

Undermining WEEDS

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NEW ZEALAND



Scientists from Scion (Michael Watt, far right) and AgResearch (Shona Lamoureaux and Graeme Bourdôt) collaborating on the development of a potential distribution model for Chilean needle grass.

Introduction

Undermining Weeds is a programme of scientific research aimed at improving the management of weeds in the pastoral and forestry sectors. It is funded jointly by the Ministry of Science and Innovation, local authorities and a wide range of industry organisations from both sectors.

Weeds threaten the sustainable development of these sectors by reducing product yields, product quality and profitability and through environmental effects from their control.

Pastoral weeds in total are estimated to cost the NZ economy \$1.2 b per annum (\$1,073 m in farm production losses + \$167 m in control costs).

Forestry weeds are similarly damaging. Without cost-effective weed control, plantation forestry would not be

economically viable. The benefit to the forestry sector from sustaining cost-effective weed control is at least \$108m/yr.

An additional and far greater benefit will come from protecting the environmental certification status of plantation forests, thereby ensuring access to high value markets for certified wood products.

Undermining Weeds is a collaboration of scientists from AgResearch, Scion, Landcare Research and Plant Protection Chemistry. To ensure it continues

meeting industry needs, it is reviewed annually by an Industry Advisory Group.

In this Newsletter we give three examples of projects from the programme in which models have been developed to help foresee and quantify the risk to our primary production posed by weeds that are currently of limited geographic distribution.

Graeme Bourdôt
Programme Leader



Buddleja outcompeting radiata pine in the Central North Island.

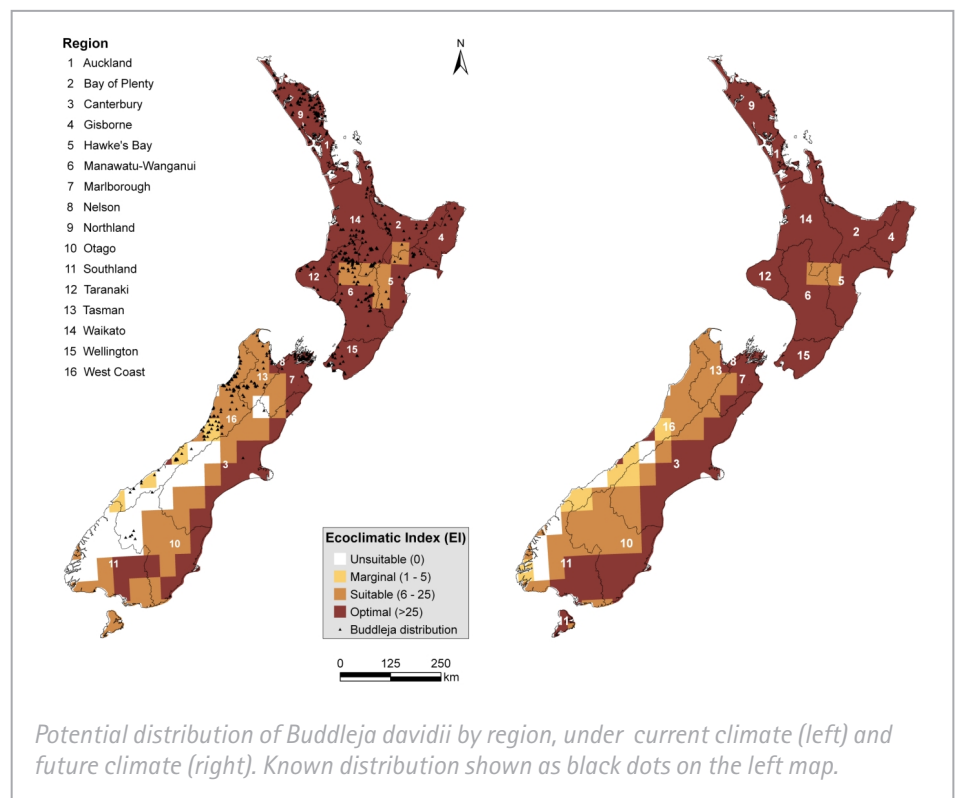
Buddleja

Buddleja (*Buddleja davidii*) is a very high impact exotic weed that competes strongly with forest plantations in New Zealand.

