SPREAD OF CHILEAN NEEDLE GRASS (*NASSELLA NEESIANA*) IN MARLBOROUGH, NEW ZEALAND

M.D. BELL

Marlborough District Council, PO Box 443, Blenheim, New Zealand

Corresponding author mbe@marlborough.govt.nz

ABSTRACT

Chilean needle grass (*Nassella neesiana*) is a "containment pest" in the Regional Pest Management Strategy for Marlborough. It is of concern because it has sharp-tipped seeds that bore into the eyes and pelts of livestock. Discovered in Marlborough in the 1930s it now infests 4311 ha. In 1987 18 properties were infested, increasing to 53 by 2000, and 96 by December 2005. In addition, both the range and density of Chilean needle grass has increased significantly since 1987, and to date no infestations have been eradicated. Failure to stop this spread is due to the difficulty of both identification and control. Effective control and land management methods for this weed are urgently needed. The probability of this weed spreading further, both within and beyond Marlborough, appears to be high. This conclusion, along with land use changes, has implications for the review of the Regional Pest Management Plan.

Keywords: Chilean needle grass, *Nassella neesiana*, Marlborough, agricultural weed.

INTRODUCTION

Chilean needle grass (*Nassella neesiana*), an erect, tufted grass originating from South America, is a naturalised pest plant found in Auckland, Hawke's Bay and Marlborough. It forms dense clumps that are unpalatable to stock when in flower and can exclude preferred pasture species. Plants produce seed from aerial inflorescences, ensheathed stem inflorescences and also from basal cleistogenes (Connor et al. 1993). The sharp-tipped seeds from the aerial inflorescences drill into the eyes and pelts of grazing livestock, devaluing the pelts and the carcases. Chilean needle grass is especially hard to control; it is only readily identified when producing aerial inflorescence (October and January) and traditional herbicides, although killing off vegetative growth, do not kill cleistogene seeds, which then germinate often causing plant density in patches to increase.

The Marlborough District Council's Regional Pest Management Strategy lists Chilean needle grass as a containment control pest, with the objective to prevent any increase in the distribution of Chilean needle grass within Marlborough. The first detailed survey of the distribution and density of Chilean needle grass was carried out in 1986-88 (Bourdôt & Hurrell 1989), providing a sound baseline for comparison of the current distribution and density. This paper summarises the present distribution and density of Chilean needle grass, looks at trends in infestation occurrences and discusses possible implications of these trends.

METHODS

Pest management staff of the Marlborough District Council annually inspect all properties with Chilean needle grass for landowner compliance with the Regional Pest Management Strategy. Individual properties are classified on the basis of % cover of Chilean needle grass occurring within the infested area of the property, with fringe properties having <5% cover, core properties 5-50% and nucleus properties >50%. Since 1999 data on infestation location and RPMS classification have been recorded within a centralised database. Information from this database has been collated to provide infestation levels during the 2005 and 2000 inspection periods (October to December) to compare with the results of Bourdôt & Hurrell (1989). The area of infestation on each property has been mapped on individual property maps. These have been combined using GIS mapping to develop a map of all known Chilean needle grass infestations based on RPMS classification (i.e. % Chilean needle grass cover). The map in Bourdôt & Hurrell (1989) was inputted into GIS format to enable any changes in distribution and density of infestations to be visualised. Information of the sub-division of properties in the Blind River area was gained by Marlborough District Council GIS staff (2000 and 2005). Land use has been determined by randomly sampling 100 paddocks in the Blind River area during the 2005 inspection period and recording present land use.

RESULTS AND DISCUSSION

Chilean needle grass has spread during the last 18 years in Marlborough. Bourdôt & Hurrell (1989) reported plants from 18 farm properties in 1987. But in 2000 there were 53 infested farms and by December 2005 there were 96 properties infested by the weed (Fig. 1). This recent exponential spread has extended the range of Chilean needle grass well beyond the Blind River area (Figs 2 & 3). It is now found 28 km into the Wairau Plains and 32 km up the Awatere Valley, from the first incursion site on Merrifield's Road discovered in the 1930s (Bourdôt & Hurrell 1989).

