Biosecurity matters—challenges to New Zealand's biosecurity system©

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INTRODUCTION

New Zealand faces continuous risk from the introduction of new plant pests and diseases. Growth and diversity in trade and tourism, changing risk pathways, climate changes, and pressure from established pests require new strategies and measures to combat these challenges. The number of mail parcels has increased by 216%, sea containers by 37% and passengers by 47% since 2003. New Zealand is now home to 213 ethnicities and 160 languages (2013 census). A new plant species establishes wild in New Zealand every 39 days and climate change alters the risk of both new pests and diseases coming to New Zealand from our trading partners, as well as their ability to establish in New Zealand.

The Ministry of Primary Industries (MPI) has created "Biosecurity 2025", outlining 5 strategic directions which aim to address some of these challenges head on. The central strategy is a "biosecurity team of 4.7 million", seeking to enlist the help of all New Zealanders to play their part in keeping risk offshore and/or reporting and managing risk onshore. An informed and responsive public means that the biosecurity system is able to respond much more quickly to mitigate and manage biosecurity risk. We're all in this together.

The popular television show 'Border Patrol' gives some glimpse into the day-to-day working life of biosecurity and customs officers. However biosecurity risk is not managed only at the New Zealand border (the 'thin blue line') yet is done throughout a whole system starting offshore, through the development and implementation of international standards and rules, trade and bilateral agreements, and domestic import health standards which specify the requirements which must be met for the importation and clearance of commercial risk goods.

The Intelligence, Planning & Coordination function of the Ministry provides data and intelligence to assist with preparedness and planning, import management, so that efforts can be focused where they will achieve the greatest results.

The Risk Analysis teams consider the environmental, social, human health and economic risks from the potential introduction of new pests and diseases to the country, informing the Risk Management teams in MPI to set the measures for imports in an import health standard. The Risk teams also manage the emerging risk system which creates a network with the international community and the New Zealand public, professional groups and scientists alerting MPI about the spread of a new pest or disease overseas, a new host, or new trends in trade and travel which could negatively impact New Zealand primary industries. The import health standard teams set the "rules" for importation of goods to manage risk, and the role of the biosecurity inspectors at the border is to verify these measures have been met and decide whether the goods can receive biosecurity clearance.

Finally, the system also includes post-border management. MPI's pest and disease hotline [0800.80.99.66] is managed 24/7, providing advice to the public on what to do if they suspect a new pest or disease. MPI's Investigation team will follow up on any calls made to the 0800 number and in the event that a suspected pest or disease is confirmed, the team will determine whether the investigation proceeds to response.

CHALLENGES TO NEW ZEALAND'S BIOSECURITY SYSTEM

Myrtle rust—blowing on the wind

When the 2017 IPPS New Zealand Region conference committee and I first discussed

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possible topics for a biosecurity presentation for the 2017 conference, myrtle rust had not appeared on the mainland but was recently noted from Raoul Island in the Kermadec Islands. At the time I thought I would be speaking about the measures already in place to manage the risk from imports of nursery stock and cut flowers, however the detection of myrtle rust in a plant nursery and adjoining property in Kerikeri and then several sites in New Plymouth meant that MPI was in full response by the time the IPPS conference was upon us in May. Unfortunately this resulted in the cancellation of several field trips to nurseries planned as part of the conference.

As we well know, myrtle rust (*Austropuccinia psidii*) attacks the foliage, fruits, and flowers of myrtaceous species and there are over 445 known hosts. The disease is also known as guava rust, eucalyptus rust, and ohia rust, according to the main hosts in overseas countries. The disease was known from Hawai'i since 2005, infecting *Metrosideros* (Ohia). It is not known how it arrived in Australia, but appeared there in 2010, and subsequently spread to New Caledonia in 2013, Lord Howe in 2016, and showed up on *Metrosideros* in Raoul Island and New Zealand in 2017.

