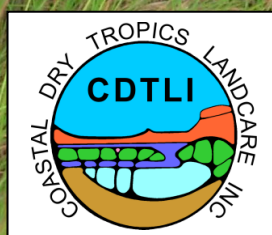


**Native Grasses
for
Revegetation
in the
Townsville Region**

Nanette Hooker



Native Grasses for Revegetation in the Townsville Region

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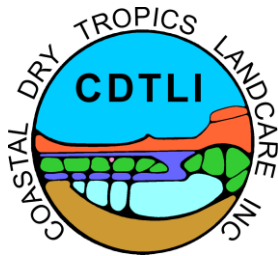
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Contents

- Introduction2
- The grass plant3
- The grass inflorescence4
- Places to obtain local native grasses4
- Alloteropsis semialata* (Cockatoo Grass)5
- Arundinella nepalensis* (Reed Grass)6
- Chrysopogon fallax* (Golden Beard Grass)7
- Cymbopogon bombycinus* (Silky Oilgrass, Silky Heads, Citronella Grass)8
- Enneapogon robustissimus* (Nineawn Grass)9
- Eragrostis elongata* (Clustered Lovegrass) 10
- Heteropogon triticeus* (Giant Speargrass)..... 11
- Ischaemum australe* (Large Bluegrass)..... 12
- Sarga plumosum* (Plume Sorghum) 13
- Setaria surgens* (Pigeon Grass) 14
- Themeda triandra* (Kangaroo Grass) 15
- Thuarea involuta* (Tropical Beachgrass, Bird’s Beak Grass) 16
- Index of common names 17
- References 17
- Table of growth features back cover

Introduction

The grass family (Poaceae) is one of the largest and most cosmopolitan of the flowering plant families of the world comprising more than 10,000 species. Grasses are found almost everywhere (even Antarctica). They are adapted to a wide range of climatic and soil conditions, and grow in habitats ranging from deserts to freshwater and marine environments. Grasses form a major component of many vegetation communities e.g. grasslands, steppe, prairie and savannas.

Grasses are the most important plant family for humans. They provide a source of food (wheat, oats, maize, rice, sugarcane) and most of the grazing for wild and domesticated animals. Grass-use pervades all aspects of human endeavour: building materials, artistic pursuits, sports and leisure activities. New uses of grasses are still being found e.g. for environmental management. Humans have used grasses in a multiplicity of ways over a great period of time.

Native grasses are an important and integral component of many vegetation communities; therefore they have an important role to play in rehabilitation and revegetation programs. Grasses have fibrous root systems and they can hold soil together and reduce erosion. Certain grass species can be used to prevent soil erosion on unstable surfaces such as beach sands (*Thuarea involuta*) and riparian areas (*Arundinella nepalensis*).

Australian grasses provide food and shelter for many Australian birds and animals. The seeds of many native grasses are important components in the diet of several granivorous parrots and finches (*Alloteropsis semialata*, *Chrysopogon fallax*, *Eragrostis* species, *Heteropogon triticeus*, *Sarga plumosum*, *Setaria surgens*), and the bulbous bases of some grasses are a food source for a number of native animals (*Alloteropsis semialata*, *Chrysopogon fallax*). The leaves of many species of grasses are used for nest and burrow linings for many Australian birds, animals and reptiles; also some grass species (*Sarga plumosum*, *Themeda triandra*) are the main component in the diet of many Australian herbivores.

In Australia there are over 1300 species of grass including non-native grasses. In the Townsville region there are more than 220 grass species, 160 of these are native. Twelve species have been selected for inclusion in this booklet. The choice of these species was based on a number of factors:

- annuals to long-lived perennials
- variable heights
- variable environmental requirements
- availability of seeds
- germination knowledge
- availability of seedlings

A table at the back of the booklet summarises some of these features.

Planning is one of the most important aspects of any revegetation effort and the decision whether or not to use Australian native grasses is an integral part of this process. Most grasses grow best in full sun or partial shade and revegetation sites need to be prepared to give the new grasses the best possible chance of survival.

