

# A National Plant Biosecurity R,D&E System

A Position Paper

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# A National Plant Biosecurity R,D&E System

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## A Position Paper

### Executive Summary

Biosecurity is recognised as one of seven areas of cross-sectoral investment for Australia's Rural Development Corporations (RDCs). This paper examines the opportunity for the seven plant based RDCs to play a greater coordinating role in National Plant Biosecurity Research, Development & Extension.

A consultation process was undertaken with Australia's seven plant based RDCs, Plant Health Australia (PHA), Governments, potential investors and key levy payer groups to investigate the preferred approaches to collaborative investment in National Plant Biosecurity Research, Development & Extension,.

The Terms of Reference governing this consultation process were defined by Horticulture Innovation Australia (HIA) and the other plant based RDCs. The Terms of Reference were to:

- 1) Understand current biosecurity investment activities, their quantum and how these investments are determined and prioritised.
- (2) Determine how the respective RDCs envisage the biosecurity component of their R&D expenditure to be managed under a national scheme.
- (3) Consult with key industry/grower bodies to ascertain their perspective on the above.
- (4) Consult with PHA on their position.
- (5) Develop a draft paper with at least two options for a future structure.
- (6) Circulate options paper to those consulted for comment.
- (7) Final paper developed with a proposal that meets stakeholders' needs. (there may be more than one if participants desire).

The following Guiding Principles were followed:

- Develop a mechanism for RD&E to be coordinated nationally. Where possible, in alignment with National RD&E strategy needs.
- Any resulting structure should be cost-neutral to participants and be based on existing income streams.
- Strong support from RDC constituents will greatly strengthen any potential solution.

The consultation process found there was a high level of agreement on what is required to drive cross sectoral investment in National Plant Biosecurity Research, Development & Extension. In particular, it was agreed that while the current National Plant Biosecurity system has all of the necessary attributes needed for developing investment, the system lacks coordination and a functional vehicle for co-investment. While government and industry parties have well defined protocols for investment and decision making, the formal linkages between the parties to enable investment decisions in R, D&E are inadequate.

Stakeholder feedback demonstrated no support for a new RDC or a Cooperative Research Centre (CRC) as a viable solution. They saw both as cumbersome and duplicitous, only adding to an already crowded space. Stakeholders recommended a model which would keep costs to a minimum through the use of existing structures and systems.

Greater coordination and activation of R,D&E investment were seen as the outputs of having the key funding and decision making parties as part of the process. Without direct involvement, coordination attempts will struggle. The lack of a coordinated, enabling approach was found to be a major problem facing the current National Plant Biosecurity Research, Development & Extension Implementation Committee (NBRDC&EIC).

Two cross sectoral investment models were proposed. The first investment model proposes that the current NBRDC&EIC be restructured with membership comprised of the seven RDCs and Commonwealth and Plant Health Committee (PHC) representatives. This Committee would be chaired by PHA. The second and preferred investment model proposes that seven RDCs create their own Biosecurity R,D&E Committee which would interact with the National Biosecurity Committee (NBC) in determining national biosecurity research priorities. The adoption of this model would be an Australian first, fully integrating Government and industry in biosecurity R,D&E and paving the way for a truly 'shared partnership' approach to biosecurity R,D&E. Both models have at their core a flexible approach to investment and the need for defined key performance indicators.

The consultation process undertaken to inform this position paper resulted in the development of a list of principles that needed to be addressed to ensure a successful cross-sectoral approach. It was agreed that these principles should be used to inform the construction of two cross-sectoral investment approaches (models) to enable RDCs to play a lead role in coordinating the National Plant Biosecurity R,D&E agenda. Two principles in particular were noted as vital, these being accountability and flexibility. Firstly, accountability to stakeholders was considered critical for all RDCs as it is a key driver of their operational and investment strategies. Any cross-sectoral system needs to address this principle. Secondly, there needs to be flexibility in how RDCs or other potential investors approach cross-sectoral investment. Any attempt at compulsory collaboration or investment potentially will struggle to succeed.

The consultation found that while there was a renewed readiness to collaborate and coordinate, any future process should be driven by one lead RDC. This RDC would be responsible for advancing the agreed investment area. Horticulture Innovation Australia (HIA) is the current lead RDC for cross-sectoral biosecurity activities and is recommended as the lead organisation to drive a new model.

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## Background

This position paper was initiated by the seven plant based RDCs through the Council of RDCs to drive greater cross-sectoral collaboration and coinvestment in plant biosecurity R,D&E. Acknowledging the complexities associated with cross-sectoral collaboration as highlighted in previous reports on RDCs, this paper deliberately restricts its scope to plant based RDCs. The rationale behind this decision is that if a working cross-sectoral model can be achieved for the seven plant based RDCs, it can grow over time to include other RDCs, developing a complete cross-sectoral approach to biosecurity R,D&E encompassing both the animal and environmental arenas. Whilst the terms cross-sectoral and national are not necessarily interchangeable, the production environments covered by the plant based RDCs span the entire country, delivering a national focus.

