

Management Guide Chilean needle grass

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Current management and control options for Chilean needle grass (*Nassella neesiana*) in Australia

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Identification

Sound identification skills are essential to manage Chilean needle grass.

When mature, it forms erect, robust tussocks up to 1m in height and 1.5m when flowering. The leaves are between 1 and 5 mm wide, up to 300 mm long and are flat in appearance with needle-like hairs on the upper side. The leaves can roll inwards when under stress.



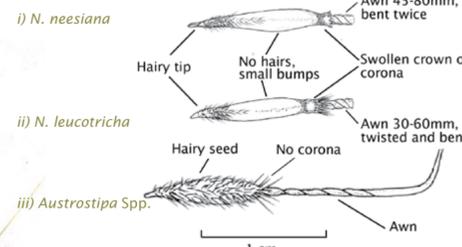
Mature Chilean needle grass plant (Photo: Charles Grech, DPI Victoria)

Young Chilean needle grass plant (Photo: Jenny Conolly)

The best time to identify Chilean needle grass is in spring, when it produces panicle seeds with distinctive purple glumes with long light green awns (40 to 85 mm) that have a nodding habit. The seed can also help differentiate between different *Nassella* species.



Chilean needle grass seed with glumes still attached



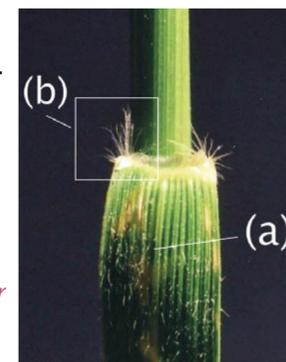
The seeds of Chilean needle grass (i) and Texas needle grass (ii) have a raised crown (corona) between the body of the seed and the awn or tail of the seed (not drawn in full). Note the long fine hairs on the corona of Texas needle grass. The seeds of native speargrasses (iii - *Austrostipa* spp.) are similar except they lack the corona and generally have a hairier seed. All seeds are typically between 6 and 10 mm in length. Drawings: K. Firth

When no seed is present, Chilean needle grass can easily be mistaken for other grasses such as tall fescue (*Festuca arundinacea*) and wallaby grasses (*Austrodanthonia* species), but especially spear grasses (*Austrostipa* species).

The best way to differentiate Chilean needle grass and other grasses is to:

Feel for short, erect hairs on the upper side of leaf (a) (most native grasses are smooth or have much softer hairs). A small tuft of hair at the junction of the leaf blade and leaf sheath (b) (Note: wallaby grasses are quite similar, but Chilean needle grass can be differentiated by its much coarser and wider leaves).

Seeds at the base of the plant (c, d) and in the leaf sheaths (e) (these basal and stem cleistogenes are not present in native grasses).



Mike Slay, Homelea Ltd



Charles Grech, DPI Victoria

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Further Information

Further information on biology, management and identification can be found in the National Chilean Needle Grass Best Practice Management Guide. For a copy visit www.weeds.org.au/WoNS/Chileanneedlegrass.

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Linear Reserves

Fire can be a useful management tool in native grasslands (Photo: Charles Grech, DPI Victoria).

Clean down areas can reduce the rate of spread along roadsides (Photo: Charles Grech, DPI Victoria)

Slashing is the most common method used to maintain linear reserves such as roadsides. To avoid contamination with thousands of Chilean needle grass seeds, it is essential to time slashing outside the Chilean needle grass seeding period and to strictly follow machinery hygiene practices. Inspection and clean-down of machinery and equipment are highly recommended to limit contamination, as is the use of a slasher cover. "Machinery hygiene guidelines for roadside managers – minimising the spread of Chilean needle grass" (Baldyga and Grech, 2005) are available for all land managers.

To reduce Chilean needle grass infestations, successful control techniques include spot spraying or, if the infestation is very heavy, boom spraying with glyphosate or flupropanate. Fire can assist detection of the

extent and nature of the infestation, especially where native species are present.

