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Chilean needle grass

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BACKGROUND

Chilean needle grass (*Nassella neesiana* formerly *Stipa neesiana*) is a serious weed on the Northern Tablelands and north-west slopes of New South Wales. According to records at the National Herbarium, it was first identified in NSW during the early 1940s in the Glen Innes region.

It is thought to have spread very slowly until the late 1970s. Identifications of this species from the Guyra - Glen Innes area since the mid 1970's have increased indicating its ability to spread. In 1996 a major infestation was identified near Tamworth in the Reedy Creek catchment. Chilean needle grass is also well established on the Southern Tablelands and southwest slopes of NSW and in southern and central Victoria.

Chilean needle grass is a native of South America occurring in Argentina, Uruguay, Chile and Brazil. It has become naturalised in New Zealand, South Africa and several European countries. In Australia, Chilean needle grass is considered a weed because it is very invasive and is less productive/lower quality than introduced pasture, causing a reduction of carrying capacity.

WHY IS IT SO SUCCESSFUL?

Research on the Northern Tablelands of NSW by the University of New England has shown that the main reason for the success of Chilean needle grass is its large, long-lived reserve of viable seed in the soil seed bank. This seed bank can persist for many years even if further seed input is prevented. It is a prolific seeder, with the potential to produce more than 20,000 seeds per square metre in a good season. It also has hidden seeds under the leaf sheaths at each of the nodes on the flowering stems that mature even if the seed head has been removed.

Chilean needle grass germinates in autumn and spring and at other times of the year given adequate moisture and temperature. Its main requirement for establishment is bare ground that can be created by over grazing or indiscriminate herbicide application. The seedling grows quite slowly but has a very high survival rate and can produce flowers in the first season. The adult plant is long-lived and very hardy, surviving heavy grazing and drought.

Seed heads emerge during late spring, and when mature have a very distinctive purplish colour. The individual seeds are very sharp at the apex (hence the name) as shown in Figure 1. By late February, most of the seed has been shed from the plant and can be found on the ground. Wind dispersal of seed appears to be almost negligible. Most of the spread is by attachment to animals (both domestic and wildlife) or machinery, particularly motor vehicles. The backward pointing hairs on the apex of the seed anchor firmly in the wool of sheep. These seeds may fall from the fleece several months later, spreading the seed to new regions. Sometimes, Chilean needle grass seed will penetrate the skin of sheep reducing their hide value and may irritate individual animals.

IDENTIFICATION

Chilean needle grass appears very similar to the native spear grasses (*Austrostipa* spp.). The most diagnostic feature of Chilean needle grass (and only found in this species) is the corona — a raised crown of small teeth, at the junction

Figure 1. Seedhead (L) and seed showing bent awns (R) of Chilean needle grass. Photos: A Storrie

of the seed body and the seed awn. The awn twists when dry and often has two bends in it.

Vegetative (green leafy) plants of Chilean needle grass can be mistaken for many other winter green species, especially *Danthonia* and fescue. Close examination reveals the presence of hairs along the leaf surface of Chilean needle grass by contrast with the hairless leaves of fescue and the much coarser feel of needle grass leaves compared with *Danthonia*. Chilean needle grass also has a small tuft of hairs at the junction of the leaf blade and the leaf sheath, which most other grasses do not have.

Chilean needle grass forms a robust tussock but is variable and not as clumpy as *Poa* or many *Eragrostis* species.

MANAGEMENT METHODS

Once established in an area and allowed to set seed, it is unlikely Chilean needle grass can be eradicated. This is because established populations have a persistent seed bank that will enable reinfestation even if adult plants have been killed. Small newly establishing infestations may be eradicated with a great deal of persistence.

The management options of established Chilean needle grass populations depend on the land use. These options include crop rotation, pasture sowing, herbicide control and grazing management with best results where a combination of options is used. The management goals should aim to reduce the soil seed bank and minimise the Chilean needle grass component of the pasture by creating conditions that hinder its growth. The most important of these conditions is the maintenance of good ground cover through competitive perennial pastures and grazing management.

1. Arable Areas

On arable lands timely planting of crops can keep Chilean needle grass populations to a minimum. Where ploughing is possible, planting a sequence of fodder crops for two or three years will reduce the weed seed bank. However seeds buried as a result of deep cultivation will remain viable for longer periods than those near the surface.

Winter or summer forage cropping or summer grain cropping programs can be used. The important issue with any of the cropping programs is to make sure that any seedlings that germinate and go through winter are prevented from flowering and seeding in late spring/early summer either by chemical, cultivation or very heavy grazing.

