AUSTRALASIAN PLANT PATHOLOGY SOCIETY INC.

Plant Health...Is Earth's Wealth

The Australasian Plant Pathology Society Inc. (APPS) Submission to the Quarantine and Biosecurity Review

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The Australasian Plant Pathology Society Inc. (Box 1) is the peak professional association for Australasian plant pathologists. Our submission to this Review focuses on plant pathology aspects of quarantine and biosecurity (Appendix 1). The Society is making the submission in recognition of the vital importance of maintaining and improving Australia's quarantine and biosecurity frameworks and outcomes. We commend the support by government and industry, and the efforts of government officers who work in quarantine and biosecurity. This submission does not represent an 'official' position of the APPS. The APPS has compiled the submission based on the inputs of individual members who decided to contribute. The APPS does not claim that the comments and recommendations reflect the views of all members or their employers. The submission focuses on:

1. *The rationale for investment in plant pathology research, regulation and dialogue for enhancement of quarantine and biosecurity.*
2. *Key issues and recommendations for improving the effectiveness and integrity of Australia's management and reporting of plant pathogen impacts in relation to quarantine and biosecurity*.

Box 1. The Australasian Plant Pathology Society Inc.

(ABN 97 339 145 365)
http://www.australasianplantpathologysociety.org.au/

Established in 1969, with roots extending back to the 19th century, the Australasian Plant Pathology Society (APPS) Inc. has *c.* 440 members. APPS members are professionals in plant disease and biosecurity research and development, diagnostics, farmer extension, tertiary education, crop protection services and government/public administration, with a common interest in plant pathogens and their management. The Society promotes independent dialogue, networking and scientifically rigorous reporting for the plant pathology sciences in Australasia at national, regional and international levels through:

(i) Information and discussion forums for members, a membership directory and job vacancy advertisements through the Australasian Plant Pathology Society business office and website (http://www.australasianplantpathologysociety.org.au/),
(ii) Organisation of the biennial Australasian Plant Pathology Conference and the regional hosting of International Conferences, workshops and seminars which review and report key issues in plant pathology research and development ,
(iii) Publication of the internationally recognised journals of the APPS - *Australasian Plant Pathology* and *Australasian Plant Disease Notes* through CSIRO publishing and
(iv) Associate membership of Plant Health Australia, the International Society for Plant Pathology (http://www.isppweb.org/) (representing plant pathologists world-wide), the Asian Association of Societies for Plant Pathology, and *inter alia* the World Directory of Plant Pathologists (http://www.scisoc.org/ispp/world%5Fdirectory/), the International Union of Microbiology Societies (IUMS) and the International Union of Biological Sciences (IUBS).

1. *The rationale and breadth of Australia's investment in plant pathology research, regulation and dialogue for enhancing quarantine and biosecurity.*

While Australia's development is broad-based, and we enjoy a high level of prosperity compared to many other countries, agriculture remains the cornerstone of our economy. Direct losses, contamination and biosecurity threats from plant disease seriously affect crop productivity and market access. Costs to the economy can also be extremely high. For example during1998-2000, public expenditure to eradicate just two disease incursions (panama disease of banana and sugar cane smut) exceeded $548 million (Holland *et al*., 2002). Conversely, Australian investment in disease control and quarantine supervision to meet Japanese area-freedom requirements for black spot of citrus add substantially to costs, but also ensures access to an important market.

Australia should maintain and extend quarantine and biosecurity preparedness through (a) effective and responsible plant disease management strategies, training and awareness raising and quarantine services and (b) international engagement to foster standardization and improvement of phytosanitary measures. This will strengthen our reputation as:

(i) a supplier of safe food and fibre, contributing to economic prosperity and world food supplies.
(ii) a champion for enhanced compliance and harmonization of phytosanitary measures as international obligations under the Sanitary and Phytosanitary Agreement of the World Trade Organisation
(iii) a leader in development assistance in plant health management and biosecurity through the AusAID and ACIAR programs, and United National Agency support and
(iv) an advocate for scientific rigor and enhanced networking and knowledge dissemination in plant pathology and biosecurity through peer-reviewed publication, awareness raising and participation in scientific organisations and forums.

2 *Key issues and recommendations for improving the effectiveness and integrity of Australia's management and reporting of plant diseases in relation to quarantine and biosecurity.*

	Issue	**Recommendations**
2.1.	Post-entry quarantine monitoring for large volume imports/throughputs needs to be strengthened.	
Resource and personnel constraints are hampering capabilities for adequately monitoring quarantine risks associated with large volume imports (such as bare-rooted nursery stock and cuttings) in post-entry quarantine (PEQ). Increased resourcing and data collection (under 2.4.) could assist AQIS personnel to focus resources on highest risk imports. The Operational Science Program in AQIS needs secure funding independent of client programs within AQIS and additional 'appropriately-qualified staff to adequately assess plant disease threats under		(a) Resources and operational support and mechanisms for cross-agency networking and off-shore certification should be reviewed to ensure that adequate quarantine protection is maintained as trade volumes increase. (b) Clarify and strengthen personnel mandates, review and enhance operational resources, and encourage and facilitate better desk-level networking between AQIS, BA and