Interestingly during subsequent discussion at the conference on myrtle rust, Ian Duncalf talked about his experiences in response to the outbreak of poplar rust in New Zealand in the 1970s. Two strains of poplar rust showed up in New Zealand approximately 1 year after the outbreak in Australia, presumably from wind-blown spores. The first places they showed up were in Northland and Taranaki and the same pattern appears for the arrival of myrtle rust in New Zealand.

Early intervention gives the greatest chance for eradication. MPI thanks the nursery operators who notified the 0800 number about suspicious symptoms.

The rust fungus attacks young, actively growing leaves and shoots. Early detections in New Zealand have been in plant nurseries because the growing conditions are ideal and there are many vulnerable young plants in sheltered, warm and damp environments. Nursery industry and growers are also vigilant in checking their plants. Often the first sign of infection is chlorotic flecks on leaves and shoots, followed by the production of masses of bright yellow urediniospores. Lesions often turn red-purple then grey with age, and often have a purple or dark brown margin.

Under the Biosecurity Act, New Zealanders have a legal obligation to inform MPI of suspected new diseases. However, while in many plants the symptoms of yellow rust pustules are highly obvious, the disease can also present cryptic symptoms in some species.

A survey of New Zealand plants in Australia as "plant sentinels" has found that *Metrosideros* species are highly susceptible but manuka (*Leptospermum scoparium*) does not appear to be extremely affected.

Brown marmorated stink bug—hitchhiker pest extraordinaire

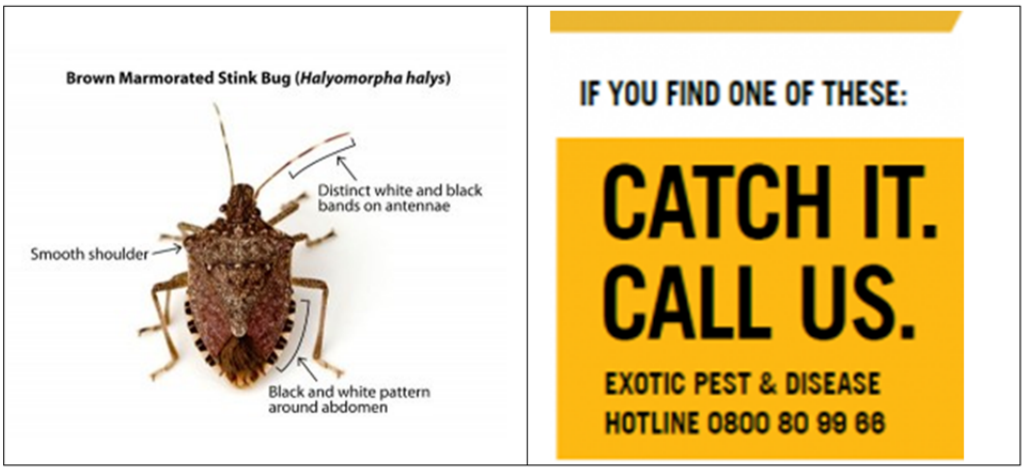
A bug which is keeping MPI extremely busy the past few years is the brown marmorated stink bug (*Halyomorpha halys*), or BMSB (Figures 1A, B). There are several look a-likes, but the way to tell these guys apart from the rest is the distinctive white and black bands on their antennae and black and white banding patterns around their abdomen. They are unlikely to turn up in your nurseries first but they quickly breed to high numbers and represent a substantial threat to our horticultural industries.

- Eggs laid on the undersides of leaves in host vegetation that surround crop plants.
- Adults fly into crops to feed, only nymphs reside in crops.
- Exhibit a preference for hosts with ripe fruit.
- When days shorten BMSB aggregate on the sides of buildings then move inside to overwinter. In a natural environment they overwinter under the bark of trees and yes, they apparently do stink.