Although Australian native grass species are considered as being low input and low maintenance, this should not be confused with “zero” management. In many revegetation sites there may be a number of introduced or weed grasses which superficially look similar to native species, particularly seedlings. This is especially relevant in riparian areas where higher nutrient and moisture levels mean there are probably dense stands of non-native grasses. For this reason, getting to know the grass species on the site is very important.

Most Australian native grasses do not have the ability to compete with robust, non-native grasses e.g. Guinea Grass (*Megathyrsus maximus*), therefore it is best for the site to be free of these weedy species, or the site must be regularly maintained.

Selection of appropriate native grasses for a particular site will depend on the proposed use of the area e.g. erosion control. Some grass species can grow in a wide range of habitats and on a wide range of soil types.

Suggested native grass species for some habitats are listed below.

Riparian grasses

Arundinella nepalensis
Enneapogon robustissimus
Eragrostis elongata
Sarga plumosum
Setaria surgens

Open woodland grasses

Alloterospis semialata
Chrysopogon fallax
Cymbopogon bombycinus
Eragrostis elongata
Heteropogon triticeus
Sarga plumosum
Themeda triandra

Wetland grasses

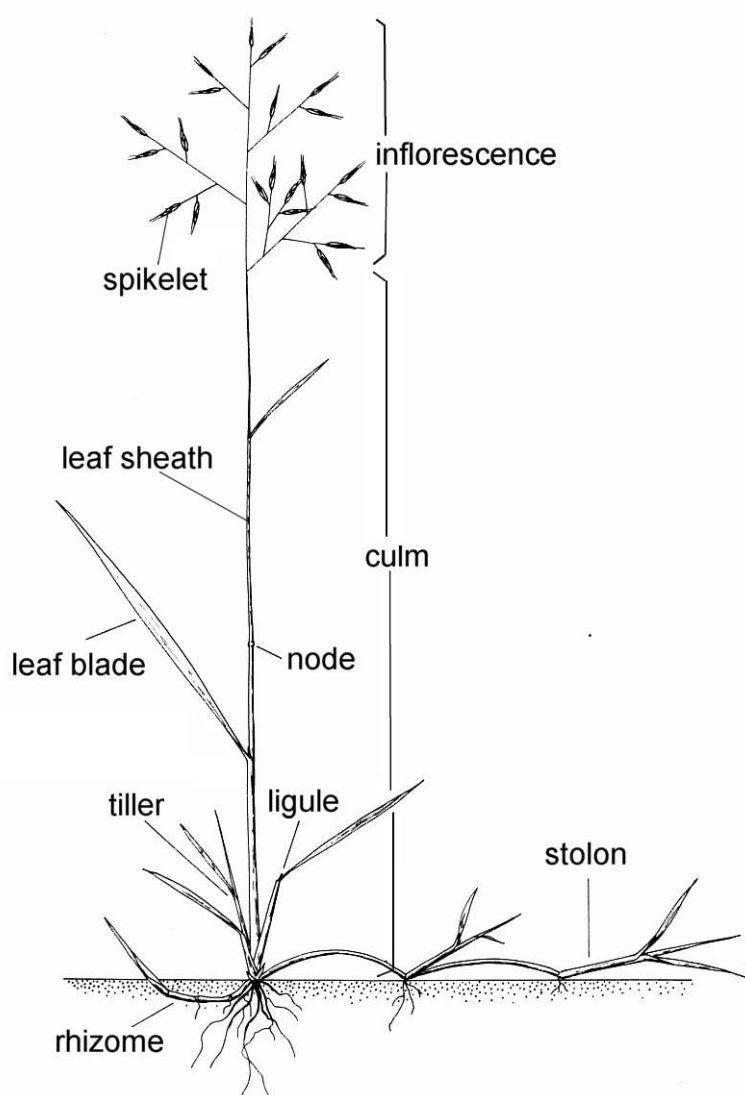
Eragrostis elongata
Ischaemum australe
Sarga plumosum

Beach grasses

Eragrostis elongata
Setaria surgens
Thuarea involuta

The grass plant

The use of technical terms is necessary when describing grasses. The diagram below illustrates some terms which may be used in this booklet.