'Increased Quarantine Intervention' (IQI) and the growth in trade.	other agency personnel to improve capabilities for addressing biosecurity threats during post-entry quarantine and post-border surveillance.
2.2.	Legislative changes and innovative approaches are needed to strengthen AQIS involvement in post-border surveillance
Currently AQIS personnel do not have adequate powers for dealing with pathogens that are gazetted as prohibited imports within only certain states and their role in post-border surveillance could be strengthened. For example, seeds that may be prohibited into WA may be permitted entry to Australia by the Commonwealth. While AQIS staff at International Airports may confiscate seed or honey on the basis of state regulations, they are not legally authorised to do so. Responsibilities for handling Post-Quarantine Detections can be problematic as both the Commonwealth and the State agencies can disagree on when and where detections, and response to detections, reside with the Commonwealth and the State.	Resources, personnel and collaborative agreements with all stakeholders should be reviewed, to strengthen involvement and clarify roles of quarantine and biosecurity personnel in post-border surveillance.
2.3.	Australia's preparedness, networking and capabilities for accurate diagnosis and assessment of current and potential plant disease risks are hampered by inadequate dialogue and current policy approaches.
As taxonomic expertise for micro-organisms world-wide is limited, it is also essential that Australia contributes adequately to global efforts in classification and identification. Australian scientists need secure access to plant pathogens on the 'target list' and samples of unidentified micro-organisms in order to classify them and develop diagnostic protocols and standards. Currently, import permits for cultures, irradiated plant pathogen specimens and DNA of microorganisms are being refused. As a consequence, research and development that is essential for completing taxonomic studies, or achieving adequate preparedness for detection and monitoring of plant disease threats to agriculture and the environment are being curtailed or forced off-shore.	Urgent review and dialogue is needed to (i) improve the processes for assessment and monitoring (ii) enable importation of microbial specimens, cultures and DNA for defined use in approved facilities for taxonomic research, provision of identification services and the development of diagnostic tools.

<table>
<tr><td>2.4.</td><td colspan="2">Insufficient use is being made of disease interceptions and routine post-entry quarantine (PEQ) inspections to gather data and disease specimens that could enhance preparedness and risk assessment.</td></tr>
<tr><td colspan="2">It is essential that Australia strengthen knowledge of the types and levels of risk associated with different types and sources of imports, and enhance reference material accumulation and data on quarantine interceptions and threats. Funding and resource constraints on AQIS personnel have reduced data collection, sampling and identification of plant disease and latent infections during inspections and PEQ. This has reduced preparedness, risk assessment and diagnostic capabilities. Restrictions on communication between AQIS and Biosecurity Australia personnel have weakened networking and agency synergies.</td><td>Operational staff in AQIS should be empowered, trained and resourced (i) to undertake more routine sampling, accurate identification and specimen curation, and data-sharing (at no cost to the importer) and (ii) to liaise or link with other experts as necessary to complete or confirm identifications and strengthen national capabilities in microbial taxonomy and biosecurity preparedness. Inter-agency and industry agreements should be adopted, and networking encouraged, to facilitate these activities.</td></tr>
<tr><td>2.5.</td><td colspan="2">Forward planning, network support and on-going resource allocation are needed to strengthen research ad development, and sustain human resource and laboratory capacity for plant disease risk and biosecurity preparedness.</td></tr>
<tr><td colspan="2">The aging workforce of plant protection professionals threatens Australia's future capability for maintaining adequate quarantine and biosecurity standards.

Shortages of personnel in AQIS and BA with knowledge and backgrounds in plant pathology, entomology and other crop protection and biosecurity sciences may be hampering understanding, responsiveness and decision-making in relation to import and market access approvals.

To enhance market access and biosecurity for Australian plant industries, Plant Health Australia, the CRC for Biosecurity and Federal, State and Territory agencies are working well with industry to establish appropriate planning and implementation frameworks and co-ordinate technology development and strengthen linkages under AUSBIOSEC.</td><td>(a) Proactive recruitment, tailored tertiary training and appropriate research funding and resources are needed to develop career paths for quarantine and biosecurity.

(b) Greater emphasis needs to be placed on qualifications and refresher /postgraduate training in crop protection and biosecurity sciences.

(c) Awareness of the broader vision and operational links of AUSBIOSEC need to be built with the wider tertiary sector and professional societies to optimise synergies and networking. Ongoing commitment by government to linking quarantine and plant biosecurity activities with the broader science-farming-community continuum is essential.

(d) Strengthening phytosanitary measures could form a larger core contribution to engagement of Australian agencies in development assistance, providing technical assistance and capacity building support for developing countries who are signatories to the International Plant Protection Convention (IPPC).</td></tr>
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A detailed review submission is attached.

Detailed Submission from the Australasian Plant Pathology Society Inc. (APPS) to the Quarantine and Biosecurity Review

1. *The rationale and breadth of Australia's investment in plant pathology research, regulation and dialogue for enhancing quarantine and biosecurity.*

Solutions to the problems of plant disease come from many quarters. Exclusion of the pathogen through plant quarantine is the first line of defense and deserves more resources (Strange and Scott, 2005[1]).

