

YELLOW BRISTLE GRASS

The Ute Guide

Third Edition

DairyNZ 

 **ag**research



Science For A Better Life

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Yellow bristle grass (YBG) is a very serious threat to pastures:

- It is an extremely aggressive annual plant which spreads rapidly through pasture
- It reduces pasture quality in late summer and autumn
- Cows may avoid it when in seed, leading to low pasture utilisation
- Grazing avoidance leads to massive seed set
- YBG death leads to open pastures resulting in re-infestation and ingress of other weeds
- It passes through the rumen and is spread around the farm in dung
- In YBG-infested farms, where YBG comprises on average 13% of total DM, the cost of supplementary balage required to maintain milk production is estimated to be \$343/ha/year¹
- YBG is now widespread throughout Taranaki, Waikato, South Auckland and Bay of Plenty

¹ Brendan Briar preliminary estimate utilising Farmax Dairy Pro.

ACTIONS!

- Learn to recognise it now
- Incursions often occur from roadsides or around maize silage stacks
- Carry out fortnightly inspections of these areas from mid-December on
- If only a small patch – isolate and take action to control (page 34)
- For large infestations several management options are available (see pages 35–41)
- Empty out stock that have grazed infested paddocks before putting them in YBG free areas
- Allow only clean machinery and supplementary feed onto your farm
- Make a plan! Using suggestions on pages 32–41, plan a strategy to combat YBG

Yellow Bristle Grass Ute Guide Third Edition

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Preface

In the seven years since the first edition of the Yellow Bristle Grass Ute Guide was published in 2006, considerable knowledge on both the impact and management of YBG has been gained. Unfortunately, during this period also, YBG has spread at an extremely fast pace and is now impacting on the production of dairy farms in Taranaki, Bay of Plenty, Waikato, and South Auckland. Worse is the knowledge that YBG can be found well outside these areas, including the South Island, but is not known to be affecting form production in these areas YET!

This third edition of the Ute Guide provides new data on the real impacts of YBG, especially as it affects the bottom line, and new information on how best to manage it on badly infested farms where eradication is impossible.

There is still considerable demand by farmers and rural professionals for more information on YBG. Thanks are due to Trevor James and Katherine Tozer who have presented at more than 30 field days throughout the North Island over the past three years. Thanks also to *DairyNZ* and *Beef + Lamb NZ* for organising most of these field days.

We also wish to acknowledge the wide support for the YBG programme, both in cash contributions and in-kind support. These range from the major funders *MPI*, *MBIE*, *DairyNZ* and *AgResearch* and a host of other enthusiastic supporters who are listed in the back cover. And lastly, many thanks to the *Yellow Bristle Grass Action Group* committee members, many of whom have been on-board since the very beginning and have contributed greatly to the programme.

Royden Hooker, Chairman, Yellow Bristle Grass Action Group, September 2013

Yellow bristle grass (*Setaria pumila*)

There are eight species of *Setaria* in New Zealand. Most are annuals. Overseas they are commonly called foxtails or millets.

Yellow bristle grass (YBG) is an annual species which arose in sub-tropical China and was spread by humans across southern Asia where it is...

“A relatively good natural grazing species, although leaf production is moderately low. It is a serious weed in some areas, especially since it only germinates late in the season once most control measures have already been applied. In some areas this grass plays an important role in stabilising bare soil to protect it from erosion.”

YBG is now widespread in Europe, parts of Africa, throughout the USA and in eastern Australia.

YBG has now spread along roadsides throughout most of the North Island and it appears that from this vantage point that it has been ‘jumping the fence’ over the past 15 years to become a major problem on farms.

Yellow bristle grass on roadside and around a cultivated field



Identification

Yellow bristle grass is an upright annual growing 25–45 cm high, although in open pasture its first leaves are typically parallel to the ground. The leaves are yellow-green to green in colour and usually red or purple at the base. They are flat, hairless, soft and twisted. The leaf sheath is flattened. There are no ears (auricles) at the junction of the leaf blade and sheath. The ligule consists of a fringe of hairs 0.5–1.5 mm long.

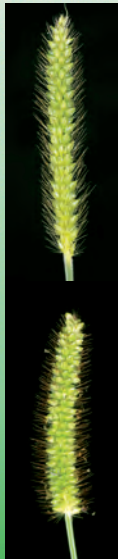
The seed head is a cylindrical ‘spike’, 2.5–10 cm long. It consists of many densely packed spikelets, with each spikelet bearing a single seed. At the base of each spikelet are five to ten bristles, 5–8 mm long. Initially the bristles are green, but soon change to a golden-brown. It is the colour of these bristles that give the grass its name.