Terminology:

- Inflorescence - a group or cluster of flowers arranged on a stem.
- Spikelet - for flower or seed.
- Culm - stem.
- Leaf blade - the expanded upper part of a leaf.
- Ligule - a membranous or hairy appendage at the junction of sheath and blade.
- Leaf sheath - the basal part of a grass leaf between the node and the ligule; at maturity it often comes away from the stem.
- Node - the part of the stem from which the leaf arises, usually thickened.
- Tiller - new shoot.
- Stolon - a trailing stem that produces roots at the nodes.
- Rhizome - an underground stem, usually growing horizontally, producing roots at the nodes.

Drawing from Tothill and Hacker (1983)

The grass inflorescence

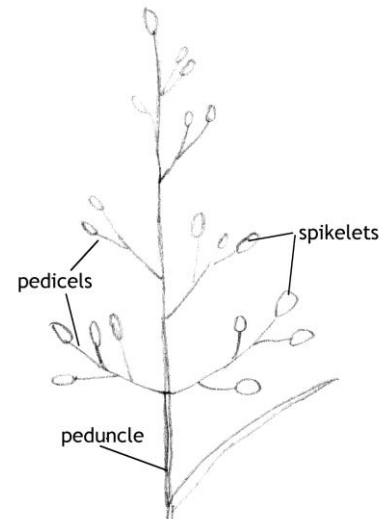
The basic grass inflorescence is composed of clusters of spikelets (flowers) arranged in a panicle which may be modified in a number of ways. The types of branching and the arrangement of spikelets on the branches determine the different types of grass inflorescence.

Types of grass inflorescences:



Raceme and Spike

The inflorescence is unbranched: the raceme has spikelets with pedicels, the spike has spikelets without pedicels (i.e. spikelets are sessile)



Basic structure of a grass inflorescence



Open panicle
Inflorescence with branches obvious



Spicate panicle
Inflorescence with branches not obvious



Spatheate inflorescence
The branches of the inflorescence are subtended by spathes (leaf-like bracts)



Digitate inflorescence
Inflorescence branches arranged at the top of peduncle like the fingers of the hand

Places to obtain local native grasses in Townsville

Greening Australia Dry Tropics Nursery,
1 Desailly Street, Gulliver
@ Barrier Reef Institute of TAFE,
Horticulture Unit, Pimlico Campus
Ph: (07) 4796 0411 Fax: (07) 4725 7922
Email:
drytropics@qld.greeningaustralia.org.au

Bush Garden Nursery,
End of Thompson Street, Mundingburra
Behind the Townsville Community Learning
Centre grounds
Phone CVA: (07) 4721 4077
Phone CDTLI: (07) 4721 4322



Alloteropsis semialata

Cockatoo Grass

NAME

Alloteropsis is from the Greek *allos* (belonging to another) and *opsis* (appearance), the spikelets and inflorescences somewhat resemble another genus of grass; *semialata*, from the Latin *semi* (half) and *ala* (wing) and *ata* (possessing), referring to the winged margins of the upper glume.

DESCRIPTION

Alloteropsis semialata is a tufted, perennial grass 20-100 cm tall. The base of the plant forms a bulb which is covered with dense, woolly hairs. The inflorescence consists of two to five finger-like branches, 2-22 cm long.

Cockatoo Grass is one of the first grasses to grow and ripen after the onset of the wet season, with flowering and seeding generally occurring about six weeks after the first rains.

DISTRIBUTION AND HABITAT

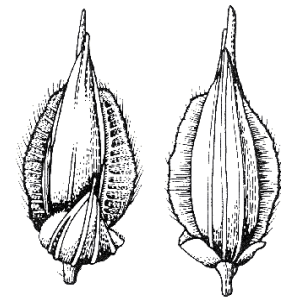
This grass is native to Australia, Asia and Africa. It is common throughout the tropics and subtropics of Australia and grows on sandy and loamy soils, including in eucalypt woodland.

