson grass	<i>Sorghum halepense</i>	75	15.4
African lovegrass	<i>Eragrostis curvula</i>	49	10.2
Liverseed grass	<i>Urochloa panicoides</i>	48	6.4
Couch	<i>Cynodon dactylon</i>	38	8.4
Kikuyu	<i>Pennisetum clandestinum</i>	15	20.8
Coolatai grass	<i>Hyparrhenia hirta</i>	14	9.5
Goose grass	<i>Elyusine tristachya</i>	12	2.3
Green panic	<i>Megathyrsus maximus</i>	8	15.0
Feathertop Rhodes grass	<i>Chloris virgata</i>	8	3.5
Red Natal grass	<i>Melinis repens</i>	4	2.4
Pale pigeon grass	<i>Setaria pumila</i>	3	5.9
White foxtail grass	<i>Pennisetum villosum</i>	2	5.2
Stinkgrass	<i>Eragrostis cilianensis</i>	2	5.0
Sorghum	<i>Sorghum bicolor</i>	2	0.5
Prairie grass	<i>Bromus catharticus</i>	2	6.7
Chilean needle grass	<i>Nassella neesiana</i>	1	3.3

\* Cover values are average % cover at sites where present.

#### Johnson Grass

Johnson grass was a relatively common roadside species recorded in this study, being found at 75 of the 164 sample sites, where it had an average cover of 15.4%. The landholder survey also identified Johnson grass to be one of the grass weed species of most concern to landholders. Both lines of evidence indicate that Johnson grass should be a focus of roadside weed management in the region. Johnson grass, a tall vigorous plant, was most abundant in drainage lines and low-lying areas in this study.

#### Rhodes grass

Rhodes grass was recorded at 116 of the 164 sampled sites with an average cover of 14.7%. While Rhodes grass is considered a useful pasture species, it is an introduced species which invades roadside reserves, potentially displacing native grass species and impacting habitat for native fauna such as reptiles and grass seed eating birds.

#### Paspalum

Paspalum was found at 110 of the 164 sites sampled during the survey. At these sites, it was found to have an average cover of 10.2%. As with Johnson grass, the cover of paspalum was greater along surfaced roads than along gravel roads and within drainage lines than along the road edge and fence lines.

For further information on this survey, please contact [cambooylandcare@gmail.com](mailto:cambooylandcare@gmail.com)