

# 3D weed management

## Chilean needle grass

*Nassella neesiana*

Chilean needle grass is a tufted grass that is increasingly becoming a serious pasture and environmental weed in south eastern Australia. It is listed as a Weed of National Significance.

Chilean needle grass can be very damaging to sheep. This grass can dominate large areas of native and introduced pastures, reducing productivity by more than 50%. A cool season perennial grass, it grows mostly through autumn, winter and spring. Young growth can be palatable, however, after setting flowers and seeds in spring, Chilean needle grass tends to have large masses of unpalatable flower stalks and little green leaf through summer.

Chilean needle grass is difficult to remove once widely established so minimising seed entry and taking early action, particularly in mid October to November, is critical to prevent seed set and minimise impact.



### Deliberation

#### Stocktake

**Early detection** is critical – be able to identify it.

**Map** infestations on your farm – where and how dense.

**Identify** sources of infestation.

#### Plan strategies

**Prevention** – clean paddocks reduce the chance of entry. Aim for zero tolerance.

**Containment and eradication** – for patchy invasion, prevent seed set, spot spray, remove (chip/hoe) existing plants, monitor and control new outbreaks.

**Management** – for extensive invasion, reduce seed set, suppress, reduce vigour, increase palatability and minimise economic impact.

### Diversity

#### Use several tools

Weaken, kill and prevent seed set or manage to minimise impact.

**Competitive pastures** in autumn/winter/spring.

**Fertilise** to improve pasture quality and palatability.

**Herbicides** – in winter and early spring before seed set.

**Rotational grazing** to graze down all actively growing grasses in the pasture (especially during October and November), followed by recovery periods to allow desirable species time to rebuild root reserves.

**Crop rotations** (on arable land) for 3-4 years using herbicides then plant competitive pastures.

### Diligence

#### Persist

Do it right, on time, every year.

#### Continue monitoring:

- For new plants – particularly after autumn/winter rain.
- The competitiveness of pastures.
- The effectiveness of each control measure.

#### Follow up:

- Repeat or use other tools where controls were poor.
- Adapt grazing or pasture management to increase competitiveness.
- Adjust your strategy as needed.

#### Prevent

**Stop** seed set.

**Quarantine** – be vigilant to prevent seed entry – clean down equipment and vehicles, quarantine stock and equipment from infested areas, spray perimeters and monitor potential entry sites.

**Destroy new outbreaks** – spot spray, hoe, burn new plants and outbreaks.

HELPING PRODUCERS MANAGE WEEDS IN GRAZING SYSTEMS

# 3D weed management

To cost effectively manage Chilean needle grass use the '3Ds' of weed management:

## What will it do?

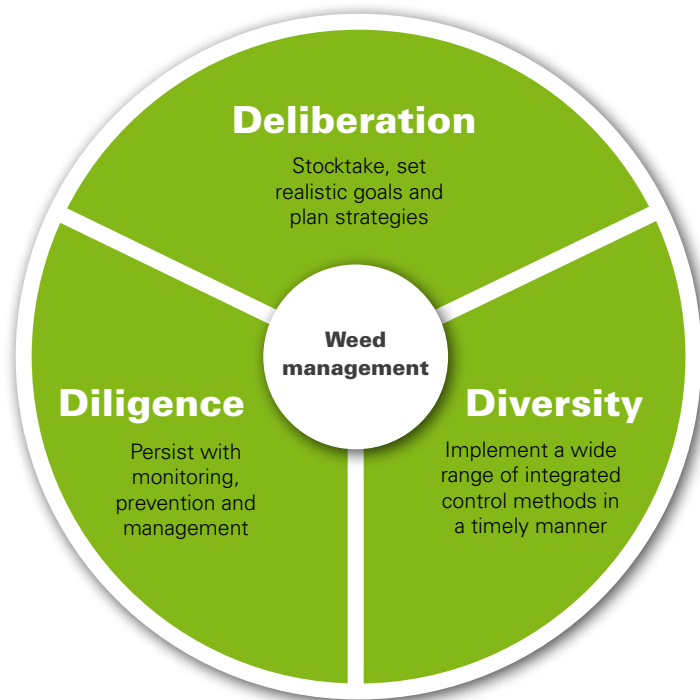
Chilean needle grass can dominate both introduced and native pastures, reducing their productivity and damaging stock.

Damage from the seed is a significant problem for livestock. The sharp, pointed seeds cause physical injury, especially to sheep, and impacts on wool, hide and carcase quality. Seed can be produced within the leaf sheaths even when the tall seed heads have been removed by grazing, slashing, burning or mowing.

