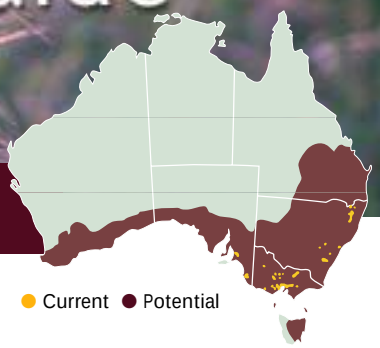
Weed Management Guide

Chilean needle grass – *Nassella neesiana*



Chilean needle grass (*Nassella neesiana*)

The problem

Chilean needle grass is a *Weed of National Significance*. It is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts. It is closely related to another *Weed of National Significance*, serrated tussock (*Nassella trichotoma*).

Chilean needle grass affects both sown pasture and native grasslands of southeastern Australia. It is relatively unpalatable and reduces farm productivity by displacing more desirable pasture species. Heavy infestations can decrease productivity by as much as 50% during summer. It also causes injury to stock and downgrades wool, skins and hides with its long, sharp seeds.

As an environmental weed it reduces biodiversity in native grasslands, where it outcompetes indigenous species.

A survey of landholders in Victoria, New South Wales and the Australian Capital Territory estimated the average annual cost of controlling Chilean needle grass was between $60 and $120 per ha, depending on whether the infestation was scattered or dense.

The weed

Chilean needle grass, named for its sharp, pointed seeds, is a perennial tussock-forming grass which grows in dense clumps. Without grazing it can grow to 1 m in height. An unusual feature of the grass is that, in addition to normal flower seeds, it produces hidden seeds which are formed in the nodes and bases of the flowering stems. These 'stem seeds' are self-fertilised and account for about one-quarter of total seed production. They enable the plant to reproduce despite grazing, slashing and fire.

The flowering seed heads are a distinctive purplish colour and the seeds are very sharp at the point.

The seedlings grow quite slowly but have a very high survival rate and can produce flowers in their first season. The adult plant is long-lived and very hardy. Its leaves are 1–5 mm wide, flat and strongly ribbed on their upper surface, with leaf edges that are rough to touch.

Heavy Chilean needle grass infestations can reduce pasture productivity by up to 50%, contaminate produce and cause injury to stock.
Photo: DPI Vic

Key points

- Chilean needle grass is highly invasive in native grasslands.
- It builds up a large and persistent seedbank in the soil.
- Rehabilitation of infested land is very difficult.
- If you are not sure about the identification of a plant, have the specimen identified by a herbarium, local agronomist or weeds officer.
- Chemical application alone will not control Chilean needle grass.
- For best results, combine herbicide application with physical removal, crop rotation, pasture sowing and grazing management.

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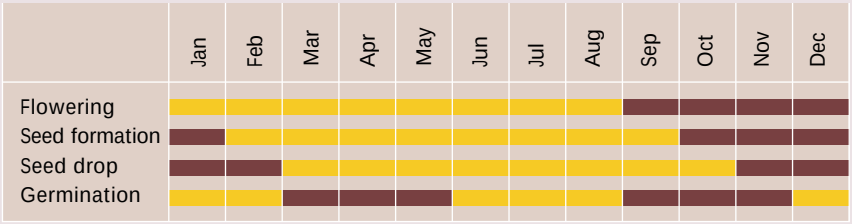
Growth calendar



Chilean needle grass flowers mainly from September to December but it can potentially flower year round. Seed is formed about one month after flowering and most seed has been dropped by February. Seeds mainly germinate in autumn and spring, but germination can occur at other times of the year given adequate moisture and suitable temperature.

