Regional best practice management of Chilean Needle Grass (*Nassella neesiana*) - New South Wales preliminary trial results.

L. McWhirter[A], J. Lowien[B], C. Grech[CDE], D. A. McLaren[EF] and B. M. Sindel[DE]

[A]NSW Department of Primary Industries (NSW DPI), Goulburn, NSW 2580.

[B]NSW Department of Primary Industries, Glen Innes, NSW 2370.

[C]Victorian Department of Primary Industries (Vic DPI), Attwood, Vic 3049.

[D]School of Rural Science and Agriculture, The University of New England (UNE), Armidale, NSW 2351.

[E]Cooperative Research Centre for Australian Weed Management.

[F]Victorian Department of Primary Industries, Frankston, Vic 3199.

Introduction

Chilean needle grass (CNG - *Nassella neesiana*), a native of South America, has become a serious weed in temperate areas of Australia, particularly New South Wales and Victoria (Anon. 2003). It is classified as a Weed of National Significance (WONS); with the potential to spread across 32 million hectares in areas receiving more than 500 mm average annual rainfall (McLaren *et al.* 1998).

It invades pastures and once established, is tolerant of drought, grazing, waterlogging and fire. Feed value (crude protein and digestibility) is lower than introduced temperate pasture species at the same growth stage (Gardener 1998). Anecdotal evidence suggests palatability is also lower. Grazing stock will avoid CNG and gradually it will displace more desirable species. CNG is a prolific seeder and the sharp seeds are problematic to livestock.

Chilean needle grass can produce two types of seed namely panicle seeds and 'cleistogene' seeds located at nodes along the stem and in the plant base. The cleistogenes can comprise up to 25% of the total seed production and ensure that the plant can survive if panicle seedheads are removed or sterilised. Seeds are predominantly spread by machinery, animals (domestic and wildlife) and water.

A project to determine best management practices was established in 2002 by the Vic DPI, NSW DPI, UNE and CSIRO. It consisted of a series of trial sites in NSW and Victoria, funded by the National Heritage Trust, to evaluate strategies for managing CNG in pastures. This paper reports on preliminary results from the two NSW sites – Glen Innes and Goulburn.

Methods

A range of treatments were imposed at each site (Goulburn 10 treatments, Glen Innes 12 treatments) with three replications. The treatments comprised various combinations of grazing (lockup, set stocking, strategic), fertiliser (+ or -), herbicide (glyphosate and flupropanate (+ or -) and pasture renovation (+ or -). Glen Innes also included a crop phase of soybeans. Plots that were pasture renovated were sown with a mix of phalaris, tall fescue (Glen Innes only), cocksfoot and perennial ryegrass with clovers (white and subterranean).

Measurements are taken quarterly and include basal vegetation composition, seedling recruitment and climatic data. Grazing management for strategically grazed treatments is based in pasture availability with livestock introduced when pasture biomass reaches 2500-3000 kg dry matter/ha and removed at 800–1000 kg dry matter/ha. Grazing stock density was approximately 300 DSE/ha. Lockup plots have grazing excluded for the duration of the trial. The stocking rate on the set stocked paddocks was approximately 12 DSE/ha for Goulburn and 8 DSE/ha for Glen Innes, although sheep had to be removed completely for periods due to drought conditions.

Preliminary results and discussion

At Goulburn (at day 401 – April 2004):

- Herbicide, irrespective of type, significantly decreased in the basal cover percentage (BC%) of CNG ($P<0.01$).
  Implication: herbicide application can manipulate the pasture composition towards more favoured species but follow up management is necessary to prevent CNG from reinfesting.
- In the strategically grazed and lockup treatments there was a significant decrease in the BC% of CNG with the addition of fertiliser and pasture renovation ($P<0.05$) compared with non renovated plots.
  Implication: while permanent lockup is obviously not a practical strategy for landholders, strategic

grazing can be a useful tool in conjunction with fertiliser and pasture sowing to manipulate the composition of pastures dominated by CNG.

- Plots that were sprayed out and resown followed by a rest period had significantly less CNG BC% ($P<0.001$) than any other treatment.
  Implication: allowing a new pasture to establish before commencing grazing appears to be an important aspect for reducing the re-infestation of CNG on areas where pasture establishment is a viable option.
- The percentage of bare soil was significantly lower ($P<0.001$) on the lockup plots compared with set stocking and strategic grazing.
  Implication: set stocking during drought (as happened at Goulburn) bares the soil and leaves it vulnerable to further invasion by weeds.

At Glen Innes (at day 564 – January 2005):

- Both flupropanate and glyphosate applications significantly reduced ($P<0.05$) the BC% of CNG.
  Implication: both herbicides can be used to reduce the initial infestation of CNG but follow up management is necessary to prevent or reduce subsequent reinfestation of CNG.
- The BC% of desirable grasses was significantly higher ($P<0.05$) in the flupropanate treatments compared with the glyphosate. Glyphosate significantly reduced ($P<0.05$) the BC% of the desirable grasses compared with the control.
  Implication: while flupropanate and glyphosate can both be used to provide some control of CNG, flupropanate may be a better option where tolerant desirable species are present. Glyphosate may initially control the CNG, but will also destroy the competition and is more suited for pasture renovation.
- The BC% of broadleaf weeds was significantly higher ($P<0.05$) in the glyphosate and flupropanate plots (glyphosate more so) than the controls.
  Implication: application of herbicide may control the target species but can have other undesirable effects that need to be considered. Flupropanate may be the best option where tolerant desirable pasture species are present.

Data from the complete three year period of the experiment is currently being analysed and compiled as part of a PhD by Charles Grech.

Acknowledgements

Thanks to: Dale Chalker (Goulburn) and Fred Fenn (Glen Innes) for their assistance with the management of the sites and the landholders (C and A Say, Glen Innes; T and D Kent, Goulburn) for their co-operation. This project is supported by Natural Heritage Trust, DPI NSW, DPI Victoria, UNE and Weeds CRC.

References

Anon. (2003). Chilean needle grass – *Nassella neesiana*. Weed management guide. National Heritage Trust and the Cooperative Research Centre for Australian Weed Management.

McLaren, D.A., Stajsic, V. and Gardener, M.R. (1998). The distribution and impact of South\North American stipoid grasses (Poaceae: Stipeae) in *Australia. Plant.Protection.Quarterly* **13**(2): 62–70.

Gardener, M.R. (1998). The Biology of *Nassella neesiana* (Trin. and Rupr.) Barkworth (Chilean Needle Grass) in Pastures on the Northern Tablelands of New South Wales: Weed or Pasture? PhD thesis, University of New England, Armidale.