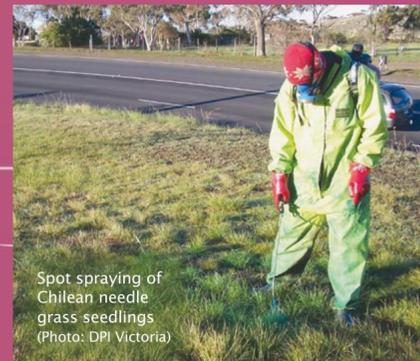
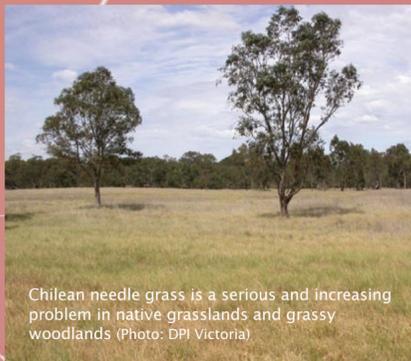
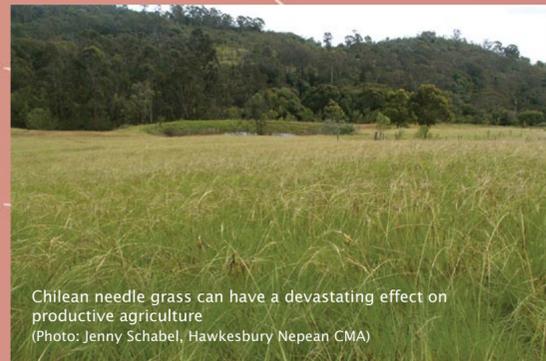
Where control methods kill Chilean needle grass plants, competitor planting needs to be incorporated. Direct drilling desired species can be useful where the site has exotic species. Direct or broadcast seeding, or replanting using tube stock or cell stock, is preferable where native species are to be restored.

Recent trials of wick wiping with glyphosate during spring and before seed set, where Chilean needle grass is taller than other vegetation, has had success in Victoria and Queensland and is currently under further development.

A cover can significantly reduce contamination of a slasher with Chilean needle grass (Photo: DPI Victoria)

Photo: Geoff Robertson





Biology and Seed Spread Management

Chilean needle grass

Chilean needle grass (*Nassella neesiana*) is a perennial tussock-forming grass, native to South America. A Weed of National Significance in Australia, Chilean needle grass is a vigorous competitor in agricultural, natural and urban environments.

The presence of Chilean needle grass has a devastating impact on agriculture. It can severely reduce pasture productivity, contaminate crops and hay, and the needle-like seed can injure stock or pets. Sheep pose a particular problem, as seed burrows into their fleece and skin and cannot be easily removed.

Considered one of the worst environmental weeds, Chilean needle grass is highly invasive in native grasslands, of which less than 1% remains (Ross, 1999). It invades urban parks and gardens and is a significant riparian weed along creeks and rivers.

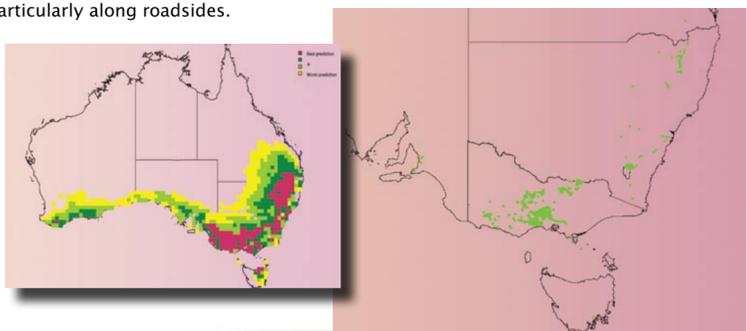
Chilean needle grass is spread by the movement of seed on vehicles, machinery and equipment, particularly along roadsides.

Distribution

Chilean needle grass has established throughout Victoria, New South Wales, Queensland, South Australia and Tasmania. Climatic modelling using CLIMATE[®] predicts that Chilean needle grass has the potential to invade 40 million hectares in Australia (McLaren *et al.* 1998) (figure one).

Chilean needle grass grows in areas with summer or winter rainfall that ranges from 450-1000mm annually. It invades all types of land within these areas and is commonly found along roadsides and other linear reserves, in pastures and crops, within native grasslands, and in urban parks and gardens including sports grounds.

Figure One: *Current distribution (below right) and CLIMATE[®] predicted potential distribution (below left) of Chilean needle grass in Australia.*



Chilean needle grass is tolerant of heavy grazing and, to a lesser extent, drought.

Chilean needle grass' resilient reproductive system produces three types of seed, which greatly impacts its ability to survive and which has important implications for its management. The seeds allow development of a large and persistent seed bank that, if not controlled, can become a challenging and long-term management issue.

Panicle seed
The main seed head (panicle seeds, figure two) develops during spring, with a single plant producing as many as 22,000 seeds (Gardener, 1998). In areas with summer rainfall, a second seeding period occurs during autumn. When flowering, Chilean needle grass seeds are purple in colour and hang like a flag, making identification easy.

Although unable to travel more than a few metres in wind, the Chilean needle grass seeds' ability to adhere to just about anything is the greatest contributor to its spread. Seeds easily attach to animals, such as livestock and domestic pets, vehicles, machinery and equipment, which then effectively transport its spread. Seeds are also spread easily in water, such as creeks and rivers.