Chilean needle grass occurs in disturbed areas such as pastures and roadsides, and in native grasslands.
Photo: Steve Smithyman

How it spreads

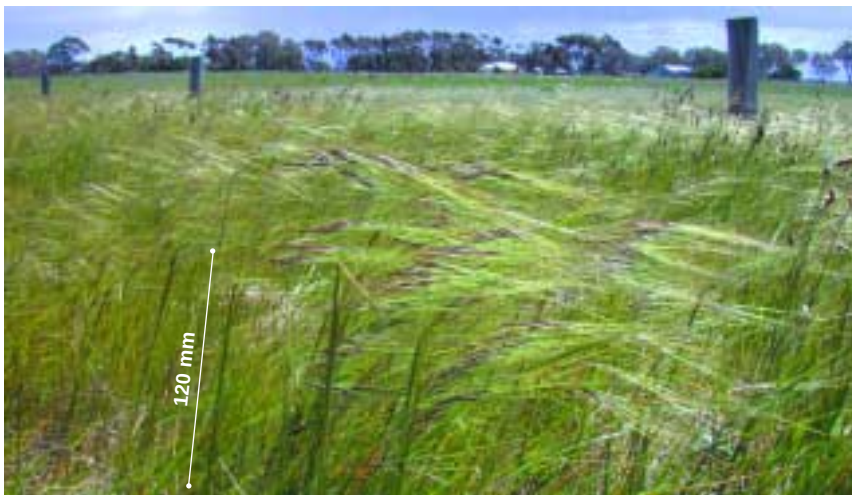
Depending on the availability of moisture, Chilean needle grass can produce more than 20,000 seeds per square metre. The resulting seedbank can persist for many years even if further seed input is prevented. The seeds are very effectively spread attached to farm machinery, clothing or livestock. Seed has also been spread along roadsides and other grassy areas by the use of mowing and earthmoving equipment. Floodwater will move seed downstream.

Chilean needle grass is a South American species. Although it was first identified in Australia in 1934, it appears to have spread very slowly until the late 1970s and has only recently been recognised as a serious weed.

Where it grows

In Australia, Chilean needle grass grows in temperate regions with annual rainfall greater than 500 mm. It can thrive in a wide range of soils and conditions and has the potential to be very invasive over a large part of the country in both pasture and native vegetation. It tolerates drought and heavy grazing.

Its known range extends from the Northern Tablelands of New South Wales, along the Great Dividing Range and through Victoria to southeastern South Australia. It is well established in large areas of New South Wales, the Australian Capital Territory and Victoria. Isolated infestations have been recorded in South Australia, southern Tasmania and the Darling Downs Region of southern Queensland.



Chilean needle grass mainly flowers from November to February but under certain conditions it can also flower at other times.
Photo: Donna Smithyman

Although Chilean needle grass occurs mainly in pastures and grassy woodlands, on roadsides, and along creeks and rivers, it is increasingly invading native grasslands.

Potential distribution

Chilean needle grass could expand its range and invade grasslands throughout much of southern and southeastern Australia. Based on climate, it could spread further in areas such as southeastern Queensland and into new areas such as southwestern Western Australia.

What to do about it

Once a paddock has developed a high level of infestation with Chilean needle grass, the large and persistent seedbank will make management difficult. Small, newly established infestations may be controlled with a great deal of persistence.

Chilean needle grass is extremely vigorous and competitive. Land managers need to know how to identify it and take prompt action if it is discovered.

Management options in established infestations will depend on land use and may include crop rotation, pasture sowing, herbicide control and grazing management. For best results a combination of options needs to be used.

The aim is to minimise Chilean needle grass in pasture by creating conditions that hinder its growth and reduce the soil seedbank. It needs bare ground to establish so it is most important to maintain a cover of competitive perennial pasture.

Check with local contacts for advice on herbicides

Although no herbicides are registered for Chilean needle grass control in Australia yet, herbicide use under permit is allowed in New South Wales. Check with weed control contacts (see table, p. 4), local councils or the Australian Pesticides and Veterinary Medicines Authority for details of current herbicides.

A drawback of herbicide control is that it may also kill desirable species and leave bare ground where seed reserves of Chilean needle grass will germinate. If there are only a few plants, it is probably better to remove them by hand than to create a bare area with spot spraying.