ECOLOGICAL NOTES

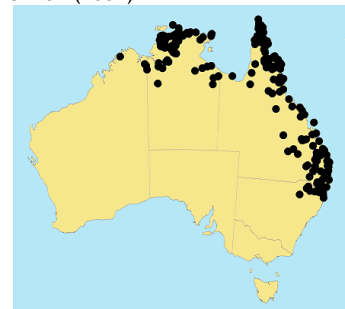
The seeds of this species are an important component in the wet-season diet of several granivorous parrots and finches, including masked finch, black-throated finch, long-tailed finch, hooded parrot, the endangered golden-shouldered parrot and the endangered gouldian finch. The bulbous bases of this grass are a food source for a number of animals e.g. Cockatoo Grass is an important component of the northern bettong's diet in the dry season.

PROPAGATION

Research has shown that the seeds of this species lose their viability after one year unless stored in a freezer. Therefore seeds should be sown soon after collection or within 12 months of collection.



Spikelet drawing from Sharp and Simon (2002)



Arundinella nepalensis

Reed Grass

NAME

Arundinella is from the Latin *arundo* (a reed) and *ella* (diminutive suffix), referring to the thin, reed-like habit; *nepalensis* indicates that the species was originally collected in Nepal.

DESCRIPTION

Arundinella nepalensis is a perennial, grass with rigid, erect stems to 2 metres tall, arising from a thick horizontal rhizome. The inflorescence is a narrow pyramid-shaped panicle, 5-40 cm long.

DISTRIBUTION AND HABITAT

This species has a wide distribution and is native to Australia, Africa and Asia. Reed Grass prefers damp sites, growing mostly along creek banks. It is also found in hollows or shallow swamps.

ECOLOGICAL NOTES

It is a valuable native grass for reducing stream bank erosion, therefore is a good species for riparian revegetation sites. It can survive growing in water for a number of weeks.

PROPAGATION

Seeds need to be stored for six months to overcome dormancy.



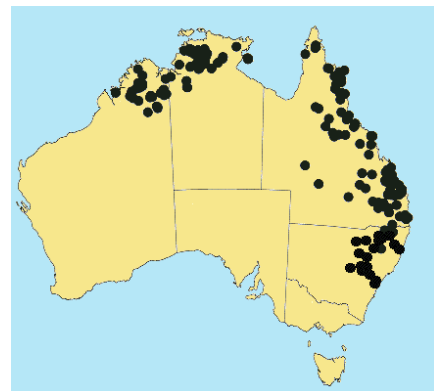
Chris Gardiner

(below left) Open spikelet (Watson, L., and Dallwitz, M.J. 1992)



spikelet

(above right) Spikelet drawing from Gardner (1952)



Chrysopogon fallax Golden Beard Grass

NAME

Chrysopogon is from the Greek *chrysos* (golden) and *pogon* (beard), alluding to the golden hairs on the inflorescence; *fallax* from the Latin for deceptive, closely resembling another species.

DESCRIPTION

Chrysopogon fallax is an erect, tufted, perennial grass 30-150 cm tall. Leaves are mostly basal; the old leaf sheaths persist and have a woolly appearance. The inflorescence is a panicle 7-21 cm long, with whorled branches. The spikelets appear at the end of the branches and are purplish to golden brown.

DISTRIBUTION AND HABITAT

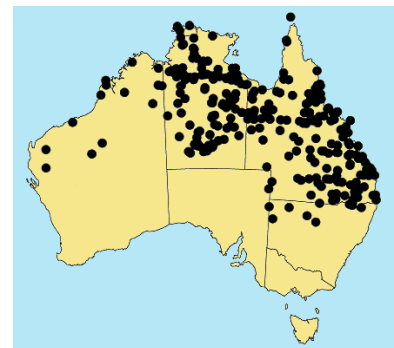
This species is endemic to Australia and grows on a range of soils. It occurs on sand among dunes, but is also found on clay and in rocky places. This grass is resistant to drought and heavy grazing.

ECOLOGICAL NOTES

Golden Beard Grass is eaten by the hairy-nosed wombat and the seeds are eaten by the long-tailed finch.

PROPAGATION

There is some indication that the seed may need to be stored for two years to achieve maximum germination.