Plant health is Earth's wealth. Plant pathogens destroy, contaminate or impede trade of at least 10 % of world food production, eroding both global food security, and farmer incomes (Strange and Scott, 2005). While Australia's development is broad-based, and we enjoy a high level of prosperity compared to many other countries, agriculture remains the cornerstone of our economy. Direct losses, contamination and biosecurity threats from plant disease seriously affect crop productivity and market access. Costs to the economy can also be extremely high. For example, public expenditure to eradicate two disease incursions (panama disease of banana and sugar cane smut) in 1998-2000 exceeded $548 million (Holland *et al*., 2002). Conversely, Australian investment in disease control and quarantine supervision to meet Japanese quarantine requirements for black spot of citrus adds substantially to costs, but also ensures access for the Australian citrus industry to an important market. Effective and responsible plant disease management strategies and quarantine services are essential. They underpin Australia's reputation as a supplier of safe food and fibre, and agriculture's contributions to economic prosperity and the world food supplies (Holland *et al.,* 2002[2])

Australia has been preeminent in 'agricultural altruism'. Currently, Australia produces enough food for more than 60 million people[3]. If the losses and contamination resulting from plant disease were eliminated, supplies might be sufficient for an additional 6 to 12 million people, and concurrently improve profitability and the efficiency of resource use.

Australia also provides development assistance, training and technical expertise for international research to reduce plant disease losses in developing countries, boosting food security and trade opportunities (Pearce *et al.,* 2006; ACIAR, 2008[4]).

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1 Strange, R.N and Scott, P.R. Plant Disease: A threat to global food security. *Annual Review of Phytopathology* 43: 83-116.

2 Holland, S., Hamilton, J., Fisher, B and Cole, A. (2005). Review of Plant Health. *Evaluation Report 9*. Department of Natural Resources & Environment, Melbourne August, 2005. 32 pp.

3 http://www.nutritionaustralia.org/food_facts/faq/sustainability_faq.asp

4 Pearce, D., Monck, M., Chadwick, K and Corbishley, J. 2006. Benefits to Australia from ACIAR-funded research. Impact Assessment Series Report No. 39, September 2006. ACIAR, Canberra, 80pp. http://www.aciar.gov.au/publication/IAS39

ACIAR, 2008. Australian Centre for International Agricultural Research http://www.aciar.gov.au/home.

Risk reduction and biosecurity require global effort. The professionals who contribute to Australian plant health system (Moran and Muirhead, 2002[5]; DAFF, 2008b[6]; Magarey, 2007) aim for international best practice in use of expert knowledge, investment in research and development and tertiary training, and in the maintenance of fair and effective regulatory and quarantine systems, to reduce plant disease risks and protect crops and amenity landscapes.

Australia promotes international accord and developing country progress in plant health management through dialogue and standard-setting under the International Plant Protection Convention and obligations under the Sanitary and Phytosanitary Agreement of the World Trade Organization (DAFF, 2008a[7]).

2. *Key issues and recommendations for improving the effectiveness and integrity of Australia's management and reporting of plant diseases in relation to quarantine and biosecurity.*

Key elements of preparedness and protection include (i) the ability to promptly and accurately inspect imported material and suspected incursions, (ii) performing necessary diagnostic and confirmation procedures, (iii) data collection, decision making and action to clear or reject consignments and deal with suspected incursions (iv) human resource management and training and (v) publication, awareness raising and international dialogue.

TOR 1. Current arrangements to achieve Australia's ALOP

2.1. Post-entry quarantine monitoring for large volume imports/throughputs need to be strengthened.

A key concern is that current processes for the allocation of import permits do not allow adequate discrimination of the risk associated with different end-users.

2.1.1. *Live plants are the greatest risk for the introduction of exotic plant disease*. Historically, post-entry quarantine (PEQ) evolved to manage small amounts of trade in germplasm for plant related industries. Now, (and this trend is increasingly exponentially) large volumes of live plants (i.e. hundreds of thousands if not millions) are traded into Australia and go straight for sale in retail nurseries and supermarkets without any intervening period in post entry plant quarantine in the case of many tissue cultured species.

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5 Moran, J and Murhead, I. 2002. Assessment of the current status of the human resources involved in diagnostics for plant insect and disease. PHA Canberra, 25 pp. http://www.planthealthaustralia.com.au/project_documents/uploads/PHA_diagnostics_report.pdf

6 DAFF, 2008b. Plant Health. http://www.daff.gov.au/animal-plant-health/plant
Magarey, R. 2007. APPS: stepping into the future – how far can we go? *Australasian Plant Pathology* 36: 503-509.

7 DAFF, 2008a. SPS Capacity building program. http://www.daff.gov.au/animal-plant-health/plant/sps and Australian International Plant Protection Convention Secretariat http://www.daff.gov.au/animal-plant-health/plant/ippc-secretariat

2.1.2. *Increasing volumes of 'medium risk' plants are a threat to ALOP.* Without increases in resources and training for AQIS personnel, the volumes of nursery plant imports and wider use of private quarantine facilities represent a considerably under-estimated threat to Australia's capacity to maintain current ALOP standards. 'Medium risk' plants for the retail trade (e.g. 'happy plants') receive only visual inspection, do not generally require a phytosanitary certificate and can be partially released before pathogen identifications are complete[8]. Risks from maintaining current inspection and certification processes include inadequate capacity/time to check for latent infections or inoculum of exotic pathogens, such as the cause of sudden oak death (which spread through the nursery trade in the USA (Frankel, 2008[9])).