***Xylella fastidiosa*—bacterial leaf scorch**

A bacterium which is being described as the world's most significant plant threat is high on MPI's radar at the moment. *Xylella fastidiosa* has been present in Central and South America since the 1880s, spreading into North America by the 1990s. Its recent spread in

Europe is cause for concern. The disease is known by many common names—Pierce's disease of grapevine (in California), almond leaf scorch, citrus variegated chlorosis (Brazil), phone peach disease, oleander leaf scorch, and recently as the causative agent of olive quick decline syndrome in Italy.



Figures 1. A. The brown marmorated stink bug (*Halyomorpha halys*). B. Promotion of the exotic pest and disease hotline for reports of the brown marmorated stink bug.

The bacterium grows in the xylem moving both upstream and downstream. It restricts or blocks the movement of water and nutrients through the plant. Deprived of sap, the plant dries out leading to wilt or leaf scorch symptoms. The bacterium is spread from plant to plant by xylem sucking insects, including leafhoppers, sharpshooters, spittlebugs and cicadas. The glassy-winged sharpshooter (*Homalodisca vitripennis*) is important in vineyards in California, while in Italy the spittlebug *Philaneus spumarius* is important. This spittlebug is also present in New Zealand, so should the bacterium be introduced to New Zealand, it is possible this vector could spread it far and wide.

In 2013 the bacterium was found in olive trees in the region of Apulia in southern Italy. The disease caused rapid decline in olive plantations and by April 2015, more than a million olive trees were infected, many of them century-old (Figure 2). The invasive disease is believed to have been introduced by ornamental plants imported from South America. In 2015, it reached Corsica and mainland France, and was detected in 2016 in Germany in oleander. In 2017, MPI received reports it is also in Spain, Majorca and Ibiza.

Five subspecies have been discovered so far.

- *fastidiosa*, affecting vines and coffee trees;
- *multiplex*, affecting almond, olive and oak trees;
- *sandyi*, affecting oleanders and coffee;
- *pauca*, affecting orange and coffee plantations in the Americas and more recently, olive trees pathogen, in southern Italy;
- The new subspecies *taiwanensis* sp. nov. affecting pear trees has also been proposed.

A host list is maintained by the Secretariat of the European and Mediterranean Plant Protection Organization (EPPO) (https://gd.eppo.int/taxon/XYLEFA/hosts). Across Europe, 359 plant species have now been identified as hosts of *Xylella.* Many of these species show no symptoms of the disease, and provide a reservoir for reinfection of other plants, making *Xylella* difficult to control. The trade in asymptomatic material is challenging international trade based on phytosanitary health certificates.

Figure 2. Mature olive trees in Pulia, Italy affected by olive rapid decline syndrome. Photo Robert Taylor, 2017.

Phytophthora

Another challenge to New Zealand biosecurity is the genus *Phytophthora*. These are not true fungi but "water moulds" and are very difficult to control in the environment once they have established. One of the most prominent species in New Zealand is *P. agathidicidae* the casual agent of kauri dieback in Northland. Several other species are causing economic and environmental impacts in New Zealand, including *P. cinnamomi*, affecting the production and viability of avocado trees and *P. pluvialis* (red needle cast) which showed up in *Pinus radiata* trees in 2015.

Phytophthoras are highly adapted plant pathogens with diverse spore forms. They can spread in the environment through soil, air, and rain splash and may be water and soil borne. They are very difficult to control once established in the environment.

MPI regulates the high impact *P. ramorum* (sudden oak death) and is currently reviewing the requirements for nursery stock, aiming to preventing the introduction of new species into New Zealand.

What you can do

- Be vigilant!
- Clean footwear after visiting overseas forests, woodlands. Wash clothes and personal belongings.
- Importing goods through mail and courier pathways? Check import requirements against MPI's Plant Biosecurity Index and IHSs.
- Contact MPI's Exotic Pest and Disease Hotline 0800 80 99 66 if you suspect a new pest/disease.
- Report information about new pests or disease threats to MPI's emerging risk system emergingrisks@mpi.govt.nz