Cymbopogon bombycinus

Silky Oilgrass, Silky Heads, Citronella Grass

NAME

Cymbopogon is from the Greek *kumbe* (boat) and *pogon* (beard), alluding to the boat-shaped sheaths which enclose the small bearded racemes; *bombycinus* from the Latin *bombyx* (silk) and *inus* (belonging to), referring to the inflorescence or leaves invested with long silky hairs.

DESCRIPTION

Cymbopogon bombycinus is a tufted, short-lived perennial, 30-120 cm tall. The leaves turn a distinct golden colour and curl on maturity. The spikelets are covered with dense woolly hairs giving them a fluffy appearance; each inflorescence branch is subtended by a spathe (leafy bract) which becomes reddish at maturity.

The leaves of all species *Cymbopogon* have an aromatic smell when crushed. The cultivated lemon grass (*Cymbopogon citratus*) is used as a culinary herb, in the manufacture of perfume and as an ingredient for curry.

DISTRIBUTION AND HABITAT

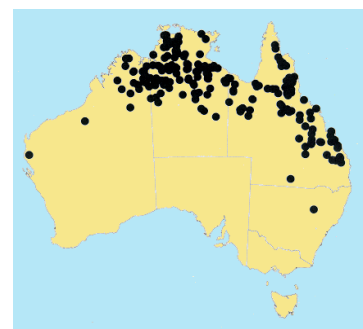
This grass is endemic to Australia. It occurs in eucalypt forests and savannas of tropical and subtropical Australia on sandy or stony soils. It usually grows on hillsides in well-drained soils.

ECOLOGICAL NOTES

Cymbopogon bombycinus produces many seeds which germinate quickly, therefore it will self propagate on revegetation sites.

PROPAGATION

Seeds only needed to be stored for one to two months to overcome dormancy.



Enneapogon robustissimus

Nineawn Grass

NAME

Enneapogon is from the Greek *ennea* (nine) and *pogon* (beard), alluding to the nine plumose lemma awns; *robustissimus* from the Latin for most robust, the grass is very tall for the genus.

DESCRIPTION

There are only 16 species of *Enneapogon* in Australia; all are native. The genus is readily recognised by the nine-awned lemmas, with each spikelet having two or more florets. The spreading awns form an attractive circular arrangement.

Enneapogon robustissimus is a tufted, annual or short-lived perennial grass 30-100 cm tall. The inflorescence, 1.5-11 cm long, is a spicate panicle (the panicle branches are very short which makes the inflorescence appear like a spike).

DISTRIBUTION AND HABITAT

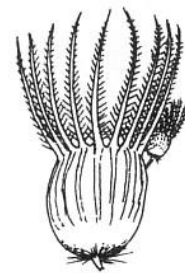
This grass is endemic to Australia. It often grows on sandy soils near creeks and in gullies on rocky hills.

ECOLOGICAL NOTES

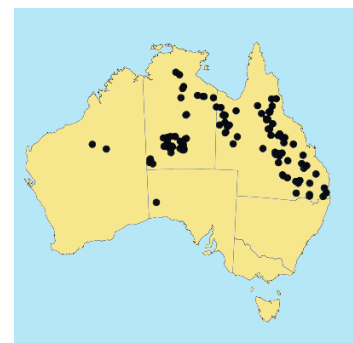
Many species of *Enneapogon* grow in central Australia where they provide food for budgerigars and parrots.

PROPAGATION

Seeds only need to be stored for one month to overcome dormancy.



Spikelet drawing from Jacobs *et al.* (2008) showing the nine awns



Eragrostis elongata Clustered Lovegrass

NAME

Eragrostis is possibly from the Greek *eros* (love) and *Agrostis* a Greek name for a herb; *elongata* from the Latin for elongated refers to the elongated inflorescence.

DESCRIPTION

Eragrostis is a cosmopolitan genus of about 350 species worldwide; there are about 73 species in Australia (58 native species and 15 introduced species). In Queensland there are 62 species. Species of *Eragrostis* are commonly early invaders of arable land and often found on poor or sandy soils or disturbed ground.