2.1.3. *Improve auditing, strengthen disincentives and foster improvements.* There is a need for (i) improved auditing, particularly of overseas treatments and certifications, (ii) review and re-enforcement of 'disincentives' for compliance breaches identified through the auditing processes and (iii) strategies to foster improvements.

2.1.4. *Possible solutions.* To maintain ALOP within resource and time constraints, imported plants should be required to come from AQIS accredited sources, with phytosanitary inspection and approval mandatory. Under our international obligation for SPS capacity building Australia could be more pro-active in improving rigor and reliability of overseas practice and certification of quarantine treatments. An example is the Australian government support for training and practitioner certification under AQIS Australian Fumigation Accreditation Scheme (AFAS), which 'reduces the risk of quarantine breaches resulting from ineffective fumigations performed overseas.

Longer term options could include: more stringent restrictions on the nursery trade; better off-shore screening, increased science and personnel capacity in AQIS especially through the Operational Science Program and the Nursery Stock unit; greater use of generic plant pathogen molecular tests on introduced plants, enhanced pre-shipment monitoring and a QGAP[10] certification of imports. Implementation of the agreed responses to the Radcliffe Review[11] could help resolve many of these issues.

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[8] Plants (other than tissue cultures) are grown for 3 months in post entry quarantine and inspected after 3 months of growth for disease and then released. If disease is detected then LEGALLY only the visually affected plants can be destroyed or re-exported, so potentially latent disease affected plants could be released. Often importers will elect to have affected plants destroyed, and the balance released rather than pay for an identification; there is a real risk that unknown viruses with unknown consequences and host range are released. Tissue culture plants are inspected and released without PEQ; the assumption being that in the absence of symptoms, they are disease free; however there are cases reported elsewhere of viruses being transmitted in tissue culture plantlets.

[9] Frankel, S.J. 2008. Sudden oak death and *Phytophthora ramorum* in the USA: a management challenge. *Australasian Plant Pathology*, 37: 19-25.

[10] QGAP could be an Australian championed certification process that combined quarantine (Q) certification with Good Agricultural Practice (GAP) certification.

[11] J.C. Radcliffe, A. Catley, R.A. Fischer, K.G. Perrett and K.P. Sheridan July 2003. *Review of Plant Research Biosecurity Protocols* Office of the Chief Plant Protection Officer, Australian Government Department of Agriculture, Fisheries and Forestry, Canberra. 34 pp. http://www.daff.gov.au/__data/assets/pdf_file/0006/146913/review.pdf
Anon. 2003. National Response to the review by Radcliffe *et al* "*Review of Plant Research Biosecurity Protocols*" http://www.daff.gov.au/__data/assets/pdf_file/0004/146911/response.pdf

Recommendation 2.1. (a) Resources and operational support and mechanisms for cross-agency networking and off-shore certification should be reviewed, to ensure that Appropriate Levels of Protection are maintained as trade volumes increase.

Recommendation 2.1. (b) Clarify and strengthen personnel mandates, review and enhance operational resources, and encourage and facilitate better desk-level networking between AQIS, BA and other agency personnel to improve capabilities for addressing biosecurity threats during post-entry quarantine and post-border surveillance.

2.2. *Innovative approaches are needed to strengthen AQIS involvement in post-border surveillance.*

2.2.1. *The legislative framework.* The current roles and responsibilities of the States/ Territories and Commonwealth need clarifying: AQIS inspectors are not gazetted under State/Territory laws to deal with State/Territory issues at the international border. For example, seeds that may be prohibited into WA may be permitted entry to Australia by the Commonwealth. While AQIS staff at International Airports may confiscate seed or honey on the basis of state regulations, they are not legally authorised to do so.

Responsibilities for handling Post-Quarantine Detections can be problematic as both the Commonwealth and the State agencies can disagree and waste time and resources deciding at what point detections, and response to detections, reside with the Commonwealth, and at what point responsibilities reside with the State. This needs to be resolved – with AQIS responsible for post-border surveillance at points of entry and around border control points (such as post-entry quarantine facilities).

Import permits should be able to be used to restrict regional access to products based on biosecurity concerns. Provision for this measure would be an important addition to maintaining biosecurity while improving market access. More legislative support is needed to clarify and enforce movement restrictions to protect against exotic pesticide resistant strains of insects and exotic strains of pathogens for species that are regionally restricted in Australia. A review of current approaches is needed to clarify how quarantine risks of new strains of endemic pathogens should be handled.

2.2.2. *GMOs*. Communication needs to be improved between AQIS and the Office of the Gene Technology Regulator (OGTR), in dealing with restricted seed that is also genetically modified. Importers can be confused bout the permit requirements for OGTR (eg. PC 3) and AQIS for post-entry quarantine (eg. Class 6.3 facility) and assume that facilities for one are automatically approved for the other agency. Some AQIS staff rightly consider that it is the importers responsibility to ensure that they abide by the regulations imposed by the OGTR. Other AQIS staff may go beyond their strict area of responsibility, ensuring that the requirements of the OGTR are

being met by the importer, in addition to compliance with the import conditions of AQIS. Protocols need to be put in place to ensure that when a genetically modified organism subject to a 'dealing' by the OGTR is grown in PEQ, AQIS then informs the OGTR about the import so that OGTR may also ensure that its conditions are met.

