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Biosecurity: Who Wants to Be A Millionaire?

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INTRODUCTION

Part of what I do as a Principal Lecturer in Horticulture is to teach Plant Health. I really enjoy teaching adult students and apprentices because I know I can make a difference to their learning. When students start, most can identify a ladybird, an aphid, and a dandelion, but beyond that, it's a bit of a void. That's not too surprising as it's a big wide world of pests, diseases, and disorders out there.

Training people in Plant Health is vital no matter what sector of horticulture you're in. if a business doesn't have knowledgeable staff, who can confidently identify and then apply the right control methods, at the right time, you will be ditching a lot of sub-standard plants or worse, your reputation as a quality grower.

Beyond any individual business's concern about pest control, is the global issue of the huge negative impact that pests have on society's wellbeing and wealth.

So let's talk money. Put your hand up if you want to be a millionaire. Good, lots of people keen on that. You know the people that didn't put their hand up, that's because they are already millionaires, which is awesome because I've heard that Australians are generous and I'd like to ask them for a donation to cover some of New Zealand's pest control costs!

Counting the costs of weeds

Professor Philip Hulme (2018) reported that weeds cost the New Zealand economy billions of dollars per year. "Recent estimates suggest about $2 billion is lost every year in lost productivity and management costs simply from our pastoral, arable and forestry sectors.

The Royal Society Te Aparangi (RSTA) noted that, "Weeds pose a threat to one-third of all New Zealand nationally threatened plant species, and could potentially degrade 7% of the conservation estate within a decade, corresponding to a loss of native biodiversity equivalent to $1.3 billion." (RSTA, 2014:2).

Counting the cost of animal pests

Recent data (Ferguson et al., 2019) found that invertebrate pasture pests, most commonly targeting New Zealand's pastures, are costing the economy up to $2.3 billion per year.

In terms of vertebrate plant pests e.g. rabbits, possums, birds, the total direct economic cost of these pests to the primary sector, is estimated to be about $1 billion per year, but with multipliers included could be as high as $3.3 billion (RSTA, 2014).

New Zealand is known for its fairness, so I'm prepared to take donations of $10 billion, partly in Bitcoin if that helps.

So why are there so many pests to control in New Zealand?

"New Zealand remains under intense pressure from pests which threaten our economy despite investing heavily in biosecurity and pest management systems", according to the Royal Society Te Aparangi (2014:1).

Part of the reason we have so many pests is that scientists believe we became an isolated island about 85 million years ago and therefore much of our flora and fauna are unique. The pests that have established here have no natural enemies to keep them in check and so they can spread relatively quickly.

New Zealand's economy is reliant on primary industry exports and tourism. In other words, we rely heavily on our natural resources such as the land, sea, fresh water, native biodiversity and the ecological functions that support their sustainability.

However, we are no longer isolated. Pests and diseases have found their way to our country by chance, by design and by human ignorance of ecological systems. New Zealand is one of the weediest places in the world and *74%* of our weeds started as ornamental garden plants that then made a break for it in their new home (Landcare Research).

Australia in the past, generously, sent us some cute wildlife – the common brushtail possum (*Trichosurus vulpecula*) in 1837 to be exact. We have whittled the possum population down to a mere 30 million thanks to extensive government and volunteer efforts (Landcare Research, 2011).

A more recent arrival from Australia has been myrtle rust (*Austropuccinia psidii*). OK, myrtle rust sent *itself* on the wind currents, but we are all devastated that it has arrived and worry what the consequences of this will be for our native Myrtaceae such as the iconic pohutukawa (Metrosiderous sp.) as well as food crops.

Figure 1. Myrtle rust arrived in New Zealand in 2017 and has now spread as far south as the top of the South Island. (Source: L. Burton).

Why is biosecurity important?

The first line of defence is a biosecurity system to prevent unwanted organisms entering our countries in the first place. Both New Zealand and Australia's biosecurity systems monitor and assess risks to minimise outbreaks of pests that already exist in our countries and to prioritise the resources available.

To test your knowledge of Australia's biosecurity priorities I have a question for you.

What is the common name of the most threatening organism for Australia that destroys plants according to the Department of Agriculture and Water Resources? Here are some clues:

This pest is not in Australia or NZ (yet) The term pest covers animals, insects and diseases. Sorry there is no 50:50 or phone a friend on this one.

The answer is *Xylella fastidiosa* – a bacterial disease that originated in the Americas and is spreading to other countries. It causes browning and loss of leaves, stunting, reduced fruit size, dieback and death of the plant. The Department of Agriculture and Water Resources (DAWR, 2019) reports that over 350 native, commercial and ornamental plant species are at risk from *Xylella.*

Xylella is just one of Australia's top 40 exotic and unwanted plant pests. It is estimated that the cost to the industries at risk if these organisms enter Australia are (in Australian dollars) $27.9 billion to the broadacre and horticulture crop industries and $2 billion to the forestry industry (DAWR, 2018).

The Department of Agriculture and Water Resources has a useful website, with a short video clip and information sheet on each of the top 40 plant pest risks to Australia.

In New Zealand, it's been hard recently not to feel depressed by the ongoing and significant pest issues that we are facing – be it *Mycoplasma bovis*, myrtle rust, the continuing spread of guava moth or the heart breaking kauri dieback. This disease is killing thousands of our giants - *Agathis australis* grow up to 50 metres and can live for more than one thousand years. The disease was identified in 2015 and named *Phytophthora agathidicida* – the kauri killing *Phytophthora* (Landcare Research, 2019). Unfortunately, kauri dieback continues to spread despite efforts to control it.

I know that many of you are working hard on protocols in the nursery industry and in the revegetation industry to prevent or control the spread of *Phytophthora species.*

Do we understand biosecurity?