Eragrostis elongata is a tufted, annual or short-lived perennial 20-90 cm tall, leafy and compact near the base. Inflorescence is 3-30 cm long, with spikelets in compact interrupted clusters. It flowers and fruits in response to rain.

DISTRIBUTION AND HABITAT

This grass is native to Australia and it also occurs in Papua New Guinea and the Moluccas. It was introduced to Hawaii and Florida in the U.S.A. and to the West Indies.

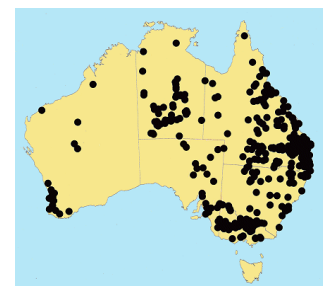
It grows on a wide range of soil types, often in or near alluvial, well-watered habitats, also on beach dunes, in rocky gullies and on disturbed sites.

ECOLOGICAL NOTES

Eragrostis elongata produces many seeds which germinate quickly; therefore will self propagate on revegetation sites. The seeds provide food for finches.

PROPAGATION

This species produces lots of seeds, which germinate easily; storage of one month is required to overcome dormancy.



Heteropogon triticeus

Giant Speargrass

NAME

Heteropogon from the Greek *heteros* (different) and *pogon* (beard), alluding to the difference between the awnless male and awned female spikelets; *triticeus*, resembling *Triticum* (wheat) with respect to the inflorescence.

DESCRIPTION

Heteropogon triticeus is a tufted, perennial grass. In the dry season, when not flowering, it is about 50-70 cm tall. In the wet season, the flowering stems grow quickly by a section of the pale yellow stem being pushed upwards until it protrudes well above the green leaf sheath that previously enclosed it. The pale sections of the internodes alternate with the green sheaths giving the plant a conspicuously banded appearance. These flowering stems are about 2 m tall and are clearly visible above other grasses. The inflorescence is a raceme more than 9 cm long; the upper spikelets have long awns (elongated bristle-like appendages) that extend above the raceme, and when the seeds mature, the awns tangle with each other.

DISTRIBUTION AND HABITAT

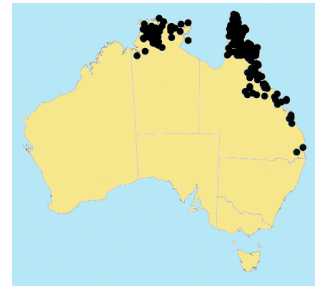
Giant Speargrass is native to Asia and Australia. It grows in eucalypt forests and woodlands, on brown and red clay loams and occasionally on sandy loams and gravelly soils in the wetter areas.

ECOLOGICAL NOTES

This species is an ideal revegetation species where the reintroduction of native animals is important. It is an important food source for many granivores: the seeds of Giant Speargrass are eaten by gouldian finch, masked finch and long-tailed finch.

PROPAGATION

Seeds need to be stored for eight months to overcome dormancy.



Ischaemum australe

Large Bluegrass

NAME

Ischaemum is from the Greek *ischo* (to restrain) and *haima* (blood), as woolly seeds of the type species were reported as being used to stop bleeding; *australe*, from the south (Australia).

DESCRIPTION

Ischaemum australe is an erect, tufted, rhizomatous perennial 50-120 cm tall. The inflorescence, 3-10 cm long, may appear to be a simple spike, but is composed of two erect, closely appressed branches; as the seeds mature the branches come apart and become fragile and readily break at the joints.

DISTRIBUTION AND HABITAT

Large Bluegrass is native to Australia and tropical Asia. It grows in coastal areas in wet situations, swamps and poor sandy soils.

ECOLOGICAL NOTES

This grass appears to be a good species for revegetation of wetland areas: it has robust rhizomes (underground stems) which give the plant the potential to compete with weedy non-native species. It can survive growing in water for long periods during the wet season.

PROPAGATION

Seeds need to be stored for 10 months to overcome dormancy.



Sarga plumosum

Plume Sorghum

NAME

Sarga, the meaning is obscure; *plumosum* from the Latin for feathery, referring to the long hairs giving the pedicels a feathery appearance.