Most other *Setaria* species have fewer bristles in their seed heads.

Mature yellow bristle grass



Seed head
with bristles



Immature yellow bristle grass



Biology

As a summer growing annual, yellow bristle grass reproduces only by seed. Seeds are dispersed by water, soil movement, animals, machinery, and as contaminants of crop seed and hay. The barbed seed heads are often carried in fur, feathers, or clothing. Seeds are hard-coated and most float on water. Germination requirements are variable, depending on several factors, including environmental conditions. Germination can begin at 16°C, but optimal temperatures for germination are typically between 20 and 35°C. **Germination typically starts in mid October and peaks from mid November to mid December depending on conditions. Early seed heads appear in late December but mostly in January and February.** Mature plants and empty seed heads will persist until the first frost.

YBG seeds are large (about 4 × heavier than summer grass seeds) and seed heads normally contain about 90 seeds. A single plant can have up to 60 seed heads. Seeds are usually dormant at maturity and require about three months of after-ripening before they can germinate. Most seeds survive only a few years under field conditions, although some deeply buried seed may survive for up to 10 years or more. Seedlings can emerge from soil depths

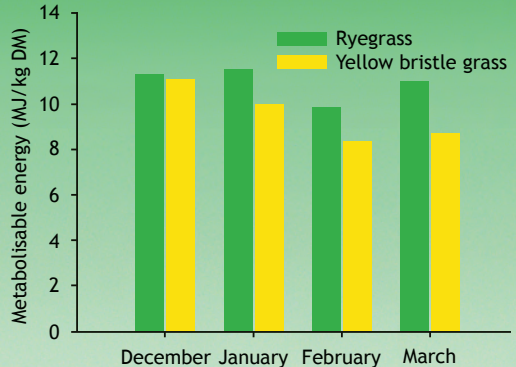
of up to 10 cm, but optimal germination is at 1–2 cm depth. **Counts have shown seed numbers up to 20,000/m² but typically 5–10,000/m² under light infestations.**

YBG occurs in areas with adequate summer rainfall, usually where the annual rainfall exceeds 500 mm per annum, although it can tolerate dry conditions once established. **It grows in areas where the soil has been disturbed, including cultivated areas, old pastures and along footpaths and the side of roads, especially where water collects.** YBG has a C₄ photosynthetic pathway so it grows best at higher temperatures and is frost tender. It is not toxic to stock but they may avoid grazing the seed head.

YBG fills a similar environmental niche to other C₄ summer annual grasses such as crowfoot grass, summer grass and smooth witchgrass. However, due to the size and number of the seed produced it is more competitive than the other species. It is moderate to slow-growing, especially if the weather remains cool, and generally will not establish and compete in vigorous ryegrass/white clover swards. **However, YBG seed can survive passage through the rumen and establishes in any gaps, especially those caused by dung.** It also readily invades run-out or damaged pastures that have been opened up due to pugging, over-grazing or the death of flat weeds or winter annuals such as annual poa.

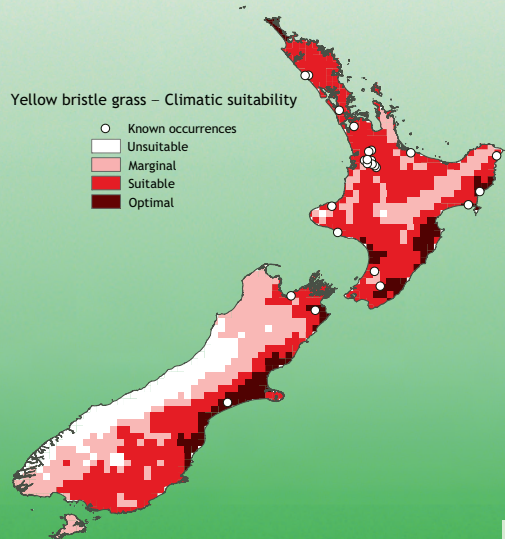
Impact on pastures

- Yellow bristle grass has lower ME than ryegrass in late summer/ autumn resulting in lower pasture quality
- Grazing avoidance can lead to lower pasture utilisation
- Yellow bristle grass competition weakens ryegrass plants
- Yellow bristle grass death opens pastures for establishment of winter weeds



Potential distribution of yellow bristle grass in New Zealand

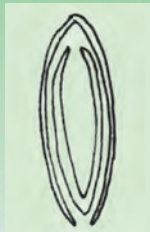
- Yellow bristle grass arose in sub-tropical China and spread throughout Asia and Europe assisted by humans
- It occurs also as a weed in North America, Africa, Australia and New Zealand
- A model representing its climate preferences based on its occurrences in Eurasia and North America shows that, under current climate, it has a wide potential distribution in New Zealand



Grass identification

Grass plants have several characteristics that can be used to differentiate species and for identification. The most important are labelled in the illustrations below.