Palatability and feed value declines significantly once it goes to seed. If managed by a combination of targeted grazing management to slow seed set and fertiliser application, the palatability and feed quality can be improved, providing usable winter feed.

Chilean needle grass is highly invasive and forms dense stands which significantly reduce the productivity of both native grasslands and introduced pastures. Producing large quantities of seed, it readily establishes in pastures with bare ground and poor competitiveness. It has a further competitive advantage over pastures as it is not a preferred grazing feed.

Biodiversity may be reduced by dominance of Chilean needle grass.



## Deliberation

### Stocktake

The first step is to gain a clear picture of Chilean needle grass on your farm.

#### Where is it and how dense?

- Inspect each paddock for Chilean needle grass. Spring is the easiest time to identify new infestations as it goes to head.
- Identify potential weed hot spots (eg, laneways, sheds and holding yards).
- Plot infestations on a farm map, including the densities. For example:

Density	Plants / ha*	Groundcover
Light	160 (1 per 60/m <sup>2</sup> )	0.1%
Moderate	1,000 (<1/ m <sup>2</sup> )	5%
Dense	> 8,000 (>1/ m <sup>2</sup> )	> 5%

\*Average across a paddock – may be as large patches.

## Is it spreading and how?

Cross-check current infestations with old maps or your memory to determine:

- Are there any new outbreaks?
- Is the existing infestation spreading?

→ A useful tool for assessing pastures is MLA's Pasture Health Kit

→ Also see: MLA Tips & Tools: Weed removers, pasture improvers – Effective weed control.

## Where is it coming from?

Identify the actual and potential sources of infestation such as vehicles, farm machinery, livestock movements, seed and hay harvested from infested areas, neighbouring lands and water movement.

## Planning

Plan carefully so that a realistic strategy can be achieved that suits your farm, considering farm size, goals, farming system, budget and extent of infestation.

### Set goals

The level of infestation will influence what you can realistically achieve.

- New or small infestation/s – detect it early and do all you can to eradicate it.
- Widely established infestation – eradication is very difficult, particularly as the seed persists. In areas where it is not legislated to control Chilean needle grass, many farmers are containing and managing it to reduce impact and make best use of it.

### Develop strategies

Develop a strategy for the whole farm and each paddock.

Infestation	Strategy
Clean paddocks	Prevention – stop it entering or establishing.
Scattered plants or small areas	Eradication – remove it.
Moderate-dense infestation	Contain – where it is not legislated to control Chilean needle grass, prevent seed set, reduce vigour and extent, and improve the competitiveness of crops and pastures.
Dense with sources of reinfestation	Manage – where it is not legislated to control Chilean needle grass, reduce spread and impact.

Prioritise the paddocks on which to spend your time and budget:

Priority	Strategies
1	Keep paddocks clean – prevent seed entry, and prevent seed set on sources of infestation.
2	Eradicate from low infestation paddocks.
3	Containment of moderate infestation paddocks.
4	Containment of infestations on heavily infested paddocks.
5	Gradual reduction of infestations.
6	Eradication from all paddocks (needs to be long term and may not be feasible).



## Identify

**Early detection and action is a high priority as Chilean needle grass is hard to eradicate once established. It is difficult to identify during the seedling stage. It:**

- Is a tussocky perennial grass.
- Has small hairs on the surface of the leaf.
- Grows to around 45 cm in height.
- Has a basal diameter of around 25 cm.
- Develops a purplish/mauve seed head during flowering (mainly in November/December).
- When not flowering, it can be confused with other winter green species such as Tall Fescue, wallaby grass (*Austrodanthonia* spp) and Spear and corkscrew grass (*Austrostipa* spp).

It can be distinguished from other grasses as it has:

- A crown of hairs or “teeth” at the junction of the awn and the seed body.
- Two small tufts of hair at the junction of the leaf sheath and leaf blade.
- Small hairs on the surface of the leaf.
- A coarser feel than wallaby grass.



## Case Study

Rex Sheedy from Glen Innes, NSW has developed a strategy to manage Chilean needle grass in his pasture. Giving him a benefit of around \$130,000 each year, it involves:

- Keeping clean country clean by being very vigilant in monitoring and spot spraying.
- Grazing it first with cattle and then with sheep when the grass is shorter and without tall seedheads.
- Planting additional feed crops in a 3-4 year rotation, followed by competitive pastures to maintain carrying capacity and reduce Chilean needle grass growth.