Stem and basal seed
The second seed type, "stem seed"

Chilean needle grass lifecycle

	SPRING			SUMMER			AUTUMN			WINTER		
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Germination												
Vegetative growth												
Flowering												
Panicle seed production												
Panicle seed maturation												
Stem and basal seed maturation	B	B	B	B	B, S	S	S	S	S	S	S	S

Legend: = general pattern of growth; N = additional seeding period in northern New South Wales and Queensland; S = stem seed; B = basal seed.

cleistogenes", forms within the flowering stems after the panicle seeds (figure two).

A single Chilean needle grass plant may produce 5-6,000 stem seeds (Gardener, 1998) which are then spread in the "CNG straw" when flowering finishes at the end of summer.

The third type of seed, "basal seed cleistogenes", forms very early in the plant's development, at the base of the Chilean needle grass tillers (in the crown, near the roots, figure two) and can mature within 12 months.

The only way to effectively prevent input of basal seeds into the seedbank is to chip out the entire plant or to treat seedlings before the basal seed develops.

The reproductive tenacity of Chilean needle grass means particular emphasis must be placed on the importance of early intervention, follow-up treatments and integrated management to prevent and control its spread.

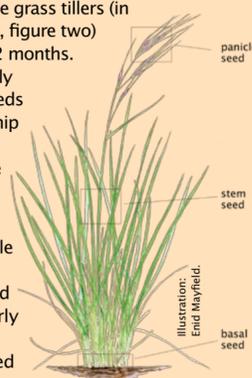


Figure two: *Where to locate the three Chilean needle grass seed types to aid identification (a) panicle seed; (b) stem seed; (c) basal seed*

The Key to Successful Management

The key to successful management of Chilean needle grass in all situations is to:

- learn to accurately identify it,
- prevent its spread, and
- integrate management techniques that will control existing plants and encourage competition by more desirable species.

Take immediate action on new infestations. Allowing Chilean needle grass to mature and establish can allow a large seed bank to develop. This makes eradication extremely difficult and can lead to many years of follow-up management as plants re-emerge from basal seed or germinate from the seed bank.

Adequate hygiene practices are essential to prevent further spread of Chilean needle grass. Avoid working in, or having stock in, areas where it is in seed. Work in clean areas first and always inspect and clean down any vehicles, machinery or equipment used in a Chilean needle grass infestation.

Always continue to monitor after control activities and conduct follow-up control if necessary. Be particularly cautious and continue to monitor sites even where Chilean needle grass is thought to have been eradicated. The persistent seed bank may mean germination occurs under good conditions in following years.

Be aware in drought conditions that, even though Chilean needle grass may appear depleted, once rains arrive it will be the first to bounce back and quickly out-compete desirable species.

Control Programs

Good hygiene practices are essential and should be incorporated into every control program.

Chemical Note: flupropanate is registered for Chilean needle grass control in all States except Tasmania and Northern Territory. It is currently the only registered chemical for Chilean needle grass control, although a range of minor use permits are available to enable use of glyphosate and fluzifop-p. Always check registration status and label prior to use.

Agriculture

A range of integrated control techniques are required for different situations such as pasture, crop and rainfall zones.

In pasture, use **strategic (rotational) grazing** to reduce seeding and competition from Chilean needle grass and to increase the effectiveness of chemicals. Cattle are preferred over sheep, where this is possible, as seed does not attach as easily to cattle.

Before spring (and autumn in summer rainfall areas), **spot or boom spray** with a registered herbicide (the choice of chemical and application will depend on the situation) to prevent seed set and to kill existing plants.

Combine these techniques by **introducing a competitor** to any emerging Chilean needle grass by sowing a crop or desirable pasture species.

Slashing or cultivation used in conjunction with spraying can improve the effectiveness of Chilean needle grass control. Wick wiping,

spray topping or fire have also proven successful where land is **not arable** (for example, steep slopes, trees or rocky terrain) or where pastures receive winter rainfall.

Always continue to monitor after any control activity is carried out, and follow up germinating seedlings by chipping out or spot spraying plants.

Sheep pose a particular problem in agricultural situations as seed easily burrows into their fleece and skin and cannot be easily removed. Place livestock in holding paddocks if suspected to be contaminated with Chilean needle grass seed.

Native grasslands

The best protection against Chilean needle grass in native grasslands is to increase competition by restoring native plant species.

A high quality and biodiverse native grassland

can resist weed invasion (Beames *et al* 2005, Wijesuriya and Hocking 1998), and for this reason restoring biodiversity should be the primary focus of control programs in these sites.

Reduce existing Chilean needle grass infestations through manual removal and selective and targeted herbicide application, taking care that control methods do not adversely affect native species.

Hand removal and **spot spraying** are the safest methods to prevent damage to native species and are most successful in small or scattered infestations.

In degraded grasslands or heavy infestations, burning may be most appropriate. Most effective when followed by selective removal, **burning** can also provide a clearer indication of the level and pattern of infestation.

Spraying or burning activities should be timed to coincide with the best time to revegetate.



Photo: Sue Hadden, DSE, Victoria