While this weed is currently restricted mainly to the North Island, a large proportion of the area identified for future forest expansion is in eastern and southern regions of the South Island where the weed is presently relatively scarce. Using a process-oriented climatic niche model (CLIMEX), we project increases in climatic suitability under climate change for the weed to be greatest in these eastern and southern regions of the South Island. As *B. davidii* predominantly colonises disturbed areas, the likely future increases in plantation area in this region can be expected to promote the spread of *B. davidii*. Possible climate-change adaptation strategies that could be implemented to reduce the spread of *B. davidii* are: inclusion on the National Pest Plant Accord; imposing a 'control line' in the South Island; inclusion on the Regional Pest Management Strategies of eastern territorial authorities in the South Island.

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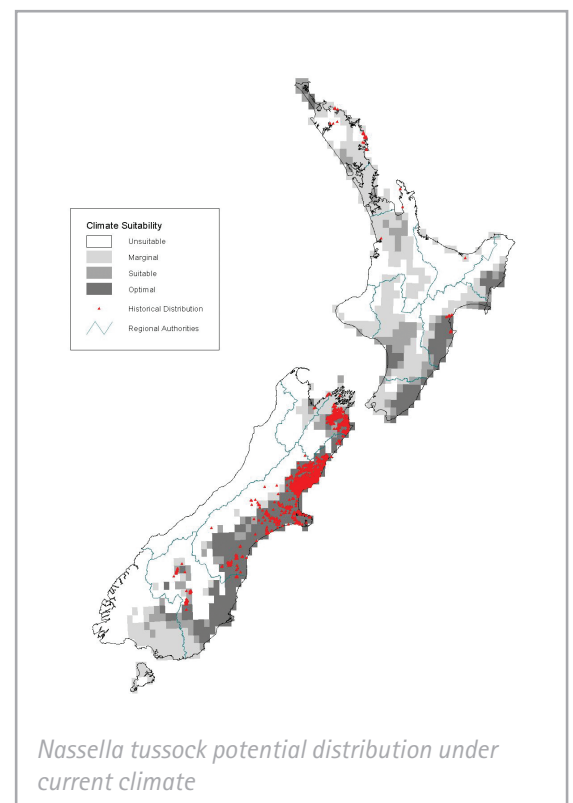
Nassella tussock in North Canterbury.

Nassella tussock

Nassella tussock (*Nassella trichotoma*) invaded indigenous tussock-grasslands in the eastern parts of the Marlborough and Canterbury regions of New Zealand following their modification for pastoral farming by the early colonists in ca. 1860.

Since the wide-scale renovation of these infested grasslands (by improving soil fertility and sowing pasture grasses and legumes) in the mid 20th century, re-invading plants have been removed annually by manually digging them out (a process known as grubbing) in regionally-coordinated management programmes. This effort, sustained until the present day, has resulted in the weed falling to densities that no longer reduce live-weight gains of sheep and other grazing animals.

The extent to which ongoing management of this weed is economically worthwhile remains a topic of intense debate within the scientific and farming communities. To help inform this debate, the potential range of nassella tussock in New Zealand was estimated using a climate model developed from global distribution data. The map generated from the model reveals vast tracts of land, particularly in eastern Canterbury and Otago, which are currently climatically suitable yet unoccupied by the weed. This information enables regional authorities to recognise sites most at risk of invasion (those with high climatic suitability that are nearby current or historical infestations), and to factor this into their management programmes.



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Chilean needle grass seed.



Seed-damaged sheep pelt.



Chilean needle grass flowering.

Chilean needle grass

Nassella neesiana (Chilean needle grass), is an invasive weed in New Zealand where it is the subject of management programmes to reduce its impacts (downgrading of wool, skins, hides and carcasses, reduced stock carrying capacity, reduced grassland biodiversity) and spread.

Inferring the species' climate preference from its distribution in its native range in South America using CLIMEX, we estimate that 15 million ha are climatically suitable in New Zealand under current climate. We also estimate that only 0.52% of this suitable area has been invaded. These results imply that *N. neesiana* could become a much greater problem in New Zealand and that management to limit its spread is justified.

The model shows that the potential range of Chilean needle grass in New Zealand is greater under future climates than it is under current climate. This result provides further justification for land management practices that restrict the movement of machinery, animals and fleeces that may contain Chilean needle grass seeds.

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