➡ To read more about how other farmers have managed Chilean needle grass, see "3D Weed Management: Chilean needle grass Case Studies" available from MLA & AWI.

A staged, long term strategy is usually needed for dense infestations. Start with management actions to reduce and weaken the weed enough to then contain it in small areas.

The suitability of choosing containment or management strategies depends on your own goals, the potential impact on neighbours and any local government requirements. They may be temporary measures until better controls become available.

### Actions

Develop an annual operating plan that clearly identifies the timing of critical must do action and tools for your strategy.

The critical must do actions for any strategy are:

- Prevent seed entry.
- Prevent seed set.
- Ensure competitive pastures.
- Routinely monitor (particularly after each autumn/winter rain) all points identified in the stocktake where Chilean needle grass can enter each paddock, along with any new outbreaks and regrowth.
- Quickly kill new outbreaks and exhaust seed reserves by spot spraying and chipping, repeated over several seasons, always before seed set.
- Suppress and gradually reduce the vigour and extent of the weeds (competitive pastures, herbicides).
- Graze to keep the weed short to improve its palatability and minimize its impact on your enterprise.

Suitable plans include a combination of tools such as:

- Non arable areas – manage for competitive perennial pastures (native and/or introduced), with spot spraying especially along perimeters.
- Arable areas – as for non arable land, plus herbicide control in cropping rotations, followed by competitive pastures.

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## Example – Chilean needle grass plan for arable and non arable land

### Stocktake

- Chilean needle grass lightly infested across 2 paddocks.

### Source

- Washed in from public land in flood.

### Strategy

- Eradicate Chilean needle grass from paddock.

### Actions

- Quarantine stock from infected paddocks or unknown sources. On paddocks containing Chilean needle grass, if arable crop for 3-4 years followed by sowing a strong perennial pasture.
- Manage grazing with quarantined stock for high pasture vigour and density to compete with Chilean needle grass.

- If non arable, manage to encourage native and introduced pastures.
- Spot spray any weeds to prevent seed set.
- Monitor and spot spray Chilean needle grass in all other paddocks.

## Diversity

Effective control requires the combination of a range of tools acting on Chilean needle grass over its lifecycle. Select a set of tools to achieve the strategy – prevention, containment, eradication or management.

The most effective strategies are a combination of carefully timed tools:

- Competitive, perennial pastures.
- Herbicides (in pastures or crop rotations).
- Strategic, high density rotational grazing.

### Prevent seed entry

Minimise the risk of seed entry and establishment by paying constant attention to likely sources of infestation such as:

<b>Farm machinery &amp; vehicles</b>	Clean down and/or quarantine to designated areas that can be monitored.
<b>Livestock &amp; wildlife movements</b>	Seeds take up to 7-10 days to pass through livestock and can still be viable. Seeds can also attach to fleeces or hides of animals (including wildlife). Restrict livestock from unknown or infested land for 10 days to specific areas that can be easily monitored.
<b>Seed &amp; hay harvested from infested areas</b>	Particularly summer or winter crops or pastures from areas with poor weed control. Carefully monitor into the next season all new sowings of pastures and crops and areas where hay is fed.
<b>Nearby land</b>	Regular surveillance of farm boundaries for new outbreaks.
<b>Water movement</b>	Carefully monitor along creeks, waterways and overland flow areas.

### Pasture management

As Chilean needle grass exploits bare ground, healthy pastures can prevent or suppress its establishment. Pasture competition greatly enhances the effectiveness of other tools.

Choose a pasture that has:

- Strong, autumn/winter growing, perennial grasses to resist weed invasion, provide groundcover and competition.
- Legumes and annual grasses to provide competition by germinating at the same time as Chilean needle grass.

Maintain good soil fertility and monitor and control pests to ensure good pasture health.

## Understanding Chilean needle grass

**Chilean needle grass is a perennial grass, making it difficult and expensive to control once established.**

**Growth:** It grows mostly through autumn, winter and spring.

Young growth can be palatable. However, after setting flowers and seeds in spring, Chilean needle grass tends to have large masses of unpalatable flower stalks and little green leaf through summer.

**Spread:** Flowering and seeding occurs in spring. It can produce both tall seed heads as well as “hidden” seeds in the leaf sheaths at the base of plants. This means viable seeds continue to be produced when the seed heads have been removed by grazing, slashing, burning or mowing.

Its seed head has pointed, sharp seeds and a long twisted awn. This causes damage to stock and also allows the plant to adhere to livestock and vehicles which encourage its spread.

