

Case study

Chilean Needlegrass controls

Overview

Chilean Needlegrass (*Nassella neesiana*) is regarded as one of the worst weeds in Australia because of its ability to reduce farm productivity.

It is highly invasive becoming dominant in pasture and grasslands but with low palatability and fodder value. It causes injury to stock and contaminates meat, wool, hides and hay.

It also invades bushland displacing native grasses and habitat. Over all it is likely to have major environmental and economic costs if left to establish.

The first official reporting of Chilean Needlegrass in the One Tree Hill area was in November 2009. With further investigation it was discovered to have become well established at some sites with a high risk to spreading.

Due to the plant's effective reproduction mechanisms and its ability to spread easily through seed dispersal, a need to identify practical control strategies was recognised.

To gain a better understanding of both plant ecology and suitable control options for the local environment, Natural Resources staff worked with interested parties and concerned locals to undertake control trials.

Three trials were conducted over several years where control options for broadacre pasture and grazing and native vegetation management areas were evaluated.



Identification

Chilean Needlegrass is easiest to identify when the plant is flowering and setting panicle seeds. Before this occurs it is difficult to identify, even for those who have seen the plant before, as its appearance closely resembles that of some native spear grasses.

It is the seed which distinguishes the plant from native species.

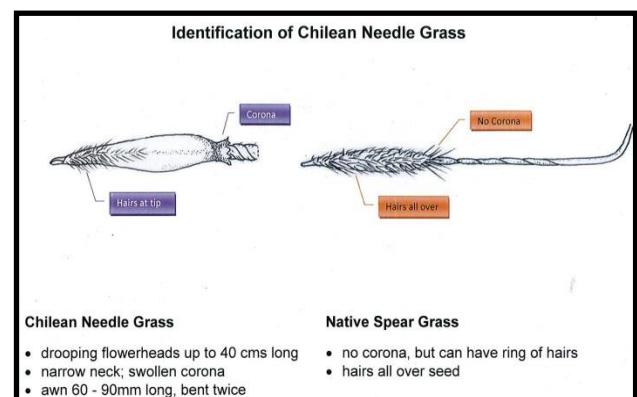
It is a tufted perennial grass that commonly grows in clumps about 60 cm tall but locally may be smaller. Germinating predominantly during winter it also opportunistically germinates during wet summers. The main flowering period, observed in One Tree Hill starts mid-late October continuing



into early summer with plants seen to flower and set seed at other times if conditions are suitable.

The flowering head is a loose panicle up to 40 cm long with purplish spikelets. Plants produce three kinds of seed with the majority developed in the aerial panicle.

Basal seeds develop in the base within weeks of germination and later stem seeds develop just above nodes. Infested areas can accumulate thousands of viable seeds per square metre.



Broadacre trial treatment

Trial treatment 2011-16

The broadacre treatment trial was initiated in 2011 by the One Tree Hill Chilean Needlegrass Community Group with a Caring for Our Country grant. This was supported and funded for a further four years through Natural Resources Adelaide and Mount Lofty Ranges.

The trial was set up in a paddock that was severely infested with the weed. The aim was to find a suitable control method that would work for both grazing and lifestyle properties, reducing infestations to enable the sowing of a permanent productive pasture.

The idea was to demonstrate an approach that local landowners could easily put into practice on their own properties. Based on cover cropping and knock down sprays, this trial showed promising results.

Method

Site soil tests highlighted fertility to be low and pH moderately acidic. Initially 12 months were spent plot testing various treatment combinations before the best combination was expanded over a 3 ha paddock.

The steps taken during the trial were:

1. soil testing
2. knock down spray of all growth in the paddock with glyphosate 540g/L at 4L/ha soon after seasonal opening rains
3. applying lime to address acidity
4. fertilising (according to soil test results) and sowing a cover crop of oats
5. steps 2 and 4 repeated for a total of four seasons of cover cropping
6. when Chilean Needlegrass levels were very low, the paddock was sown to permanent pasture.

Grazing management played an important role in the trial. Controlling grazing so as not to over-graze, maintaining a good cover of oats, providing a high level of competition to any new germinations from the weed seedbank.

Results

In the second year of sowing oats, a high number of plants germinated from seed in the soil bank. This confirms our suspicion that individual treatments would have only a short term effect on Chilean Needlegrass control.

As the level of plants decreased with repeat treatments, there was a significant increase of Guilford Grass and annual grasses as these weeds took over the bare ground. At the end of the fourth round of cover crops, paddock monitoring had a zero return of Chilean Needlegrass. A clear success!

In May 2016 the paddock was sown with permanent pasture after a final total knockdown spray. The pasture mix sown was 30% subterranean clover and 40% ryegrass with 30% annual grasses.

The seed mix included Holdfast GT phalaris, Advance AT phalaris, Kasbah cocksfoot, Kidman perennial ryegrass and a mix of subterranean clovers.

The results of the pasture sowing were excellent and a vigorous perennial ryegrass and subterranean clover pasture had replaced the Chilean Needlegrass and Guildford Grass.

The increase of pasture production in the trial paddock compared to the adjacent control paddock was dramatic – at least four fold. In addition, the quality and palatability of the sown pasture is well above that of the Chilean Needlegrass pasture.



Trial paddock (left) control paddock (right)

Recommendations

This strategy relies on:

- soil testing and liming to redress soil acidity
- improving soil fertility which favours desired pasture species over Chilean Needlegrass (which thrives in low fertility soils)
- complete knockdown sprays after opening rains
- cover cropping with oats or short term ryegrass each season for at least three years
- sowing a suitable pasture once Chilean Needlegrass presence is very low
- continued monitoring and spot spraying.