Use short duration, high intensity grazing

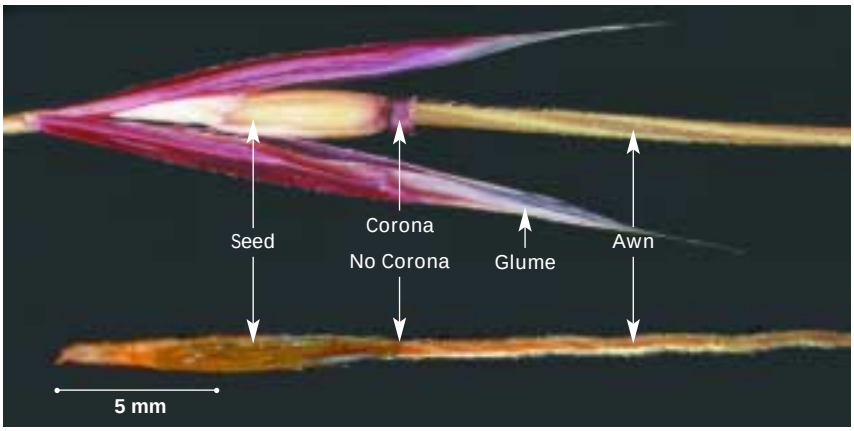
Chilean needle grass can produce good feed in its vegetative state during winter, but is less palatable once it flowers in summer.

In well-established and large infestations, grazing strategies aimed at making Chilean needle grass a more productive component of pastures and reducing its abundance are the only practical alternatives. Short duration, high intensity grazing, followed by long rest periods designed to favour faster growing competing grasses, may achieve this end. This will help the faster growing desirable species such as fescue to slow the growth of Chilean needle grass through shading and competition for moisture.

Regular paddock inspection and appropriate action to eliminate newly emerged plants are vital to maintaining clean areas.

Making paddocks smaller and increasing mob sizes involves a greater capital outlay for fencing and watering points and a change to the way stock are handled. It also requires spending more time in decision making/management when compared with traditional low intensity set stocking. However, the benefits are better pasture, fewer weeds and better livestock returns.

Hand weeding or chipping is effective on small patches but plants cannot be left to dry out in the paddock because of the basal and stem seeds.
Photo: Kate Blood



The seeds of Chilean needle grass (*top*) have a raised crown (corona) between the body of the seed and the awn or 'tail' of the seed. The seeds of native spear grasses (*Austrotipa* species, *bottom*) are similar except that they lack the corona. Note, the outer glume of the native spear grass has been removed.
Photo: DPI Vic

Look-alike species of grasses

Chilean needle grass is similar in appearance to the native spear grasses (*Austrostipa* species). They all have sharp seeds with a long curved or bent awn and hairy tip, and may appear red before drying to a straw colour. The most distinctive feature of Chilean needle grass seed is the corona at the join of the seed body and the seed awn.

Before flowering, green leafy plants of Chilean needle grass can be mistaken for many other winter green species, especially *Austrodanthonia* and *Festuca*. If you look closely, you can see hairs along the leaf surface of Chilean needle grass, in contrast with the hairless leaves of fescue. Chilean needle grass also has a small tuft of hairs at the junction of the leaf blade and the leaf sheath which fescue does not have. The leaves of Chilean needle grass are much coarser and wider than those of *Austrodanthonia*.

Weed control contacts

State / Territory	Department	Phone	Email	Website
ACT	Environment ACT	(02) 6207 9777	EnvironmentACT@act.gov.au	www.environment.act.gov.au
NSW	NSW Agriculture	1800 680 244	weeds@agric.nsw.gov.au	www.agric.nsw.gov.au
Qld	Dept of Natural Resources and Mines	(07) 3896 3111	enquiries@nrm.qld.gov.au	www.nrm.qld.gov.au
SA	Dept of Water, Land and Biodiversity Conservation	(08) 8303 9500	apc@saugov.sa.gov.au	www.dwlbc.sa.gov.au
Tas	Dept of Primary Industries, Water and Environment	1300 368 550	Weeds.Enquiries@dpiwe.tas.gov.au	www.dpiwe.tas.gov.au
Vic	Dept of Primary Industries/Dept of Sustainability and Environment	136 186	customer.service@dpi.vic.gov.au	www.dpi.vic.gov.au www.dse.vic.gov.au
WA	Dept of Agriculture	(08) 9368 3333	enquiries@agric.wa.gov.au	www.agric.wa.gov.au
Australia wide	Australian Pesticides and Veterinary Medicines Authority	(02) 6272 5852	contact@apvma.gov.au	www.apvma.gov.au

For up-to-date information on which herbicides are registered to control Chilean needle grass and the best application methods and dosages, contact your state or territory weed management agency or local council. This information varies from state to state and from time to time. Contact details are listed above, including contacts for the Australian Pesticides and Veterinary Medicines Authority, which hosts the PUBCRIS database. This database contains information on all herbicides that are registered for use on weeds in each Australian state and territory.