**Weakest point:** The weakest point in the life cycle of the Chilean needle grass is the seedling. Seedlings are characteristically very slow growing and, while exhibiting more vigour than serrated tussock, they are extremely vulnerable to competition at this stage.

## How competitive is your pasture now?

Determine whether the species composition and density of your pastures is adequate to compete against Chilean needle grass. Typically (there are significant differences between species) ideal pasture plant densities are:

Rainfall zone	Ideal pasture plant density	Groundcover
Low	10 plants/m <sup>2</sup>	>90%
Medium-High	15-30 plants/m <sup>2</sup>	>90%

➔ MLA Tips & Tools “Grazing management for perennial based pastures.”

## Grazing management

Manage grazing of pasture to achieve a balance between pasture competitiveness and palatability.

Competitive pastures have high persistence, density, vigour and productivity. To encourage pasture competition:

- ➔ Defer summer grazing so that the pasture is dense and competitive when Chilean needle grass seedlings are emerging in autumn.
- ➔ Keep autumn and winter herbage (perennial grasses, annual grasses, legumes, weeds) above 1500 kg/ha dry matter by adjusting grazing pressure throughout the year.
- ➔ Ensure Chilean needle grass is subjected to at least the same grazing pressure as introduced and native pasture species (eg, the stipoid grasses like spear grass and corkscrew grass).

- ➔ Allow desirable pastures to rebuild root reserves and set seed.
- ➔ Fertilise in early autumn to increase growth and competitiveness of desirable pasture species.
- ➔ Use strategic rotational grazing with appropriate stock density before seeding and to prevent aerial seeding (mid October to the end of November). Set stocking tends to favour the weed. On most perennial pasture and clover types:
  - Rest after the autumn break so annual species can establish.
  - Encourage desirable native and introduced pasture species to build root reserves leading into the period when Chilean needle grass requires heavy grazing to prevent/reduce seed set. Generally rotational grazing is required.

- Allow good recovery periods after grazing (30-50 days).
- Adopt relatively short grazing periods (2-30 days) during active growing phases.

- ➔ Use cattle first to graze Chilean needle grass as they are less selective, remove the tall heads off the grass and reduce the height of the grass.
- ➔ Exclude sheep when Chilean needle grass goes to seed and/or exclude sheep until after the weed height has been grazed down by cattle. This can reduce the impact of the weed seed on sheep.

## Herbicides

Timing, selection and application of herbicides are important so they can effectively kill plants and prevent seed set.

Herbicide options for Chilean needle grass are:

- ➔ Spot spraying or broadacre in-crop.
- ➔ Registered and on-permit options include flupropanate and glyphosate. Check options carefully before use.
  - Flupropanate is slow acting with a residual effect. Spray in winter if you can identify Chilean needle grass. If spraying after September then add glyphosate to flupropanate to prevent seeding.
  - Glyphosate can be used for spot spraying.

## Match control measures with the biology of the plant



- Herbicides are most effective when pastures are strong enough to compete with the weakened weeds.

Timing is critical:

- Spray in winter or early spring, at flowering but before seed set.
- Herbicides are most effective on actively growing plants – winter and spring.

Some farmers have been trialling a spray/graze approach. This involves spraying Chilean needle grass with a sub lethal level of herbicide in October, then grazing it at a high stocking rate for a short period of time to reduce seed set.

### Cropping rotations

The main benefit of crop rotation is the herbicides used during the cropping phase. Both fallow and in-crop herbicide applications help to deplete the weed seed bank.

To be an effective form of control against Chilean needle grass, crop rotations need to:

- Prevent weed seed set over the fallow and crop growing period. Broadleaf or fodder (oats) crops can be established by direct drilling or conventional cultivation.
- Have three to four years of treatment with effective herbicide to prevent weeds seeding in October or establishing.
- Be followed up by a strong perennial competitive pasture.

### Mechanical control

**Cultivation** can be effective provided it achieves complete weed kill and is generally used in conjunction with appropriate herbicides. However, Chilean needle grass establishes readily on bare ground so cultivation alone can encourage it. A crop needs to be well established to suppress the increased weed germination that generally follows cultivation. Cultivation is generally compatible with winter crops that are grazed before the weed seeds, and are then treated with glyphosate.

**Mowing and slashing** will not kill the plant or prevent seed production as the plant can produce seeds at the base of the plant. However, this method can increase the palatability of the weed as well as reduce the amount of tall seed heads set and therefore decrease the impact on sheep.

