Environmental Biosecurity Senate Inquiry 2014

Plant Biosecurity Cooperative Research Centre Submission

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Executive summary

Australia is increasingly at risk of the entry and establishment of invasive species of biosecurity concern. A robust biosecurity system is essential for the wealth and wellbeing of our nation. The consequences of incursions of invasive species have potentially devastating environmental, economic and social consequences.

An effective biosecurity system that protects Australia's natural environment does not begin and end at the border. Changing demographics, increasing trade and greater tourist movements mean our biosecurity approaches must be highly dynamic and innovative.

The nature of biosecurity threats, their prevention, surveillance, containment and eradication, means a sustained and coordinated approach is essential across the biosecurity continuum – pre border, border and post border.

To this end, biosecurity must be a shared responsibility. All organisations – public and private – with any responsibility for managing natural resources, or involved in the supply chain for imported goods, must place greater emphasis on biosecurity and improve coordination and investment.

Preparedness and prevention are more effective strategies than extensive eradication responses or long term management, control and containment.

Preparedness and prevention will be considerably improved if 23.5 million Australians have a better awareness and understanding of biosecurity risks.

There are five principles for effectively managing the risk of invasive species to Australia's natural environment:

1. **We must know our enemy**

Australia requires an effectively integrated national and targeted approach to risk prioritisation, pathway analysis, surveillance and diagnostics in order to reduce the risk of introduced pests and disease, and must be an active global participant in order to understand biosecurity threats.

Successful prevention requires a nationally coordinated approach that encompasses both environmental and agricultural threats. This includes extensive government, industry and community awareness of these threats.

2. **We must be prepared**

Through investment in biosecurity systems and science, Australia can minimise the risk of the entry and establishment of invasive species likely to harm its natural environment.

Historically the surveillance, prevention and import risk analysis focus has been on regulated pathways, however the lack of focus on unregulated pathways has meant this is typically where incursions manifest.

A technologically supported approach to plant biosecurity is essential for effective and efficient protection.

3. **We must move quickly**

Speed is essential in addressing any environmental biosecurity threat.

Resourcing for immediate response is vital. Rapid response should not be hindered by negotiation of responsibility and funding, or lack of capacity. **To this end, both the Australian and State governments could jointly consider an allocation of funds specifically set aside for immediate use in the initial stages of an incursion – thereby avoiding the inevitable delays in the allocation of funds and resources while jurisdictional matters are resolved.**

4. We must use experts

Australia's biosecurity reputation is the envy of the world, and is underpinned by expertise in State and Federal agricultural and environmental departments, and research agencies.

In order to maintain effective preparedness for and response to incursions, our biosecurity effort must continue to be led by these experts.

However, investment in this capacity must be strengthened and continued collaboration and coordination with international expertise must be prioritised.

5. We must work together

An effective biosecurity system requires a clear policy and administrative framework with well-resourced structures and well understood responsibilities.

There is currently a lack of capacity and clear articulation of responsibilities in the environmental area. This has led to a reliance on agriculturally focussed organisations to lead responses when both environmental and agricultural expertise must be employed in a timely and effective manner.

Well-resourced and integrated biosecurity research, development and extension (RD&E) are essential for an effective national biosecurity system. The national coordination, leadership and resourcing of RD&E will become increasingly important in a rapidly changing biosecurity environment.

Introduction

Australia is increasingly at risk of the entry and establishment of invasive species. This risk applies both to our agricultural industries and to Australia's unique natural environment and way of life.

A robust biosecurity system is essential for the wealth and wellbeing of our nation. The consequences of such incursions have potentially devastating economic, environmental and social consequences.

Failure in our biosecurity shield can wreak significant damage, as evidenced by overseas experience and the pests and diseases that Australia currently spends significant resources in trying to manage, control and contain.

While the importance of border control is clear, invasive species are not bound by spatial or temporal boundaries.

An effective biosecurity system that fully protects Australia's natural environment does not begin and end at the border.

Rather, a sustained and coordinated approach to achieving biosecurity through vigilance, rapid response and impact management needs to be in place across the biosecurity continuum – pre border, border and post border.

Australia must learn from the United States (US) experience and resist placing increased responsibility for biosecurity activity with border control agencies such as customs and immigration.