This approach is good for grazing properties where stock can be managed to control grazing pressure.

While ongoing monitoring and spot control of Chilean Needlegrass is still required post trial, this result is a great example of what can be achieved with a strategy and a good dose of persistence.



Herbicide trials

The effectiveness of the treatments trialled included the use of two herbicides registered for use on Chilean Needlegrass. A non-selective product, glyphosate 360g/L and one selective for tussock grasses and soil residual, flupropanate 745g/L were applied at different rates and mixes, and compared to a treatment of no herbicide and of manual removal of plants.

Trials were set up in a paddock patchy with Chilean Needlegrass and becoming more densely infested. First treatments were replicated three times. Each site contained six plots measuring 1m x 1m with different treatments.

First treatments trialled 2013-17



Plot C – 7 months post treatments

Plot 1: control
(no treatments)

Plot 2:
1% glyphosate

Plot 3: 0.15%
glyphosate + seed
heads removed

Plot 4: 0.15%
glyphosate plus
0.2% flupropanate
+ seed heads
removed

Plot 5:
0.2% flupropanate

Plot 6: chipping +
manual removal of
plant (the most
labour intensive
treatment)

Early observations led to expanding trials onto larger plots 12m² to further test single treatments of glyphosate and flupropanate options and if there was any advantage of adding a surfactant.

Second treatments trialled 2014-15

Plot A: 0.15% glyphosate + 0.3% flupropanate with pulse (surfactant)

Plot B: 0.3% flupropanate with pulse

Plot C: 0.15% glyphosate with pulse

Plot D: 0.3% flupropanate *no pulse*

Combined results

Good results were seen initially across all plots where treatments were applied.

Control

Plants within control plot 1 (no treatments) continued to grow and set panicle seed seasonally. Plants continued to

develop into larger tussocks from basal seed growth. Plots remained thick with cover.

Glyphosate

Plots treated with glyphosate had the best initial Chilean Needlegrass mortality rate also preventing seasonal development of panicle seed, however later seedling recruitment was higher than in plots where flupropanate was applied.

Ground was bared out and vegetation slower to recover in plots treated with glyphosate at the 1% rate compared to plots with 0.15% applied, where pasture plants were not adversely affected. Although, these plots later did show a significant higher composition of Guildford Grass.

Flupropanate

Although the plots treated with flupropanate without glyphosate were slow to respond, this was expected due to the herbicide's mode of action. In the second trial though, where pulse surfactant was added, plants were slower to show any deterioration and mortality than those where flupropanate alone was applied.

Chilean Needlegrass recruitment was reduced with no seedlings growing to maturity on all blocks sprayed with flupropanate for up to 3 years post treatment. This is likely due to the soil residual properties of the herbicide acting.

In March 2017, 3 ½ years post treatment and after a record wet summer period, some seedlings were noted.



Plot B – 12 weeks post treatment

Chipped

Hand chipped plots had some early follow up to take out tussock rootstock not fully removed in the first treatment and that had re-sprouted.

This demonstrates the need to carefully remove all rootstock where the basal seeds form if this treatment is to be used. Plots remained thick with cover.

Only a few new seedlings were noted later in the trial. Good vegetative cover and no further disturbance may have provided good competition suppressing establishment.



Other findings



Plot C – Sept 2017

During the course of the trial, the variation of quantity and composition of other pasture grasses and weeds between treatments, were noted.

Extended tests showed basal seeds from samples taken in the field once developed are not affected by the herbicide and remain viable.

Recommendations

Broadacre paddocks and larger populations require a long-term management strategy which may include:

- integrated controls – burning, slashing, spraying and re-pasturing
- choice of herbicide applications and timing
- managed stock grazing and quarantined movement.

The results of the herbicide trial indicate the use of flupropanate as an effective herbicide for both short- and long-term control of Chilean Needlegrass, regardless if seed heads are removed or not.

Broadacre herbicide treatments will also need to consider herbicide withholding periods for stock grazing, other pasture compositions that may be affected, restrictions of use near watercourses and application methods.



Plot B – Nov 2015

For individual plants or small populations the best options may be chipping and removal, and targeted spot spraying. Chipping requires good plant ID skills, is labour intensive and application must ensure all of root base is removed to be most effective for initial control.

This treatment suits situations where Chilean Needlegrass plants are present in low numbers and in native bushland settings. Removal of seed heads followed up with targeted spot spray may be useful in situations where patches are too big to chip. In the long term this will reduce the amount of seed in the soil bank and prevent seeds from being dispersed.

The key is having a plan and carrying out the actions at the right times.

There is now good reason for landowners to join the battle and implement proven techniques with an expectation of effective control. The benefits of a productive landscape are well worth the effort.

Property biosecurity practices, along with good vehicle and stock movement controls, also plays an important role in helping to control weeds and reduce the risk of spread.

Declarations

The following sections of the NRM Act apply to Chilean Needlegrass in the Adelaide and Mount Lofty Ranges region:

175 (1) Cannot import the plant into South Australia

175 (2) Cannot transport the plant, or any material or equipment containing that plant, on a public road

175 (3) Cannot transport the plant within or between properties

177 (1) Cannot sell the plant

177 (2) Cannot sell any produce / goods carrying the plant

180 (1)(2)(3) Infestations must be reported to the NRM board

182 (1) Landowner must destroy the plant on their land

For more information

Please contact your local Natural Resources Centre for further information, advice and assistance in controlling Chilean Needlegrass.

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www.naturalresources.sa.gov.au/adelaidemtloftyranges



Australian Government



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