Recommendation 2.2. Resources, personnel and collaborative agreements with all stakeholders should be reviewed, to strengthen involvement and clarify roles of quarantine and biosecurity personnel in post-border surveillance.

TOR 3. Resourcing levels and systems and their alignment with risk in delivering requisite services.

2.3. Australia's preparedness, networking and capabilities for accurate diagnosis and assessment of current and potential plant disease risks are hampered by inadequate dialogue and current policy approaches.

2.3.1. *Restrictions on micro-organisms*. Restrictions on importation of microbial cultures, disease specimens, herbarium and reference material, and DNA of exotic, and unidentified and potentially exotic organisms, are impeding development of diagnostic protocols, taxonomic research and disease identification.

2.3.2. *Anomolies*. One anomaly is that plant DNA does not require a permit, yet fungal DNA does. Importation of certain fungal species is permitted, provided they are labelled or are recognisable to an AQIS officer, yet the DNA of those species would not be permitted without an import permit! But the DNA of an organism poses no risk in itself.

2.3.3. *Minimising costs and wasted effort*. There is also a need to make import application and risk assessment procedures a more transparent process, both in terms of how decisions are made regarding particular microbial species, and how permit applications are costed. It has been the experience of many plant pathologists that attempts to obtain prior information as to what material is likely to be granted a permit and what is not, to avoid costs and time wasted in filing applications that are unlikely to be granted, are usually unsuccessful. The response from AQIS, to whom the application is to be submitted, has been that a decision will be made by BA after the application as been made. Yet intending importers are not permitted to contact BA to make enquiries. A web-based listing of approved and rejected applications, which detailed the proposed import (named to species/country of origin) and reasons for rejections would provide potential applicants with guidance for decision-making.

2.3.4. *Preparedness is constrained by policy*. It is counter productive to efforts to detect and respond to exotic pathogens when BA will not recommend approval[12] of

[12] At present, Biosecurity Australia are not recommending importation of plant pathogen material as there is no nationally agreed (Commonwealth, States, Industry) policy in place. Plant Health

the importation of reference collections (vis. herbarium specimens and pathogen cultures) for research with appropriate safeguards in AQIS-approved premises, or positive DNA controls for diagnostic tests. For example Australian recipients of funding from the Office of the Chief Plant Protection Officer (OCPPO) have been refused permits to import gamma irradiated herbarium specimens, cultures and DNA samples. The purpose of importing such material is to have access to diagnostic material in the event of an incursion, and to undertake taxonomic and genetic diversity studies. It is a waste of government funds if there is no concomitant secure repository within Australia for reference samples and positive DNA controls. These restrictions are making it near impossible to undertake essential preparatory research for detection of exotic organisms and are actually reducing Australia's biosecurity.

Detailed examples of this type of problem and its consequences are outlined in the attached Appendix 2.

It is a critical concern that large importations of plants for retail sale seem to get easier clearance (see 2.1.1.) than the microbial diagnostic materials required for essential scientific research related to improving Australia's biosecurity preparedness.

Recommendation 2.3. Urgent review and dialogue is needed to (i) improve the processes for assessment and monitoring (ii) enable importation of microbial specimens, cultures and DNA for defined use in approved facilities for taxonomic research, provision of identification services and the development of diagnostic tools.

2.4. Insufficient use is being made of disease interceptions and routine post-entry quarantine (PEQ) inspections to gather data and disease specimens that could enhance preparedness and risk assessment.

2.4.1. *More extensive data collection informs risk assessment.* The greatest plant biosecurity risks for Australia's plant industries and the environment are from live plant imports and (to a lesser extent) the fresh produce trade. Resources would be best deployed to focus on adjusting quarantine measures for those risks to maintain ALOP, and in collecting more data at the border (on types and extent of risks), to inform risk assessment processes and to audit and foster improvement of the pre-border information and treatments. Special strategies may be needed to manage disease introduction risks associated with deliberate smuggling by arriving travellers of small quantities of plant propagating materials such as budwood. Strategies to deter smugglers include the increase in penalties associated with these crimes, concerted efforts to prosecute alleged offenders and the provision of subsidies for industry and individuals to reduce the costs associated with importing live plant materially legitimately through post entry quarantine.

Committee and Plant Health Australia have agreed to consult with relevant parties to develop a national policy but this has not yet occurred.

2.4.2. *Cost-recovery policies are hampering data collection.* At present, cost-recovery policy limits the collection of data that could improve monitoring of pests and diseases at the border because importers are often not prepared to pay the costs of these services. More accurate and detailed data collection (at no cost to importers) would help inform and develop risk assessment processes. Disease identifications are often only performed to the level required to make a decision on treatments for the commodity. Dedicated funding to the AQIS Operational Science Program to increase the diagnostic and taxonomic capacity, together with better coordination with BA, State agencies and the National Collections of Plant Pathogens, should lead to the collection and analysis of useful data targeted to current risk analyses or review of risk analyses. Funding should also be made available to adequately curate specimens of intercepted pathogens, and to obtain species-level classification and advice from specialists in external agencies.