Following the terrorist attacks of September 11, 2001, federal agency roles and responsibilities were modified to help protect agriculture. In March 2003, more than 1800 agriculture specialists within the United States Department of Agriculture's (USDA's) Animal and Plant Health Inspection Service became Department of Homeland Security Customer and Border Protection employees, while USDA retained responsibility for setting inspection policy, providing training and collecting user fees.

Within four years it was obvious that agencies faced management and coordination problems and in 2006 the US Government Accountability Office concluded the vulnerability of US agriculture to foreign pests and diseases was increased under the new structure.[1]

Any dilution of the biological focus of front line staff would be a high risk for Australia, noting that other border agencies have a very different set of priorities which do not always sit comfortably with the goal of detecting and responding to the threat of pest introductions.

The most effective strategies Australia can employ to manage the risk the entry and establishment of invasive species likely to harm Australia's natural environment are prevention of entry and preparedness to quickly detect and eradicate invasive species when entry occurs. Together they are more effective and efficient than extensive eradication responses or long term management control.

Biosecurity preparedness and prevention must be a shared responsibility. All organisations – public and private – with any responsibility for managing natural resources must place greater emphasis on biosecurity and improve coordination and investment.

Preparedness and prevention will be considerably improved if 23.5 million Australians have a better awareness and understanding of biosecurity risks.

There is no better example of the power of the public in maintaining Australia's biosecurity shield than the case of the Khapra beetle (*Trogoderma granarium*).

1 United States Government Accountability Office: Management and Coordination Problems Increase the Vulnerability of U.S. Agriculture to Foreign Pests and Disease. GAO-06-644: Published: May 19, 2006. Publicly Released: May 19, 2006. http://www.gao.gov/products/GAO-06-644

A serious pest in the international grain industry, it feeds on stored grain and dry foodstuffs. Infested grain also becomes contaminated posing a health risk. Khapra beetle is not present in Australia but its establishment would put at risk the $A1.8 billion of grain exports that leave Australian shores each year.

In 2007, the beetle was reported by a member of the public unpacking a container of household goods in Western Australia that had arrived from Scotland. Identification and response was rapid, the house quarantined and the beetle eradicated at a cost of $A207,685.[2] The potentially devastating impact on Australia's grains industry, and the biosecurity reputation that underpins market access, was avoided with market certification of pest freedom preserved.

Five principles must underpin adequate arrangements to prevent the entry and establishment of invasive species likely to harm Australia's natural environment.

1. We must know our enemy
2. We must be prepared
3. We must move quickly
4. We must use experts
5. We must work together

We must know our enemy

Central to any effective biosecurity system is an ongoing understanding of what we are dealing with.

Such understanding can only be obtained through an effectively integrated national and targeted approach to risk prioritisation, pathway analysis, surveillance and diagnostics in order to reduce the risk of introduced pests and disease.

This preventative approach requires national coordination that encompasses both environmental and agricultural threats.

Looking specifically at agriculture, it is clear that industry plays an integral and active role in the overall biosecurity system. This was demonstrated when the fungal wheat disease karnal bunt was erroneously identified in a shipment to Pakistan in 2004. Market access was temporarily denied to Australian wheat by many countries, and $A1 billion per year export markets and downgrading of grain quality was at risk. Fortunately Australia was well positioned to rapidly validate its absence due to sampling undertaken prior to shipment, and market access was regained.

By comparison there are few other commodities and possibly no environmental-only pests where Australia could provide such validation of absence or mount that level of response.

Effective prevention is also underpinned by extensive industry and community awareness of threats. This is demonstrated through the risk posed by the Asian gypsy moth, whose incursion is likely to occur through cargo. Asian gypsy moth caterpillars feed on more than 600 species of trees, such as oak, birch, aspen, eucalyptus, holly, rose, fruit trees and ornamental plants.

Vessels arriving in Australia from identified high risk ports in Asia and Russia are the subject of heightened biosecurity surveillance by Department of Agriculture biosecurity inspectors. This program relies on strong cooperation with shipping lines and awareness of crew on vessels to be vigilant for Asian gypsy moth egg masses on the structure of the ship. Plant biosecurity scientists in the Department have undertaken considerable work to identify high risk ports internationally, resulting in more targeted inspections in Australia, and an increase in the detection and removal of viable egg masses on ships. There is now an opportunity to

2 PBCRC1033: With the benefit of hindsight: A bioeconomic analysis of past pest incursion, Ben White, Professor School of Agricultural and Resource Economics, UWA, http://www.pbcrc.com.au/

examine more closely where the highest risk ports of arrival are domestically, taking into account shipping pathways, climatic conditions that favour establishment, and proximity to surrounding vegetation.