When using herbicides always read the label and follow instructions carefully. Particular care should be taken when using herbicides near waterways because rainfall running off the land into waterways can carry herbicides with it. Permits from state or territory Environment Protection Authorities may be required if herbicides are to be sprayed on riverbanks.

Chilean needle grass is highly invasive and tolerates drought and heavy grazing.
Photo: Weeds CRC

Rotational cropping

On arable land, planting crops may help control Chilean needle grass. Where ploughing is possible, planting a sequence of fodder crops for a number of years may reduce the seedbank. Summer grain cropping can also be used. With any of the cropping programs it is vital to ensure, by using either chemical control or cultivation, that any Chilean needle grass seedlings are prevented from flowering.

Slashing may reduce seed set in the flower heads but it can actively disperse stem seeds if machinery is not kept clean.
Photo: DPI Vic

Physical control is suited to small infestations

Hand weeding or chipping is very effective on single plants or small patches. Plants cannot be left to dry in the paddock because of the basal and stem seeds. The whole plant needs to be destroyed.

Slashing may reduce seed set in the flower heads but it can actively disperse stem seeds if machinery is not kept clean.

Mowing with a catcher mower during flowering will reduce set seed but, once again, it will not remove the basal and stem seeds. Clippings must be burnt and the mower must be thoroughly cleaned before it is used anywhere else.

A biological control program has recently commenced

A biological control program has identified agents in the countries of origin of Chilean needle grass that attack the weed. Research on the rust fungus *Puccinia nassellae* is being conducted in Argentina to ensure that it is safe and will not attack any other species if released in Australia. It may prove to be the first successful biocontrol program of a perennial grass anywhere in the world.

...case study

Rotational grazing at Ashley Park, NSW Northern Tablelands

Adopting management practices that encourage competitive plant species is an effective way to control weeds in grazing situations. A rotational grazing trial has been conducted by Dr Mark Gardener and A/Prof Wal Whalley of the University of New England at the 'Ashley Park' property near Glen Innes on the New South Wales Northern Tablelands. The results of the trial show that strategic grazing management can encourage desirable perennial grasses in pasture densely infested with Chilean needle grass.

Taking advantage of the relatively slow growth rate of Chilean needle grass, the researchers and the landholder used rotational grazing (grazing at high stocking rates over short periods of time) to heavily graze the pasture and give the faster-growing perennial grasses an advantage during the subsequent rest periods.

The estimated contribution by dry weight of Chilean needle grass in the spring fell from 55% to about 30%, with a corresponding increase in other perennial grasses such as cocksfoot, tall fescue and paspalum.

The Chilean needle grass changed from rank, unpalatable tussocks to a shorter, green and apparently more acceptable grass. The pasture was no longer completely dominated by Chilean needle grass but included a higher proportion of palatable exotic grasses, particularly cocksfoot and tall fescue.

Previous attempts to control Chilean needle grass on the property using herbicides, cultivation and pasture establishment had failed because of the weed's large and persistent seedbank.