DESCRIPTION

Sarga plumosum is a tufted, perennial grass 1-3 m tall. The stems have distinctive bearded nodes. Leaves usually have a white mid-rib, and vary in colour from shiny green to blue-green. The inflorescence is usually a dense panicle 12-45 cm long with dark red-brown spikelets.

DISTRIBUTION AND HABITAT

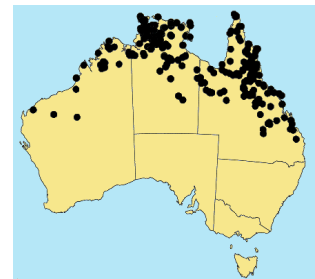
Plume Sorghum is native to Australia and tropical Asia. It is found on sands, red earths and heavy loams, and grows in swamps, claypans, watercourses, waterholes and valleys.

ECOLOGICAL NOTES

The seeds of this species are eaten by Gouldian finch, masked finch and long-tailed finch.

PROPAGATION

Seeds need to be stored for nine months to overcome dormancy.



Setaria surgens

Pigeon Grass

NAME

Setaria is from the Latin *seta* (bristle), referring to the bristly inflorescences; *surgens* from the Latin *surgo* (raise), referring to the long ascending culms.

DESCRIPTION

Setaria surgens is a decumbent or ascending annual, 20-60 cm tall. The inflorescence is bottle-brush shaped and the seeds are held close to the stem among stiff whitish to purplish 1 cm long bristles. These bristles remain after the plump, ripe seeds fall.

DISTRIBUTION AND HABITAT

Pigeon Grass is endemic to Australia and grows mostly on sandy soils of forest country.

ECOLOGICAL NOTES

The seeds of many *Setaria* species are a valuable food source for numerous bird species. Varieties of *Setaria italica* seeds are commonly found in bird seeds sold in the shops. *Setaria surgens* grass seeds are a food source for many Australian birds; it is a source of food for the rare, black-throated finch.

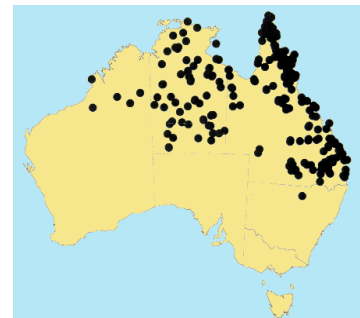
Queensland Department of Main Roads is currently using this species for roadside revegetation.

PROPAGATION

Seeds only needed to be stored for one to two months to overcome dormancy. Pigeon Grass is sometimes rather delicate and should be planted in clumps. When the plant dies it should have produced plenty of seeds which should germinate quickly in the new season.



Spikelet drawing from Jacobs *et al.* (2008)



Themeda triandra

Kangaroo Grass

NAME

Themeda is from the Arabic *thaemed* (little water), the allusion is obscure; *triandra* is from the Greek *treis* (three) and *aner* (man), possessing three stamens (most grasses have three stamens).

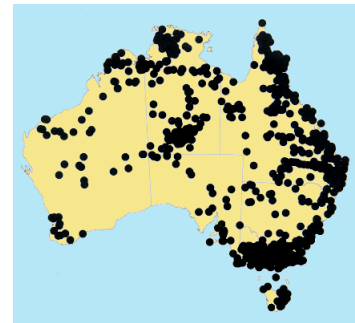
DESCRIPTION

Themeda triandra is a tufted perennial grass; the local species in Townsville is 30-100 cm tall. The inflorescence is leafy and up to 35 cm long; each inflorescence branch is subtended by a spathe (leafy bract). This species is probably the most recognisable member of the grass family in Australia.



DISTRIBUTION AND HABITAT

Themeda triandra is native to Australia, Africa and Asia. It was more widespread prior to European settlement; it is very susceptible to overgrazing and has been replaced by Black Speargrass (*Heteropogon contortus*) owing to a combination of fire and grazing.



ECOLOGICAL NOTES

Themeda triandra is widely used for landscaping and revegetation.