Following the cropping phase establishment of a perennial pasture will provide competition for remaining Chilean needle grass seedlings. The pasture must be allowed to properly establish and maintain good ground cover all year-round and develop height plus bulk from November to February to have a smothering effect against Chilean needle grass seedlings. In addition, regular paddock inspection and spot spraying to eliminate newly emerged plants is vital to maintain clear areas.

2. Non Arable Areas

The same principles apply as those for arable areas. The seed bank should be reduced by a succession of short-term pasture or annual fodder crops established by direct drilling. In many locations, steep or stony country causes great difficulty, even for direct drilling. In these areas, aerial application of herbicide, seed and fertiliser would be necessary, but, where possible, ground application of herbicide is preferred to reduce off-target damage.

Pasture management of these areas is vital to ensure plenty of competition to needle grass seedlings. Strategic grazing and resting of pasture should aim to maintain comprehensive ground cover, particularly during spring and autumn germination of Chilean needle grass seeds.

For specific pasture species and management recommendations for your area refer to the appropriate pasture management guides.

3. Chemical Control

Several years' research conducted by NSW Agriculture's Weed Research and Demonstration Unit has provided guidelines for chemical control. In summary, glyphosate gave 90% control at 1.5 L/ha when applied in autumn, but was significantly less effective from a spring application. By contrast fluproponate was equally effective from a spring or autumn application. Figures 2 and 3 detail rates and level of control with glyphosate and fluproponate.

Chemical control is a useful tool to be used in a management program. Herbicide application before direct drilling is essential. Later in a program, spot spraying of re-invading seedlings will also be vital to reduce pasture degradation.

Glyphosate will generally be preferred to fluproponate for initial boom spraying in autumn where the area is to be resown because of the high cost of fluproponate. Glyphosate is used for or to assist in seedbed preparation prior to direct drilling, conventional preparation or aerial seeding.

Fluproponate would be preferred for smaller infestations, spot spraying or removing Chilean needle grass from an established pasture where the infestation is large enough to warrant boom spraying. At registered boom spraying rates fluproponate has reasonable selectivity, leaving behind pasture species such as fescue and cocksfoot.

However some pasture species are sensitive to fluproponate depending on timing — for example phalaris is sensitive to autumn applications but has little effect when applied in summer. Label information on selectivity should be carefully read. Manufacturers should be contacted if in doubt.

Figure 2: *Nassella neesiana* control with glyphosate

Spring - applied 28/11/89 assessed 10 Months after Treatment Autumn - applied 8/3/90
7 Months After Treatment
Source: Northern WRDU

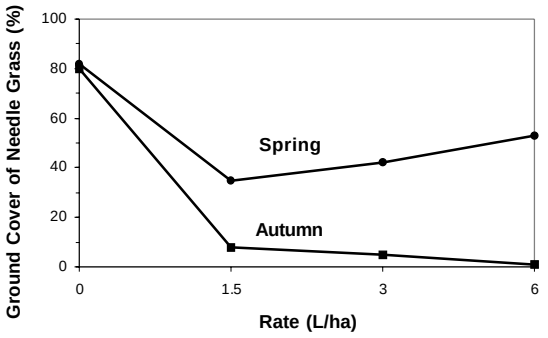
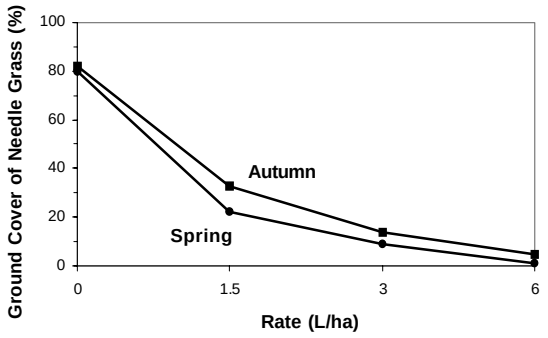


Figure 3: *Nassella neesiana* control with fluproponate

Spring - applied 28/11/89 assessed at 10 Months afterTreatment
Autumn - applied 8/3/89 assessed at 7 Months after Treatment
Source: Northern WRDU



Under some circumstances, usually at flowering, low rates of glyphosate can be added to the slower acting fluproponate to provide a quicker desiccation and reduce seed production. Pesticide permits are available for both fluproponate and Roundup® Biactive.

Weed wipers using glyphosate have been used on Chilean needle grass with varying success. If plants are wiped between flowering and milky-dough stage (usually November to early December) panicle seed set is prevented. This overcomes seed problems when grazing (wool vegetable fault and eye/carcass injuries). Wiping to kill plants has not been highly successful, with less than 60% kill.