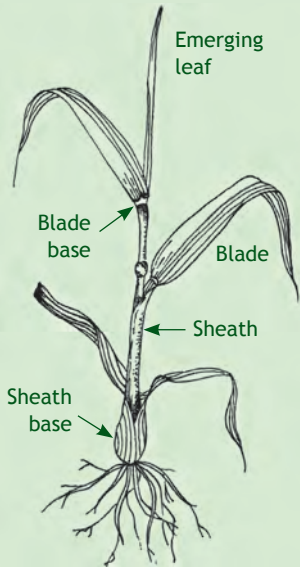
These plant characters are used to separate grass species that are sometimes confused with yellow bristle grass, especially at the seedling stage. A hand lens might sometimes be required to examine the junction of the leaf blade and the sheath as, after the flower and seed head, this is the most diagnostic part of the plant.



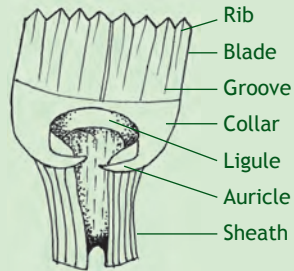
Cross section of a folded leaf



Cross section of a rolled leaf



Leaf base detail



Ligule types

Membrane



Fringe of hairs



Yellow bristle grass (*Setaria pumila*)

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Characteristics:

Emerging leaf rolled

Ligule a ring of hairs about 1 mm long

Auricles absent

Sheath flattened and hairless

Leaves slightly rough on the edges, with long hairs only at the base

Distinguished by:

- Flattened, hairless leaf sheath
- Long hairs at the base of the rough-edged leaves
- Leaf sheath often turning reddish purple



Yellow bristle grass (*Setaria pumila*)

Yellow bristle grass can be distinguished from the other two common *Setaria* species by:

- **Knot-root bristle grass:**
 - has narrower leaves
 - has finer seed heads with shorter bristles (see page 16)
 - has knot-like short rhizomes underground
- **Rough bristle grass:**
 - does not have the red coloured base
 - has seed heads that stick together and to clothing, fur, etc.



Seed head differences

Rhizome differences



Yellow bristle grass (*Setaria pumila*)

Knot-root bristle grass (*Setaria gracilis*)



Yellow bristle grass is sometimes confused with knot-root bristle grass

Characteristics:

A perennial grass with thin, strong leaves with a few long hairs on the collar

Ligule short, hairy

Auricles absent

Short, slender, knotty rhizome

Grows in waste places and in particular along roadsides

Distinguished from yellow bristle grass by:

- Thinner, tougher leaves
- A thinner seed head which lacks the yellow tinge
- Rhizomatous roots



Knot-root bristle grass (*Setaria gracilis*)

Rough bristle grass (*Setaria verticillata*)

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Yellow bristle grass is sometimes confused with rough bristle grass

Characteristics:

Upright growing annual with bristly seed head

Leaves bright green, soft, hairless but often with long hairs next to collar

Emerging leaf rolled

Ligule hairy, 0.6–1.5 mm long

Auricles absent

Sheath flattened when very young becoming rounded, usually pale green

Seed head has barbed awns that stick together

Distinguished by:

- Upright seedling
- Sheath usually green
- Ligule a fringe of hairs
- Seed heads that stick to each other



Rough bristle grass (*Setaria verticillata*)

Crowfoot grass (*Eleusine indica*)

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Characteristics:

Emerging leaf folded

Ligule a thin fringe of hairs 1–2 mm long

Auricles absent

Leaf sheath flat and hairless except for its upper margin

Leaves hairless except at their bases

Distinguished by:

- Long hairs at the leaf base
- Vertical green stripes on the pale leaf sheath
- Leaf sheath flat, never coloured at its base



Crowfoot grass (*Eleusine indica*)

Barnyard grass (*Echinochloa crus-galli*)

22



Characteristics:

Emerging leaf rolled, but becoming flat later

Ligule absent

Auricles absent

Sheath more or less sparsely hairy (particularly at the junction of the leaf sheath and blade) light green to purplish in colour

Distinguished by:

- Its upright growth habit
- Absence of a ligule



Barnyard grass (*Echinochloa crus-galli*)

Summer grass (*Digitaria sanguinalis*)