Asian gypsy moth is one example of a number of hitchhiking pests; others include the burnt pine longicorn beetle from New Zealand, and the Giant African snail from many countries including Asia and the Pacific.

A key priority in the national effort to prevent the entry and establishment of such pests is to significantly increase education of all workers involved in the shipping and cargo supply chain. Commonwealth and State biosecurity officials rely upon the eyes and ears of co-workers in the ports and container depots to provide alerts when pests first appear. This alliance between government and industry is vital to improving Australia's chances of keeping out these invasive species.

Active participation in global and regional biosecurity collaboration also makes a significant contribution to Australia's awareness and understanding of biosecurity threats.

We must be prepared

Through investment in biosecurity systems and science, Australia can minimise the risk of the entry and establishment of invasive species likely to harm Australia's natural environment.

The pathways by which invasive species can enter Australia are many. **Historically the surveillance and prevention focus has been on regulated pathways** – predominantly ports and airports.

The lack of focus on unregulated pathways means this is typically where incursions manifest. Unregulated pathways are unpredictable and difficult to foresee, and can range from migratory birds and animal movement to wind-borne travel.

Take for example the arrival of Currant lettuce aphid in Australian in March 2004. Never detected before, it was first reported in Tasmania following a prolonged period of easterly winds. DNA analysis concluded the Tasmanian aphid was of the same origin as that found in the South Island of New Zealand. Analysis of the wind patterns concluded that the duration of travel from New Zealand to Australian ranged from 72 to 192 hours. Those winds passed over Tasmania before heading north over mainland Australia.

Analysis showed that it was possible for the same air currents to deposit the aphid not only on Tasmania but on the mainland almost at the same time.[3]

Given the unpredictability of unregulated pathways, a technologically supported approach to plant biosecurity is essential for effective and efficient protection.

The effectiveness of new technology became apparent when, in 2010 in central Queensland, cotton crops were ravaged by a species of mealy bug thought to be new to Australia. Almost immediately, remote microscopy was used to send real-time images of the pest via the internet to an expert in California, who was able to identify it as an exotic pest. A rapid response was then activated.

The Plant Biosecurity CRC is currently working with a number of groups who have recognised the benefits of the remote microscope technology to establish regional or industry-based pest-detection networks. The Plant Biosecurity CRC is also collaborating in South East Asia on a similar cross-country initiative, all in order to identify and combat invasive pests threatening agricultural industries and markets before they arrive.

The development and resourcing of a nationally coordinated remote microscope network would offer significant improvement in Australia's biosecurity shield.

[3] Understanding the significance of natural pathways into Australia and New Zealand, Plant Biosecurity Research Cooperative Research Centre 1031, 28 February 2014. Project leader Alan Yen. Authors Kyla Finlay, John Weiss and Jessica Vereijssen.

We must move quickly

Speed is fundamental when addressing any environmental biosecurity threat – either eradication or containment.

A significant international investment is underway to support the early assessment of a biosecurity threat through the Global Eradication and Response Database (GERDA). GERDA can provide information on previous response attempts and their analysis, where sufficient data is available. It currently has around 114 users from 17 countries.

Ultimately, the database aims to improve the success rate and efficiency of future eradication programs by improving transfer of knowledge. Its lessons so far include identification that eradication usually has a shorter duration and smaller footprint than pest management and that more eradications have been successful than is generally realised.

While detection and identification must be swift, so must action, and resourcing for immediate response is vital. Rapid response cannot be hindered by negotiation of responsibility and funding, or lack of capacity. To this end, both the Australian and State governments could jointly consider an allocation of funds specifically set aside for immediate use in the initial stages of an incursion – thereby avoiding the inevitable delays in the allocation of funds and resources while jurisdictional matters are resolved.

The case of Myrtle rust, first detected in Australia in April 2010, provides an excellent example. Myrtle rust infects the Myrataceae family which includes eucalypts, paperbarks, bottlebrush, tea tree and lilly pilly. It is now considered an established invasive pest, with impacts such as effects on plant production and trade; the cost and efficacy of chemical control measures; the loss of street and amenity trees; the cost of tree removal and replacement of susceptible species already being observed.