Pasture topping is a useful technique for seed sterilisation in spring/early summer. For sheep producers this allows Chilean needle grass paddocks to be grazed (after complying with chemical withholding periods) without the panicle seed causing significant problems with wool vegetable fault or eye/carcass injuries. It also significantly reduces the amount of seed going to the soil seed bank.

Chemical control has its drawbacks. The non-selectivity of most herbicides result in the death of both desirable and target species. Since Chilean needle grass has a large seed bank and a requirement for bare ground to establish, the resulting vegetation after herbicide application may actually have a greater proportion of the weed. Bare ground resulting from herbicide application should be re-seeded to provide the germinating Chilean needle grass with competition. If there are only a few plants it is probably better to remove them by hand than create a bare area with spot spraying.

It must be emphasised that chemical application alone will not control Chilean needle grass.

4. Grazing Management

One inexpensive and adaptable tool available to most landholders is grazing management. Although Chilean needle grass is less palatable than other introduced pasture plants, research has shown that during winter it produces a reasonable quantity of average quality feed (up to 16.6% crude protein and digestibility of approximately 60% — in comparison the temperate pasture grass fescue had crude protein up to 18.8% and digestibility of approx. 65%). In extensive areas of Chilean needle grass where it is uneconomical or impractical to control, consideration should be given to utilisation in winter in combination with pasture topping or weed wiping in spring. In South America it is considered an important winter growing pasture grass. However, during summer it produces little green leaf and a large amount of unpalatable flower stalk.

Because of its lower palatability compared to other pasture species, a high density –short duration strategic grazing management system is preferable. This allows better utilisation of the pasture as well as allowing the faster growing desirable species such as fescue to slow the growth of Chilean needle grass through shading.

A heavy grazing with cattle in spring, when the flower heads were developing, reduces the number of flower stalks produced and made the grass more palatable to stock. Landholders have made Chilean needle grass dominated pastures more productive by using heavy stock densities for a short duration during the flowering period. Spraytopping of the pasture in the early flowering period with very low herbicide rates is also said to increase palatability.

The most important thing in any system of grazing management is to maintain good ground cover and favourable conditions for the faster growing desirable pasture species.

Permits currently available for Chilean needle grass control can be found at http://www.apvma.gov.au/permits/permits.shtml. Check expiry date of permit before use.

PER4843 – Pasture - 3 L/ha fluproponate or Spot treatment - 200 mL fluproponate + 150 mL Roundup® Biactive per 100 L water. Expires 30 September, 2006

PER5894 – Pasture spray-topping – Spot – 1 L in 100 L water glyphosate (360 g a.i. /L). Boom – 0.8 L glyphosate (450 g a.i.) /ha or 1 L glyphosate (360 g a.i.) /ha Expires 30 September, 2004

PER5895 – legume pasture and lucerne – 1–2 L/ha Fusilade® 212 plus 1% Supercharge® applied at flowering before milky dough stage of CNG, prior to hay cutting. Expires 30 September, 2004

5. The Future

Chilean needle grass is a widespread naturalised species in Australia. Control using conventional methods has proven difficult. Control can be achieved using an integrated approach of cropping, herbicide application and grazing management. If Chilean needle grass has become widespread on your property, then viewing Chilean needle grass as a permanent part of your farming system is likely to be more fruitful than attempting its eradication.

However, it is important to act promptly when an infestation is recognised as small infestations may be controlled. Where any doubt exists as

to the identification of the plant, have the specimens identified by a local agronomist.

Biological agents are being investigated by organisations such as the CSIRO. However biological agents for weed control are rarely successful when used alone.

ACKNOWLEDGMENTS

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Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (June 2003). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the New South Wales Department of Agriculture or the user's independent adviser.

Always Read the Label

Users of agricultural (or veterinary) chemical products must always read the label and any Permit, before using the product, and strictly comply with the directions on the label and the conditions of any Permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or omitted to be made in this publication.

Pesticide Residues may accumulate in animals treated with any pesticide or fed any crop product, including crop residues, which have been sprayed with pesticides. In the absence of any specific grazing withholding period(s), grazing of any treated crop is at the owner's risk. Withholding periods for stock treated with any pesticide or fed on any pesticide treated plant matter must also be observed. Pesticide residues may also contaminate grains, oils and other plant products for human use and consumption. Growers should observe harvest withholding periods on the pesticide label and should not assume that in the absence of a withholding period or after the expiry of a withholding period that the plant will be free of pesticide residues.

Pasture Improvement

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders is possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

The Native Vegetation Conservation Act (1997) restricts some pasture improvement practices where existing pasture contains native species. Inquire through your office of the Department of Land and Water Conservation for further details.

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