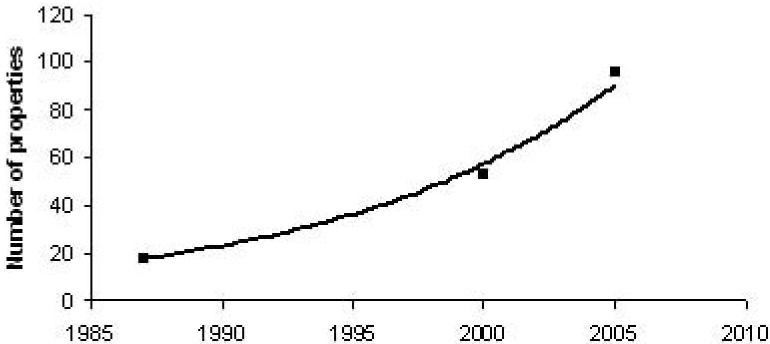

FIGURE 1: The increase in number of properties infested with Chilean needle grass in Marlborough over the 18 years from 1987 until 2005. The 1987 point is from Bourdôt & Hurrell (1989). The fitted line is the exponential function $Y=17.67e^{0.0896x}$ where x is Year with 1987=0; R^2=0.995.

The sub-division of properties has increased the number of properties recorded with Chilean needle grass, as each time a property is sub-divided the database records a new incursion on the newly created property, increasing the number of properties infested, but not the pest's range. Between 2000 and 2005 43 new incursions were recorded on the database, of which 20 are the result of sub-division. So despite a background of increasing sub-division, the spread of this weed is real. The model fitted to the data in Figure 1 predicts that by 2025 532 farms will be infested with Chilean needle grass if the exponential increase continued unchecked.

Coupled with a range expansion, the land area infested has dramatically increased. In 1987 Chilean needle grass infested 1558 ha (Bourdôt & Hurrell 1989) and it presently infests 4311 ha. The density of infestations has also changed (Figs 2 & 3; Table 1) with 69% of infestations considered core or nucleus (>5% Chilean needle grass) compared to

FIGURE 2: Distribution and % ground cover of Chilean needle grass infestations in Marlborough in 1987; adapted from Bourdôt & Hurrell (1989).

FIGURE 3: Distribution and % ground cover of Chilean needle grass infestations in Marlborough in December 2005.

19% during the mid 1980s (Bourdôt & Hurrell 1989). Failure to halt the spread is primarily a result of the difficulties in controlling this pest. Chilean needle grass is only readily identified when producing aerial inflorescence, by which time basal cliestogene seeds are viable (Connor et al. 1993). Therefore treatment with glyphosate based herbicides, whilst killing vegetative growth and preventing aerial seeding, does not prevent the plant reproducing via cleistogene seeds. The unavoidable removal of competing vegetation when using glyphosate may in fact be assisting seed germination and causing patch density to increase. At this time there is no residual herbicide available that can be used in widespread applications to prevent seed germination. The difficultly in controlling Chilean needle grass is highlighted by the fact that no incursions have been eradicated from any property where this pest has been found, although the spread has probably been slowed by control rules as required under the Regional Pest Management Strategy. New methods for control urgently need to be developed to control this pest if its spread is to be contained.

TABLE 1: Land area (ha) infested with Chilean needle grass under Regional Pest Management Strategy classifications in Marlborough.

Classification	1987[1]		2005	
Fringe (<5% ground cover of CNG[2])	1271	(81%)	1346	(31%)
Core (5-50% ground cover of CNG)	240	(15%)	2106	(49%)
Nucleus (>50% ground cover CNG)	48	(4%)	859	(20%)
Total	1558	(100%)	4311	(100%)

[1]Adapted from Bourdôt & Hurrell (1989).
[2]CNG= Chilean needle grass.

Land use in areas infested with Chilean needle grass has also started to change (Table 2). Although grazing is still the principle agricultural activity in the area, this is declining and viticulture is rapidly increasing, a trend that is likely to continue. Changing land use has implications for the way this pest is possibly spread, and management options to try and contain this spread. Machinery use in vineyard development has been implicated in the establishment of several new incursions. Likewise the increase in the number of lifestyle blocks creates a different set of problems as many of these owners are not familiar with agricultural pest issues. Such issues need to be addressed in the Regional Pest Management Strategy if Chilean needle grass is to be contained.

TABLE 2: Percent land use in paddocks infested with Chilean needle grass in Marlborough.

Land use	1987[1]	2005
Pasture	88	67
Cropping/ cultivated soil	10	3
Lucerne	<1	8
Trees	2	2
Vineyard	0	20

[1]Adapted from Bourdôt & Hurrell (1989).

Bourdôt & Hurrell (1989) argued that Chilean needle grass was in the lag phase of infestation in the mid 1980s. With the significant expansion in the number of properties infested, range and density, it should be considered that this pest is now in the early part of the explosion phase. Without effective management it is likely to continue rapidly spreading both within Marlborough and probably beyond. The probability of Chilean needle grass spreading beyond Marlborough is high given the closure of local freezing works that means stock must be moved out of district to be killed (the majority go to Christchurch), as well as the increased use of machinery during vineyard development that is occurring in core infested areas.

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