2.4.3. *Jurisdictional and institutional arrangements.* There is a need to strengthen the interaction between BA and AQIS, particularly through the Operational Science Program within AQIS. This is in order to target research and data collection at the border, to assist BA in policy formulation and determination, and to enhance biosecurity science awareness of their personnel.

Although the current approach of separate institutions provides some independence for the policy arm, there are major deficiencies with, and even some prohibitions on, communication between the agencies, with losses in synergy and efficiency. Merging BA into AQIS, in a similar structure to MAFF in NZ may improve some of these communication issues. A merger of the two agencies could follow the recommendations of the Nairn Review (Recommendation 10).

There are important roles for the state government agencies in risk assessment research and monitoring of post-border incursions, and for AQIS through the Operational Science Program in monitoring border incursions.

2.4.4. *Strengthen independent auditing.* The auditing arrangements for AQIS need to be strengthened and independence improved. There is always the risk that officers that deal with importers on a daily basis may become 'too close' to the importers and lose their sense of independence. Independence could be improved by ensuring that all audits occur through an independent unit outside AQIS. For example, all audits of Quarantine Approved Premises (QAP) could only be undertaken by certified officers in a dedicated and independent QAP auditing unit, or similarly certified private sector personnel - at present this does not occur. Auditors need to be well trained and expertise maintained in the QAP unit. Current staff rotation policies in AQIS lead to the frequent loss of experience and expertise in this area.

Recommendation 2.4. Operational staff in AQIS should be empowered, trained and resourced (i) to undertake more routine sampling, accurate identification and specimen curation, and data-sharing (at no cost to the importer) and (ii) to liaise or link with other experts as necessary to complete or confirm identifications and strengthen national capabilities in microbial taxonomy and biosecurity preparedness. Inter-agency and industry agreements should be adopted, and networking encouraged, to facilitate and enhance these activities.

TOR 2. ***Public communication, consultation and research and review processes***

2.5. Forward planning, network support and on-going resource allocation are needed to strengthen research ad development, and sustain human resource and laboratory capacity for plant disease risk and biosecurity preparedness.

2.5.1. *Forward planning for research and resources.* To enhance market access and biosecurity for Australian plant industries, Plant Health Australia, the CRC for Biosecurity and Federal, State and Territory agencies are all working well with industry to establish planning and implementation frameworks and to co-ordinate technology development and strengthen linkages under AUSBIOSEC.

2.5.2. *Loss of expertise - Culture, efficiency and resourcing.* The workforce of plant protection professionals is aging, and this poses a threat to Australia's future capability for maintaining adequate quarantine and biosecurity standards (Moran and Muirhead, 2002). Shortages of personnel in AQIS and BA with knowledge and backgrounds in plant pathology, entomology and other crop protection and biosecurity sciences may be hampering understanding, responsiveness and decision making in relation to import and market access approvals. Recent recruitment drives by AQIS have focussed on customer service skills at the expense of biosecurity/technical skills. While 'bed-side manner' is as important as it is for health sector workers, AQIS staff should have tertiary-level qualifications in disciplines related to biosecurity sciences. Taxonomic skills are also paramount, and staff need to be recruited and trained with a range of taxonomic ability for fungi, nematodes, viruses and bacteria.

2.5.3. *Tertiary training*. Unfortunately universities often have not adequately adapted their teaching programs to offer the specialist training for biosecurity in undergraduate degrees, and access to instruction in basics such as plant pathology or entomology is declining. Increasingly, specialisation in a plant health discipline requires additional post-graduate training. The deficiencies in under-graduate training will be addressed through initiatives supported by Plant Health Australia and the CRC for Plant Biosecurity, but there needs to be broader access, and refresher training in basic diagnostic sciences.

2.5.4. *Agency structures.* There needs to be a much stronger Operational Science Program in AQIS and inter-agency linkages, in order to provide training to staff in other programs and to run appropriate diagnostic facilities for imports and exports. Potentially, the OSP and the Northern Australia Quarantine Survey (NAQS) program could be combined to provide a stronger and more unified science unit within AQIS. Links with the CRC for Biosecurity, tertiary training institutions and professional associations such as the APPS, should be fostered, to enhance refresher training and skills enhancement.

TOR 4. Governance and Institutional arrangements to deliver biosecurity quarantine and export certification services.

2.5.5. *Access to diagnostic services.* Wherever there is an international border, AQIS needs ready access to a responsive front-line diagnostic laboratory staffed with trained personnel. AQIS also needs to ensure that appropriate arrangements and resources are in place to optimally utilise the services of specialist taxonomic and identity validation services provided by other agencies. In Australia, diagnostic capacity in plant pathogens largely lies in State agencies and Universities.

2.5.6. *Enhancing access and capacity to diagnostic labs.* As part of a cooperative all-of-government approach to managing potential disease incursions, AQIS needs access to a *minimum* of one high level diagnostic laboratory (QC3 level) in all of the state and territory capitals. There needs to be close cooperation between Commonwealth and State/Territory agencies to ensure that these facilities and co-opted personnel are available for incursion responses.