Impact from myrtle rust has been recorded in a wide range of ecosystems including World Heritage Areas. Some of the anticipated longer-term impacts are now beginning to emerge and include loss of plant species, loss of biodiversity, reduced flowering and seed production, and the subsequent impact on plant regeneration, and ecosystem damage resulting in the loss of ecosystem functions such as climate regulation and carbon sequestration.[4,5]

Response to the initial incursion has been the subject of much discussion and provides an insight into how unclear responsibilities and accountabilities can determine the extent of the impact of such a threat.

A unique aspect of the Myrtle rust emergency response was the disjointed stages of action, with the response initially falling under national emergency management procedures for one week, then outside the national process and under the state process for a further two months, before falling again under the national emergency response program.[6] Shifting responsibilities meant surveillance levels fluctuated, as did community and public awareness and engagement.

The Myrtle rust incursion highlights the complexity of interactions between agencies at both Commonwealth and state level, and the need for both rapid and highly visible response activity in the early stages of detection. It also highlights the importance of available funds for immediate allocation.

[4] CRC70186 Final Report: Understanding myrtle rust epidemiology and host specificity to determine disease impact in Australia, Dr Geoff Pegg, Dr Suzy Perry, Dr Angus Carnegie, Dr Kylie Ireland and Dr Fiona Giblin, 30 May 2012, http://www.pbcrc.com.au/

[5] *Puccinia psidii* in Queensland, Australia: disease symptoms, distribution and impact, G. S. Pegg, F. R. Giblin, A. R. McTaggart, G. P. Guymer, H. Taylor, K. B. Ireland, R. G. Shivas and S. Perry, Plant Pathology (2013). doi: 10.1111/ppa.12173

[6] Emergency response to the incursion of an exotic myrataceous in Australia, Keynote paper APPS 2011, Angus J Carnegie and Kevin Cooper, Australasian Plant Pathol. (2001) 40;346-359

We must use experts

Australia's biosecurity reputation is the envy of the world, and is underpinned by Australia's own expertise in State and Federal agricultural and environmental departments, and research agencies.

In order to maintain effective preparedness for and response to incursions, our biosecurity effort must continue to be led by these experts. This concept should also extend to the biological qualifications and training of front line biosecurity staff whose role is to recognise and respond to biosecurity threats.

Investment in this capacity must be strengthened in the face of increasing biosecurity risks.

Continued collaboration and coordination with regional and international expertise will also increase knowledge, improve the quality of science, strengthen capacity and deliver improved biosecurity outcomes for Australia.

The benefits of regional collaboration in plant biosecurity RD&E are evident through the work of the Plant Biosecurity CRC. A specific example is the risk posed by tomato potato psyllid. The psyllid is a small pest that spreads a devastating disease of many plants. If established in Australia it would result in millions of dollars being lost from the tomato and potato sector. It was detected in New Zealand in 2006, and the Plant Biosecurity CRC is drawing on the expertise and experience of New Zealand to consider how to protect the Australian potato industry.

In a similar fashion, New Zealand is benefitting from Australia's expertise on myrtle rust, a disease that would wreak cultural and economic havoc should it impact on New Zealand's iconic Pohutukawa trees, and the Manuka forests that sustain New Zealand's honey industry.

We must work together

Australia's biosecurity shield must be a team effort, with collaboration and coordination across agencies and jurisdictions. It requires a clear policy and administrative framework with well-resourced structures and well understood responsibilities.

The current lack of capacity and clear articulation of responsibilities in the environmental area is of concern. This has led to a reliance on agriculturally-focussed organisations to lead responses when the optimal approach would see both environmental and agricultural expertise employed in a timely and effective manner.

Weeds are the most obvious example of this, and highlight the urgent need for coordination and prioritisation in both the environmental and agricultural space.

While weeds are considered invasive, and many impacting weed species have established in the environment, there is a gap in research and coverage by a national cost sharing agreement for response, in particular for new incursions of exotic weeds. The impact of weed incursions can be extensive and nationally significant.

Take the example of Red witchweed which causes an estimated $US7 billion of damage to grain crops in Africa each year and has cost the United States more than $US250 million in eradication from the Carolinas alone. Seeds remain viable in soil for up to 15 years and can be a contaminant of imported and exported grain and pasture seed or within soiled imported machinery.

In 2013 and 2014, Red witchweed was identified on a handful of sugar cane growing properties and a cattle property at Mackay, in Queensland. The detection of Red witchweed in Queensland has the potential to significantly impact market access for our commodity industries focussed on export.