**Chipping (hoeing)**, hand weeding or spot burning (eg, flame throwers) can be used for a few, sparse new Chilean needle grass invasions. Once established, the plants are well anchored in the soil and difficult to pull out. It is important to remove all the root system, so that the plant can't recover. Follow-up is needed to look for emerging seedlings.

### Biological control

No bio-controls are available for Chilean needle grass. Research in this area indicates that biological controls will be difficult, largely because Chilean needle grass is closely related to other grasses such as the *Austrostipa* spp.

## Choose a diversity of carefully timed tools for the must do actions

Tools	Prevent new seed entry	Kill existing plants	Reduce rigour	Minimise impact
Grazing	Hold stock in clean areas 10 days before moving from infested to clean paddocks. Check if animals come from infested areas and if there is wool or hide contamination.		Use strategic rotational grazing to encourage high competition in autumn/winter and minimise the impact of seeds during the growing period (mid Oct to Nov). Graze with cattle before sheep.	
Pastures	Ensure pastures are competitive, especially in autumn/winter. Maintain 90% groundcover.	Keep herbage above 1500kg/ha dry matter in autumn and winter.	Ensure pastures are competitive in autumn/winter. Maintain 90% groundcover.	
Herbicides	Spray any new entrants and seed sources.	Spot spray or broadacre depending on level of infestation – winter/early spring.		
Cropping	Clean equipment before use.	Winter crops for 3-4 seasons with selective herbicide during fallow and in-crop.		
Mechanical	Clean equipment before use.	Chip or burn individual plants.		Slash in spring to increase palatability and reduce seedhead height.
Quarantine	Minimise risk of entry & watch all possible entry sites.			Isolate stock that graze the weed.

# Diligence

Chilean needle grass is an ongoing challenge for many properties. The key is to be diligent to achieve critical outcomes:

- Persist with control to keep on top of it.
- Prevent seed set.
- Prevent it from entering.

**Monitor** constantly, particularly in winter, spring and after control measures. Review the areas of infestation by updating farm maps and/or counting weed density in quadrats:

- Is the weed density reducing?
- Is it contained to existing areas?
- Are infested areas reducing in size?
- How effective was each control activity?
- Is management being achieved?
- Are winter/spring pastures healthy and competitive?

**Timing must be right** – be sure control measures are effective before seed set in spring/summer. Plan carefully so Chilean needle grass control activities fit with other workloads.

Put into your farm diary the critical actions for your strategy:

- Summer/autumn/winter – manage for competitive pastures.
- Autumn – fertilise.
- Winter/spring – herbicides, monitoring, cropping.
- Spring – grazing to minimise seed impact.
- All year – prevent seed entry.

**Follow up** – if control measures haven't worked, repeat or use another tool before seed sets.

**Integrate** your weed management plan with your overall farm management strategy to ensure that it can be achieved.

**Review** and modify the plan based on progress, successes and failures. Adapt to seasonal conditions if needed to ensure pasture is competitive and to act on unusual outbreaks.

Photos page 1 & 3: Charles Grech, Department of Primary Industries, Victoria

## Further information



For further information on Chilean needle grass or pasture management, contact your local agricultural office or agronomist. You may also find useful information from:

### Australian Wool Innovation

[www.wool.com.au](http://www.wool.com.au)  
Ph: 1800 070 099

### Meat & Livestock Australia

[www.mla.com.au](http://www.mla.com.au)  
Ph: 1800 675 717 – option 3

MLA Tips & Tools: Grazing management for perennial based pastures

**3D Weed Management Chilean needle grass Case Studies** available from AWI and MLA

### National Taskforce on Chilean needle grass

Chilean needle grass Best Management Manual is available at: [www.weeds.org.au/WONS/chileanneedlegrass](http://www.weeds.org.au/WONS/chileanneedlegrass)

### WEEDeck – for identification

[www.weeds.org.au/weeddeck](http://www.weeds.org.au/weeddeck)

### CRC for Australian Weed Management

Weed Management Guide: Chilean needle grass  
[www.weeds.crc.org.au/weed\\_management](http://www.weeds.crc.org.au/weed_management)  
Ph: 08 8303 6590

### NSW Department of Primary Industries

Agnote DPI 194 – Chilean needle grass  
[www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au)  
Ph: 02 6391 3100

### Department of Primary Industries Victoria

Landcare Notes series no. PP0086, KTRI  
[www.dpi.vic.gov.au](http://www.dpi.vic.gov.au)  
Ph: 136 186

### Department of Primary Industries and Water, Tasmania

[www.dpiw.tas.gov.au](http://www.dpiw.tas.gov.au)  
Ph: 1300 368 550