24



Characteristics:

Emerging leaf rolled

Ligule membranous, 1–2 mm long, blunt

Auricles absent

Leaf blades very hairy underneath when young, and only a few long hairs at base when mature

Leaf sheath light green usually densely hairy with 3–4 mm hairs

Distinguished by:

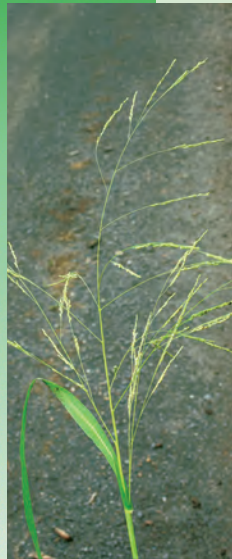
- Broad hairy leaves
- Prostrate growth habit



Summer grass (*Digitaria sanguinalis*)

Smooth witchgrass (*Panicum dichotomiflorum*)

26



Characteristics:

Emerging leaf rolled

Ligule a rim of 1–2 mm long hairs

Auricles absent

Lower leaf sheath usually hairy, usually strongly red in colour

Leaves with more or less a few hairs near the base

Distinguished by:

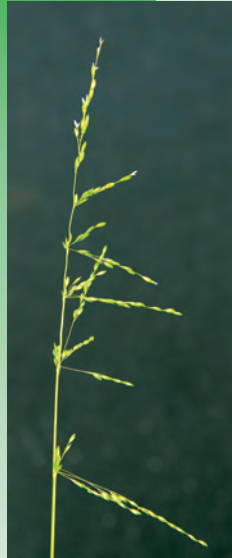
- Narrow leaves
- Red coloured, hairy leaf sheath



Smooth witchgrass (*Panicum dichotomiflorum*)

Veld grass (*Ehrharta erecta*)

28



Characteristics:

Emerging leaf rolled

Ligule membranous, jagged, 3–8 mm long

1–2 mm long hairs at the junction of leaf and sheath

Leaves broad and soft

Seed head with hanging branches appearing to originate on one side

Distinguished by:

- Long, milky white, jagged ligule



Veld grass (*Ehrharta erecta*)

Annual ryegrass (*Lolium multiflorum*)

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Characteristics:

Emerging leaf rolled when young
(NB for perennial ryegrass the emerging shoot is folded)

Leaves long, shiny, hairless with well developed midribs

Auricles long, clasping

Sheath base often tinged pink in colour

Distinguished by:

- Long clasping auricles
- Hairless, shiny backed leaves



Annual ryegrass (*Lolium multiflorum*)

How is yellow bristle grass spread?

- **Roadsides** Spread by mowers, machinery and stock
Will fall, blow through fence and birds can carry seed into paddock
Stock grazing roadsides will move YBG seed around via dung
- **Livestock** **YBG is able to survive passage through the rumen and be deposited and establish in the dung**
- **Cropping** YBG is a common contaminant of maize silage crops
- **Maize** Feeding out fresh or improperly ensiled maize can spread YBG
- **Hay** Will be readily spread by infested hay
- **Silage** YBG seed placed in sealed maize silage did not germinate after 1 week of burial
- **Effluent** YBG seed survives up to three months in effluent and can be spread via effluent pumped onto pastures

Management on roadsides

- Spray with glyphosate (e.g. Roundup®) – timing is important to avoid the need for several applications, spray just as first seed head emerges (after Christmas – January depending on season and weather)
- Try and create a thatch of dead plants to stop further YBG germination
- Residual herbicides have the potential to prevent germination of YBG
- Mowing – won't kill YBG, but seed will be produced very low down and therefore lessens the risk of spread
- Manual removal is an option for small amounts
- **DON'T GRAZE ROADSIDES FROM DECEMBER TO MAY**
- **DON'T MAKE INTO HAY**, wrapped balage is OK (see page 32)

Management of small infestations

- Use fenoxaprop (e.g. Puma[®]S) before seed heads appear, if seed heads present remove 24 hours after spraying. Watch for further germination of YBG, if treated with fenoxaprop a 2nd time fence off to prevent grazing for 3 months
- Glyphosate (e.g. Weedmaster[®]) can be used to kill YBG without concern of residues. However, YBG seeds will not be killed and other weeds may quickly invade the space
- Manual removal is a very good option if you can
- Avoid seed being spread further afield by fencing off, mowing and collecting seed or spraying
- **But whatever you do, DON'T GRAZE WHEN THE SEED HEAD IS VISIBLE**
- Be vigilant as YBG will germinate throughout the summer as conditions (rainfall) allow