It was encouraging in 2018 to hear that New Zealand's Ministry for Primary Industries (known as MPI), had formed a new business unit called Biosecurity NZ to provide a stronger focus on biosecurity. We have scientific experts, trained staff in Biosecurity NZ, Regional Councils and other community groups and professional networks and I thought "*we had it under control".* And then two things in particular made me think that maybe *we didn't…*

Last year the Government's 'One Billion Trees' programme was launched with the aim of planting One Billion trees in a decade: good news in itself. The bad news was that the Ministry released a list of trees as a guide to councils and the public, which included a number of well-known tree weeds such as hawthorn (*Crataegus* sp), sycamore (*Acer pseudoplatanus)* and Taiwan cherry (*Prunus campanulata*). It took others such as Forest & Bird (2018) to point out the mistake which included one species that was illegal to sell or propagate and others that ratepayers are spending millions on trying to eradicate.

How could anyone working for the Ministry for Primary Industries fail to notice, or understand the difference, between suitable trees and invasive tree weeds. Then, I read an article with the heading, 'Biosecurity Not Well Understood'. It related to a government report that included the scary statistic that only 2% of New Zealanders see biosecurity as relevant to them and 40% do not know, or have limited knowledge of, what the word even means (Biosecurity 2025, 2018).

These two events combined, made me think, what is going on here? Have we run out of people with even the most basic knowledge of biosecurity and plant health? Given that a substantial amount of New Zealand's wealth is due to our primary industry

exports, and that these industries rely on quality biosecurity systems, it was shocking to read that so few people understood how any failure in our biosecurity would directly affect them economically. For example, about 60% of New Zealand's total production of fruit and vegetables is exported and this trade was recently valued at $3.62 billion by the Horticulture Export Authority (2018).

The millions that some people dream of, via the lotto draw, or the television quiz game, might be their only hope if the plant equivalent of 'foot and mouth' disease, should ever reach our shores.

I'm worried that we are not training enough entomologists, plant pathologists, horticulturalists, researchers and IT specialists to deliver a robust biosecurity system to manage these complex challenges. Unsurprisingly given my role, I believe knowledge is power, and an accessible, quality education is the building block of a resilient and innovative knowledge-based economy.

I believe that both our governments need to wake up and look at the numbers of those training in plant sciences and horticulture, and significantly increase funding to *attract* and *train* people at every level - from degrees to certificates, *whether it's on campus, on job or online*. The number of people studying horticultural science in New Zealand at degree level has undergone a massive decline since the 1980's – I should know because I was there.

Experienced horticulture industry members are already playing their part in biosecurity vigilance, as are many organizations such as Predator Free New Zealand and Weedbusters but is this enough?

Who's responsible for biosecurity?

I took a closer look at Biosecurity New Zealand and was pleased to see that it had taken stock of its essential role, and with partner organisations, called 'Biosecurity 2025' were producing strategies, setting targets and conducting surveys to measure their progress.

Some of the results of their public survey (Biosecurity 2025, 2018a) were encouraging. For example, nearly all New Zealand adults (96%) recognised the importance of protecting New Zealand from unwanted pests, weeds, and diseases. However, only 29% agreed that they could identify the main pests, weeds and diseases that pose a threat to New Zealand's environment. The survey results showed there was also a need for greater public awareness of biosecurity, why it mattered in our everyday lives and how Kiwis could help.

Biosecurity New Zealand also correctly identified that relying on their own staff and resources was never going to be enough to win against pests; it was going to take all of us. They have set out to achieve a biosecurity team of 4.7 million people. In other words, they are trying to encourage every New Zealander to contribute to minimizing our biosecurity risk.

Figure 2. A Biosecurity Team of 4.7 Million. Source: With the permission of Biosecurity NZ, Biosecurity 2025.

One of their key messages is that we all suffer the consequences if we don't have a strong and resilient biosecurity system (Biosecurity 2025, 2018b). Their aim that ''biosecurity education and training is building the necessary knowledge and skills for all ages across the system" is heartening but I have yet to see the details of how they plan to achieve this (Biosecurity 2025, 2018c).

Without governments seriously valuing the educators and science staff that they already have, and the crucial experience and knowledge from industry people like yourselves, plant health skills will not easily transfer to the next generation of horticulturalists, let alone the general public.

One of the themes of this conference is 'Manage Change', and one of the biggest issues in biosecurity, is how to predict and assess the effects of a warming climate on the spread of unwanted organisms. There should be a sense of urgency about this as a warming climate makes an already difficult biosecurity situation, even worse.

In general, the warmer the climate, the faster pests reproduce. New Zealand has a temperate climate but there is an increased risk of tropical and subtropical pests entering our country, surviving and spreading due to global warming. Increases in storms, and changes to wind patterns and ocean currents will also contribute to new distribution patterns of unwanted pests.

On this theme, I'd like to play a two-minute clip about climate change produced by NIWA which is New Zealand's National Institute of Water and Atmospheric Research. The video is called 'Our Climate Is Changing' and was produced in June 2018.
https://www.niwa.co.nz/videos/our-climate-is-changing

It asks the question, are we ready for change?

CONCLUSION

We all have a part to play to ensure our biosecurity systems are as robust as possible, so we can continue to enjoy the financial benefits from our primary sector exports, built on our natural resources. Invasive pests, diseases, and weeds erode that wealth and the cultural taonga (treasure) that is our responsibility to sustain and protect.

Knowledge of plant health requires continued investment in the education of those training in horticulture, plant sciences and associated sectors. Funding is also needed to increase the public's awareness of why biosecurity matters and how each of us can together contribute to this challenging task.
Kia ora and Ko Tatou: This is Us.

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