2.5.7. *Research and development.* While support for the CRC for plant Biosecurity has been significant (> $30 million per annum including in-kind), global efforts in research and development to improve quarantine and biosecurity science and diagnostics have not kept pace with the increase in trade and the increased risks of plant disease incursions. Australia is still lagging in comparison to global benchmarking of the proportion of GDP that should be allocated to development assistance. An injection of more development assistance resources for biosecurity related research and development could boost gains for both Australia and developing countries. Innovative options are also needed to enable more off-shore high-level research and consultation in biosecurity sciences and quarantine threats.

2.5.8. *AQIS needs to be more proactive in R & D collaboration.* The overarching R&D framework of the National Plant Health Strategy[13] within AUSBIOSEC will significantly enhance identification of gaps and priority setting for research across the biosecurity continuum. An important opportunity is for AQIS to be more pro-active and make use of existing structures (such as the CRC) in identifying gaps, proposing research directions and enhancing dialogue with BA, Plant Health Australia, Australia's development assistance program, and other stake-holders. AQIS should be more involved in national priority setting and collaboration for research and development (e.g. of specific diagnostic tests, off-shore surveys), and the OSP program should be more involved national collaborative activities. The strengthening of links between science staff of AQIS and BA and research agencies (State Departments, Universities, CSIRO) and industry will help them to identify and target research questions and define research initiatives that improve Australia's biosecurity.

2.5.9. *Are arrangements for Australia's export inspection and certification effective?* No, there has been a serious erosion of capacity for 'science based decision-making'. The inspection and certification services are no longer adequately supported by the AQIS Operational Science Program (OSP), and hence decisions are often made by

[13] National Plant Health Strategy: http://www.planthealthaustralia.com.au/site/National_Plant_Health_Strategy_-_Background.asp

non-science trained staff within AQIS. Contaminant insects or pathogens are sent for identification to external agencies on an *ad hoc* basis by staff in the Exports Program. Scientific advice and training is no longer provided to staff within the exports program, other than on full cost recovery or when funding is provided.

There as also been a decline in institutional knowledge of who can undertake particular mandatory inspections and certification, and how to get them organised. People trying to export goods can get passed from 'pillar to post', and become very frustrated trying to obtain the necessary requirements for the declaration. Often the AQIS export staff are unaware of who is competent to undertake the tests required for certification, or even whether such tests are possible. (This will be partly addressed by the National Diagnostic Network.) Difficulties encountered by Australian exporters contrasts sharply with the web-based services and electronic manuals offered to US exporters and importers on the USAID APHIS website.

Australian government support in pest risk assessment and capacity building, particularly in the ASEAN region, has helped improve science-base decision making in partner countries, but a sustained, long-term effort is needed, here, and overseas.

2.5.10. *Are the arrangements for incursions with a principally environmental impact appropriate?* If incursions of 'environmental' plant pathogens occurred or spread into National Parks, the consuming public would be very concerned but, the current Park management policy is not to intervene against pests and diseases in National Parks, regardless of the threats these pests and diseases pose to the park ecosystems or to those in other areas in Australia. This may not necessarily be AQIS' responsibility but one of the responsible agencies needs to liaise with DEWHA and other relevant parties, to develop appropriate contingency plans for key pathogen threats *before* such incursions occur. AUSBIOSEC will progress planning responses in this area.

Recommendation 2.5. (a) Proactive recruitment, tailored tertiary training and appropriate research funding and resources are needed to develop career paths for quarantine and biosecurity.

Recommendation 2.5. (b) Greater emphasis needs to be placed on qualifications and refresher /postgraduate training in crop protection and biosecurity sciences.

Recommendation 2.5. (c) Awareness of the broader vision and operational links of AUSBIOSEC need to be built with the wider tertiary sector and professional societies to optimise synergies and networking. Ongoing commitment by government to linking quarantine and plant biosecurity activities with the broader science-farming-community continuum is essential.

Recommendation 2.5. (d) Strengthening phytosanitary measures could form a larger core contribution to engagement of Australian agencies in development assistance, providing technical assistance and capacity building support for developing countries who are signatories to the International Plant Protection Convention (IPPC).

Appendix 1. Key elements contributing to the effectiveness and integrity of Australia's management and reporting of plant diseases.

Climate, environment and globalization. Globalisation and Climate Change, and the increasing movement of people, livestock and plant products have increased the risks and costs of exotic disease incursions.

Research and Development. Australia's plant health and biosecurity research and development focus is on:

- Assuring the breadth, accuracy and legal protection of Australia's specimen-based plant diseases records,
- Maintaining adequacy of current knowledge and improving preparedness for management of key endemic, introduced and exotic pathogen threats,
- Enhancing our international leadership and collaboration in
    - the discovery, description and identification of indigenous and exotic plant pathogens,
    - the selection and improvement of crops with disease resistance
    - the development and continual improvement of integrated crop protection, market access and biosecurity strategies.

Regulatory, consultation and funding frameworks. Australia has the necessary legal and regulatory frameworks, government authorities and mechanisms for national and regional consultation with industry, the private sector and trading partners in the management of plant disease risks and responses to biosecurity threats and in planning and supporting research and development.

Quarantine and Biosecurity. Australia is a signatory to the International Plant Protection Convention and the Agreement on Sanitary and Phytosanitary Measures under WTO. These commit Australia to meeting international standards for phytosanitary measures. This review will provide recommendations for improvement of current structures, arrangements and legislative frameworks.