Management of large infestations

- Use fenoxaprop (e.g. Puma® S see page 34) from mid-December on to spray YBG
- Topping to improve utilisation and possibly reduce the quantity of seed set
- Lengthen grazing interval in early summer to have more grass cover and post-grazing residue
- Shorten grazing interval in summer and autumn to minimise YBG flowering
- Avoid grazing a clean paddock after stock have been exposed to YBG seed
- Use chain harrows to spread dung and avoid creating conditions which favour YBG establishment



Management by pasture renewal

- Must have two summers out of YBG seed production before sowing new pasture
YBG must not be allowed to set seed!
- Use crops in which YBG can be readily controlled, for example:
 - maize (use Latro® as a post-emergence spray)
 - chicory (use Sequence® as required)
 - turnips (use Sequence® prior to crop canopy closure)
 - lucerne or other legume (use Sequence® as required)
 - for annual summer crops plant annual ryegrass or winter cereal in between
- Look after new grass and keep all weeds out, **do not overgraze**
- Otherwise, use normal pasture renewal principles (e.g. treated seed and appropriate endophyte, etc.) refer to DairyNZ Pasture Renewal Guide

Pasture renewal tips

- Pasture renewal should be carefully planned as part of a whole-farm forage supply strategy
- Understand why the pasture has failed and address any underlying issues (e.g. drainage, fertility, insects, etc.)
- If the desired end point is a long-term perennial ryegrass pasture, good weed and pest control before sowing is critical. Plan to spend some time out of both grass and clover to break the weed/pest cycle
- Always use treated seed (e.g. Ultrastrike™ or similar)
- Treat seeds infected with novel endophytes (e.g. AR37, NEA2, etc.) as a perishable product – store carefully, sow asap and check the seed certificate to make sure that you are getting what you paid for!
- Use full cultivation only where necessary – no-tillage offers both agronomic and environmental benefits
- Be careful with grass-to-grass renewals – it can be like painting over rust

Grazing management

- Avoid overgrazing and opening of pastures to weeds
- Overgrazing in summer can also expose the ryegrass crown to direct radiation in summer and may kill the plants
- Avoid moving stock from an infested to a clean paddock
- In dry years might need to use more supplementary feed early to preserve pastures (i.e. prevent overgrazing)
- YBG will not be controlled over summer if grazing intervals are extended as mature seed heads are produced within 21 days of grazing
- Reduction of stocking rate may be required to achieve some of the above

Frequently asked questions

- **Does Puma® S harm the grass or clover?**

No, fenoxaprop (Puma® S) does not affect perennial ryegrass or clovers

- **What other species will Puma® S control?**

Fenoxaprop will kill all annual summer growing grasses that are present at the time of spraying, including summer grass, crowfoot grass, smooth witchgrass and barnyard grass

- **Can I use Puma® S around maize crops to control YBG?**

Only if you completely avoid any spray or drift hitting the maize which is very sensitive to fenoxaprop

- **Can I make repeat applications of Puma® S?**

Not recommended at this stage as we don't know how long residues would persist from more than one application (see page 34)

Puma® S – best use advice

In trials Puma® S gave 100% control of small YBG plants and 90% control of YBG at early seed head stage. Follow these tips and you can enjoy the same success.

Planning

- To ensure the best result, plan to apply to YBG plants no later than early seed head emergence
- With a 28 day withholding period plus 7 day ‘freshen-up’ period, plan on a 35 day grazing interval when controlling YBG
- The use of Puma® S is successful when desirable species can replace the YBG that is controlled. Target paddocks where the population of desirable species (ryegrass and clover) is sufficient to fill the gaps created by controlling YBG

Use

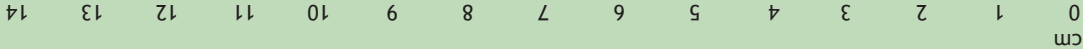
- It is important to have sufficient YBG leaf area present to absorb Puma® S. This can be achieved by leaving at least 7 days between the end grazing and applying Puma® S
- To ensure effective weed control apply 750 ml/ha Puma® S and ensure good weed coverage by using a spray volume of 250 L/ha water
- Puma® S does not have residual activity. YBG that germinates after application of Puma® S will not be controlled
- It is important not to mix Puma® S with any other chemicals including adjuvants.
- Puma® S is rainfast 1 hour after application when applied to a dry crop
- New for 2013 Puma® S is available in a 1 litre container, ideal for smaller paddocks

Scan the QR Code to access further Puma® S technical information

www.cropscience.bayer.co.nz

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