Because weeds affecting production systems are not covered by the Emergency Plant Pest Response Deed (EPPRD), and weeds that specifically impact on production are also not covered in the National Environmental

Biosecurity Response Agreement (NEBRA), the impact on these individual businesses and livelihoods has been, and continues to be, significant. The lack of established and agreed arrangements for detections of significant exotic weed incursions that impact production industries has caused unwarranted delay in mobilising an effective nationally cost-shared eradication response that is arguably in the national interest.

While Australia continues to be in the favourable position of being free from many of the world's most serious plant pests, this freedom will only be maintained if the biosecurity system continues to improve and remain robust through active research. **Well-resourced and integrated biosecurity research and development is essential**.

The nature of biosecurity threats means that sustained and coordinated RD&E is essential at every stage – before pests reach Australian shores, at our borders, and then across the length and breadth of Australia. Without science to support effective preparedness, response, containment and management, plant pests have the potential to devastate Australia's biodiversity.

A fully functioning biosecurity shield requires significant and enduring resources, including sustained investment in RD&E. Current resourcing of biosecurity RD&E is low and presents a risk to the long-term effectiveness of Australia's biosecurity shield.

Plant pathology and entomology are two key disciplines in plant biosecurity RD&E and the need to invest in capacity and capability in this area alone is clear. The age profile of those employed in both disciplines has shifted sharply towards an older profile over the past seven years. The number of plant pathologists now in the over 55 age bracket has increased, with lower numbers now evident in the under 35 age bracket. There is a similar result for entomology.

These shifting profiles are of concern when seen alongside service expectations. Of the 275 currently employed respondents, 28 per cent will retire within the next 10 years, 40 per cent within 15 years and a further 12 per cent will be lost due to other factors. Therefore over 50 per cent of current capacity will require replacement within 15 years, just to maintain the status quo.[7]

Nationally coordinated RD&E will also become increasingly important in a rapidly changing biosecurity environment. Currently, two national vehicles are fulfilling this role in plant biosecurity – CSIRO's Biosecurity Flagship more broadly, and the Plant Biosecurity CRC. Funding for the latter will cease in 2018. Given biosecurity is a challenge Australia will face forever, a more sustainable approach to funding its RD&E is required.

The need for cross-sectoral collaboration and coordination of RD&E is nowhere more evident than in the preparation for incursion of the devastating Varroa mite that has destroyed honey bee populations worldwide.

Pollination services to Australian horticulture and agriculture were valued at $A1.7 billion a year in 1999-2000 for the 35 honey bee dependent crops. Honey bees also offer an immeasurable contribution to floral biodiversity and conservation. It is generally accepted that it is only a matter of time before the Varroa mite is detected and spreads through Australia's healthy and productive honey bees.

In Europe and the US, 95-100 per cent of unmanaged hives disappeared within three to four years of Varroa mite infestation.

Australia's preparation for inclusion and establishment of Varroa mite is essential to the ongoing sustainability of honey-bee dependent crop industries, as well as Australia's natural environment. A 2011 DAFF (Department of Agriculture, Fisheries and Forestry) document entitled "A honey bee industry and pollination continuity strategy should Varroa become established in Australia" lists actions to be taken in order to prepare the industry. PHA (Plant Health Australia), RIRDC (Rural Industries Research and Development Corporation), HAL (Horticulture Australia Limited), DAFF, HortResearch, CSIRO, the Almond Board of Australia and the Australian Honey Bee Industry Council are making arrangements to prepare broader industry and government.

7 Plant Pathology and Entomology Capability Study 2012. Commissioned by APPS and Australian Entomological Society.

Varroa mite's detection, and industry's response and adaption to minimise its impact, will depend on the level of preparedness and willingness to co-ordinate and resource effective and reliable control programs. A singular approach will not prove effective. Rather, collaboration across industry around a range of programs will be necessary. Additional to the funding and activities currently dedicated to Varroa mite, the Australian Government needs to invest further in facilitating industry access to research and training resources through an organisation such as the Plant Biosecurity CRC.

The National Plant Biosecurity Strategy provides a sound basis for collaboration and coordination across the biosecurity spectrum. The recently developed National Environment and Community Biosecurity RD&E Strategy sits alongside this.

While together they plan for nationally coordinated biosecurity RD&E supporting management across our borders, authorised and supported leadership is also essential to delivery. The National RD&E Framework must provide this authority in order to support the maintenance of Australia's natural environment in the face of increasing biosecurity risk into the future.