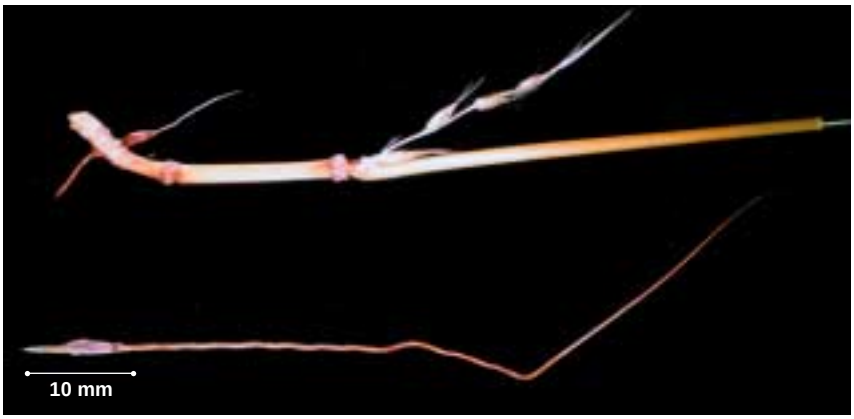
Preventing seed movement to uninfested areas

Movement of stock, machinery and forage contaminated with seed are the main ways by which Chilean needle grass is spread. Cleaning of plant, equipment and material are very important in preventing further spread, as is controlling the movement of livestock from infested to clean areas. Stopping seed movement within the property is also important. Check machinery (including the interior of the vehicle) moving onto your property and drive visitors around in your own vehicle. Always wash down vehicles and machinery in the same area to allow easy follow-up control of any seeds that may germinate. Ensure that service provider vehicles (eg telephone, electricity, gas) are free of Chilean needle grass seed.

When you are buying hay, stock feed, and crop and pasture seed, make enquiries about where it was produced to ensure it did not come from areas known to be infested with Chilean needle grass. Feed stock in the same areas to minimise the risk of seed spread and to limit the area requiring control.

Control in native grasslands

Chilean needle grass is a difficult weed to manage in native grasslands. To minimise damage to native vegetation, early detection is essential and careful physical removal of isolated plants is recommended. Revegetation with indigenous species is needed to prevent reinfestation. Larger infestations need to be contained using a combination of available methods to minimise the spread of Chilean needle grass into native grasslands.



The stem seeds (*top*) are located at the nodes (or joins) on the stems and at the base of the flowering stems. They are normally concealed by the leaf sheath, which has been removed in this instance. A normal flower seed (*bottom*) is sharp, with a hairy tip and a long curved or bent awn.
Photo: DPI Vic

Legislation

Chilean needle grass is a prohibited species under the *Quarantine Act 1908* and is therefore not allowed to be brought into or sold in Australia. Few regions have declared it as a noxious weed, as enforcement would be difficult. It is declared as a pest plant in the Australian Capital Territory and parts of New South Wales, meaning that landholders are required to control it.

Acknowledgments

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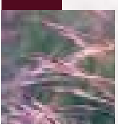
Maps: David McLaren (DPI Vic/ Weeds CRC).

How to control Chilean needle grass

Quick reference guide

Chilean needle grass – *Nassella neesiana*



Preventing new infestations

Maintaining weed-free machinery and equipment is very important in preventing further spread of Chilean needle grass. Check machinery moving onto your property and wash down vehicles and machinery in the same area to allow easy follow-up control of any seeds that may germinate. Don't buy hay, stock feed, or crop and pasture seed from infested areas.

In pasture

When there are only a few plants, remove them by hand weeding rather than spot spraying to prevent creating a bare area.

The use of smaller paddocks and larger mobs offers the benefit of better pasture, fewer weeds and better livestock returns.

On arable land

Control may be achieved using an integrated approach involving rotational cropping and a mix of cultivation and herbicide application to prevent seeding.

The flowering seed heads of Chilean needle grass are a distinctive purplish colour.
Photo: DPI Vic

Control options

Type of infestation	Chemical	Grazing management	Physical	Rotational cropping
Small infestation in pasture	Spot spray with registered herbicide.	Maintain good pasture cover by carefully managing pasture and not overgrazing.	Remove by hand weeding or chipping; whole plant needs to be removed.	Not suitable.
Well-established and large infestations in pasture	Not suitable.	Use short duration, high intensity grazing followed by long rest periods.	Mowing will reduce seed set but will not remove stem seeds.	Not suitable.
Arable land, moderate to heavy infestation	Not suitable.	Not suitable.	Not suitable.	Plant crops, and use chemical control or cultivation to ensure that seedlings do not flower.

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National Chilean Needle Grass Taskforce

CRC Weed management

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