PROPAGATION

Seeds usually need to be stored for 12 months to overcome dormancy.



Thuarea involuta

Tropical Beachgrass, Bird's Beak Grass

NAME

Thuarea is named after French botanist and ship's officer Aubert du Petit-Thouars (1756-1831); *involuta* from the Latin *involvere* (inroll), referring to the inrolled leaf blades.

DESCRIPTION

Thuarea involuta is a mat-forming, perennial grass with velvety-soft leaves. This prostrate grass is 2.5-25 cm tall. The inflorescence is a one-sided raceme, 1-3 cm long, with 1 to 2 female flowers at the base and four to six male flowers at the apex.

The short flowering shoots bend down as the seed ripens, and the capsules (formed by the spathe in a water-tight fold) either become buried in the sand or float away in the sea.

DISTRIBUTION AND HABITAT

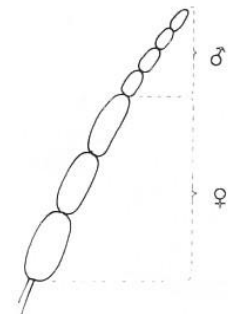
This grass is native to Australia, Asia and Africa. It is restricted to sandy coastal areas and is usually found on sandy foredunes.

ECOLOGICAL NOTES

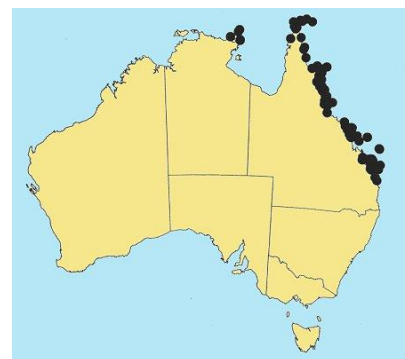
It is an efficient sand binder and forms deep roots and can grow in shaded areas. It has been planted at Saunders Beach for dune stabilisation.

PROPAGATION

This grass has been propagated vegetatively by planting sprigs.



Inflorescence diagram from Simon (1993)



Index of common names

Bird's Beak Grass.....	16
Citronella Grass	8
Clustered Lovegrass.....	10
Cockatoo Grass	5
Giant Speargrass	11
Golden Beard Grass	7
Kangaroo Grass	15
Large Bluegrass.....	12
Nineawn Grass	9
Pigeon Grass	14
Plume Sorghum.....	13
Reed Grass	6
Silky Heads	8
Silky Oilgrass.....	8
Tropical Beachgrass.....	16



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Table of growth features

Scientific Name	Life Cycle	Habit	Height (cm)	Preferred Soils	Preferred Habitats	Flowering Times
					R = Riparian O = Open Woodland W = Wetland B = Beach	
<i>Alloteropsis semialata</i>	Perennial	Tufted	20-100	Sands, loams	O	November - May
<i>Arundinella nepalensis</i>	Perennial	Tufted, erect	up to 200	Damp soils	R	November - May
<i>Chrysopogon fallax</i>	Perennial	Tufted	30-150	Range of soils	O	November - May
<i>Cymbopogon bombycinus</i>	Perennial	Tufted	30-120	Well-drained	O	April - August
<i>Enneapogon robustissimus</i>	Annual or Perennial	Tufted	30-100	Damp soils, sands	R	April - June
<i>Eragrostis elongata</i>	Annual or Perennial	Tufted	20-90	Range of soils	ROWB	November - May
<i>Heteropogon triticeus</i>	Perennial	Tufted, erect	20-200	Loams and gravelly soils	O	August - February
<i>Ischaemum australe</i>	Perennial	Tufted	50-120	Damp soils, sands	W	November - April
<i>Sarga plumosum</i>	Perennial	Tufted, erect	100-300	Range of soils	ROW	November - June
<i>Setaria surgens</i>	Annual	Tufted or trailing on ground	20-60	Mostly sands	RB	November - February
<i>Themeda triandra</i>	Perennial	Tufted	30-100	Range of soils	O	November - February
<i>Thuarea involuta</i>	Perennial	Prostrate	2.5-25	Beach sands	B	November - May