Scientific credibility and networking. Dissemination of plant disease research findings and technical information and stake-holder networking have been enhanced by Australia's:

- strong record of publication and conference support, ranging from specialist research to regulatory and grower focused knowledge and technology
- national and international dialogue and networking, negotiation and standard setting and
- national scientific societies with links to international associations and forums that promote attention and advancement of plant health sciences.

(Shivas and Beasley, 2005[14]; Magarey, 2007; Plant Health Australia, 2008; Stirling *et al.,* 2008[15])

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[14] Shivas, R. and Beasley, D. 2005. *Management of Plant Pathogen Collections.* Department of Agriculture and Fisheries. 82pp.

[15] Stirling G R *et al.,* (eds) 2008. Plant and Soil Nematology in Australia and New Zealand. Special Issue of *Australasian Plant Pathology* 37.

Human resources and networking. Knowledge and research on plant disease requires a global approach. Nationally and internationally co-ordinated efforts make best use of scarce resources and expertise to develop and share solutions which improve plant disease management and market access. A large proportion of Australia's plant disease specialists with broad-based training in plant pathology and diagnostics are reaching retirement age. In their place is a new generation of scientists whose training has been more specialized and focused on molecular diagnostics and crop improvement. Strategies are needed to capture and retain the declining knowledge base and technical expertise and increasing specialization plant disease specialists

Active professional associations such as the Australasian Plant Pathology Society make important contributions to securing and improving plant disease management.

Appendix 2. Case study Importation of reference cultures of plant pathogens

from Dr J Thomas, QDPI&F

State Departments of Primary Industries are in the front line of detecting and managing incursions of exotic pathogens. In addition to their key role in incursion responses, they are heavily relied upon by AQIS for post entry quarantine diagnoses and NAQS for survey diagnostic support. National and international market access is reliant on area freedom from diseases and under the International Sanitary and Phytosanitary Agreement and the Emergency Plant Pest Response Deed, it is imperative that reference standards (i.e. positive controls) are used in any diagnostic assays undertaken. Also, considerable national resources are currently being directed towards the preparation of contingency plans and diagnostic protocols for pests and pathogens identified on a risk-based system.

A crucial issue affecting our diagnostic capability in plant biosecurity is the availability of positive controls to allow diagnostic assays to be developed and validated before an incursion occurs and for available assays to be used for border interceptions. These controls generally need to be imported when dealing with emergency plant pests (EPPs), and these applications are assessed by AQIS, with policy advice from Biosecurity Australia. In-house specialist expertise on which to base these permit decisions is scarce in BA, and consultation with external experts and the applicants is essential to prevent such impasses. However, this seems not to happen. Access to these positive control reference cultures has become increasingly difficult in recent years, to the point where pathogens on a PHA target list will not be considered by BA for importation. Recent advice from BA states that, "There is currently no nationally agreed official process or framework governing the deliberate importation and containment of these pathogens for research or diagnostic purposes……no recommendations will be made on the importation of pathogens on the PHA Target Pest List until such time as a national approach is agreed upon[16]." This restriction, precluding work under the strictest containment conditions, flies in the face of the importation of ornamentals, nursery stock and cut flowers, which can harbour unknown pathogens, unrecognised host/pathogen combinations and even pathogens on the PHA Target Pest List.

Over many decades, there have been no documented instances of escapes of plant pathogens deliberately imported for research purposes, despite containment conditions in earlier times being much less stringent than those currently required. A critical consideration is that the material to be imported is for *in vitro* use only, and under the QC3 containment conditions proposed, there is no logical pathway for escape of these organisms. Assessment of such applications and subsequent conditions attached to the permits need to be realistic to facilitate rather than impede the responsible use of this material.

Some specific examples highlight these problems:

[16] Plant Health Committee and Plant Health Australia have been charged with developing a national approach, but they have yet to deliver any recommendations on this issue.

DPI&F have contracts with DAFF to prepare diagnostic standards for two EPPs – banana bract mosaic virus and cotton leaf curl virus. These tests cannot be satisfactorily validated and the diagnostic standards completed without the appropriate positive controls, but import of these viruses is prohibited as they are on the PHA Target Pest List. Use of desiccated tissue in a QC3 containment facility is proposed, which provides no obvious pathway for pathogen escape – CLCuV is not mechanically transmissible and despite repeated attempts mechanical transmission of BBrMV has not been achieved in several laboratories. The insect vectors of these viruses cannot acquire the virus from desiccated tissue. The reality is that work with these organisms could be conducted in cotton or banana plantings with no risk of spread! However, no progress has been achieved since August 2006.

In 2007, an export-seed consignment from Queensland was rejected by Indonesian quarantine authorities, due to purported infection with Rice stripe virus. Neither the virus nor its vectors are known to occur in Australia. The Office of the Chief Plant Protection Officer requested that DPI&F conduct urgent diagnostic tests, but due to lack of a valid import permit we could not obtain a positive control to validate the test. When a specific permit was finally issued, the stringent conditions could not be met by the sole overseas source, and they declined to send the positive control material. The consignment was destroyed and Australia was unable to refute the report or to verify it and undertake an appropriate incursion response.