The paper in part has been stimulated by responses to the release of the Australian Farm Institute's (AFIs) final report on a National R, D&E system which proposed the development of a new RDC devoted to plant biosecurity. The public responses to the AFI report found that the broader plant industry would prefer to develop an approach to biosecurity R,D&E which uses the available investment structures, therefore avoiding duplication of resource investment. This approach is founded on the basis that plant biosecurity R,D&E is an area of shared purpose and increasing importance across the seven plant based RDCs. Plant Biosecurity is also identified as one of seven cross-sectoral strategies in the national R,D&E framework for the primary production sector.

## Current National Status of Plant Biosecurity

The Australian Biosecurity environment is complex with multiple interactions at many levels between many entities. In legislation alone the Plant Biosecurity Status Report<sup>1</sup> lists 26 Acts (Commonwealth, State and Territory combined) which cover or have an impact on Plant Biosecurity.

There are a number of committees that operate either directly or indirectly in national plant biosecurity. While membership of these committees varies, it involves most groups involved in biosecurity including State and Commonwealth Jurisdictions, Universities, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), RDCs, industry bodies, primary producers, private companies, research providers and supply chain stakeholders. The level of engagement is heterogeneous and often disconnected.

From a government perspective, at the senior level the Agricultural Senior Officials Committee (AGSOC) receives and acts on advice from the National Biosecurity Committee (NBC) and Research and Innovation Committee. The Plant Health Committee sits beneath the NBC, reporting through to NBC and the National Plant Biosecurity R,D&E Implementation.

NBC is chaired by the Secretary of the Department of Agriculture and Water Resources as a member of the Agricultural Senior Officials Committee (AGSOC). NBC membership comprises senior officials from the Australian, State and Territory primary industry or environment departments with each jurisdiction permitted up to two representatives. According to the NBC website :

“The NBC is also responsible for managing a national, strategic approach to biosecurity threats relating to plant and animal pests and diseases, marine pests and aquatics, and the impact of these on agricultural production, the environment, community well-being and social amenity.

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<sup>1</sup> The National Plant Biosecurity Status Report 2015 – Plant Health Australia 2016  
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A core objective of the committee is to promote cooperation, coordination, consistency, and synergies across and between Australian governments. This includes exploring measures to:

- provide assurance that the system is working
- better connect the biosecurity rationale to market access and trade
- increase visibility and engagement with sectoral committees
- engage, partner and communicate with relevant stakeholders, as required
- coordinate biosecurity investment in the national interest”

The Research & Innovation Committee (R&I) is an Advisory Committee to the Agriculture Senior Officials Committee (AGSOC). In particular, the R&I Committee is responsible for oversight of the development and implementation of the National Primary Industries Research Development and Extension Framework (the Framework). The Framework is one of the Priority Issues of National Significance as outlined in the Terms of Reference for the Agriculture Ministers' Forum (AGMIN). The R&I Committee also provides advice on the overall performance of the primary industries research innovation system and emerging technologies including biotechnology to AGSOG, and works with the Council of Rural Research and Development Corporations (CRRDC).

Plant Health Committee (PHC) is comprised of the Chief Plant Health Manager from each Jurisdiction and the Australian Chief Plant Protection Officer (Commonwealth) and PHA. The Australian Chief Plant Protection Officer's (ACPPPO) role is to act as the primary representative of, and an advisor to the Australian Government on all matters relating to the management, maintenance and improvement of Australia's plant health status and associated systems. PHC also has three sub-committees; Domestic Quarantine and Market Access, Plant Health Surveillance and Plant Health Diagnostics each of which have PHA as chair or deputy chair. PHC's brief is to provide policy, technical, regulatory advice and leadership on Plant Biosecurity and to provide formal advice to the NBC.

At an industry level, biosecurity is handled nationally through two mechanisms. Research and Development (R&D) is funded through the relevant RDCs whilst incursions/eradication programs and or pest/pathogen management is largely the domain of Peak Industry Bodies who are Members of PHA and in most cases signatories to the Emergency Plant Pest Response Deed (EPPRD). This Deed is administered by Plant Health Australia (PHA) as its primary function. Not all industries are Deed signatories and not all industry bodies have direct access into the RDCs through statutory levies. This is particularly the case in horticulture. Whilst the remit of the RDCs is broader than just biosecurity, all the plant based RDCs have listed biosecurity as a priority<sup>2</sup>. The signatories to the Deed are not the RDCs, but the individual Peak Industry Bodies of which there are over 30<sup>3</sup>. RDC involvement with PHA is through associate membership and through provision of research funding and support.

Within their respective environments, industry and government have clear operational mechanisms with PHA providing the linkage (Figure 1). PHA sits astride the government and industry sectors. PHA holds member meetings twice annually with associated industry forums and annual regional meetings at regional locations around the country. PHA also regularly meets with members on a one on one basis to understand individual member biosecurity issues. These PHA meetings provide almost entirely the only opportunity

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<sup>2</sup> (National Plant Biosecurity Implementation Committee notes).

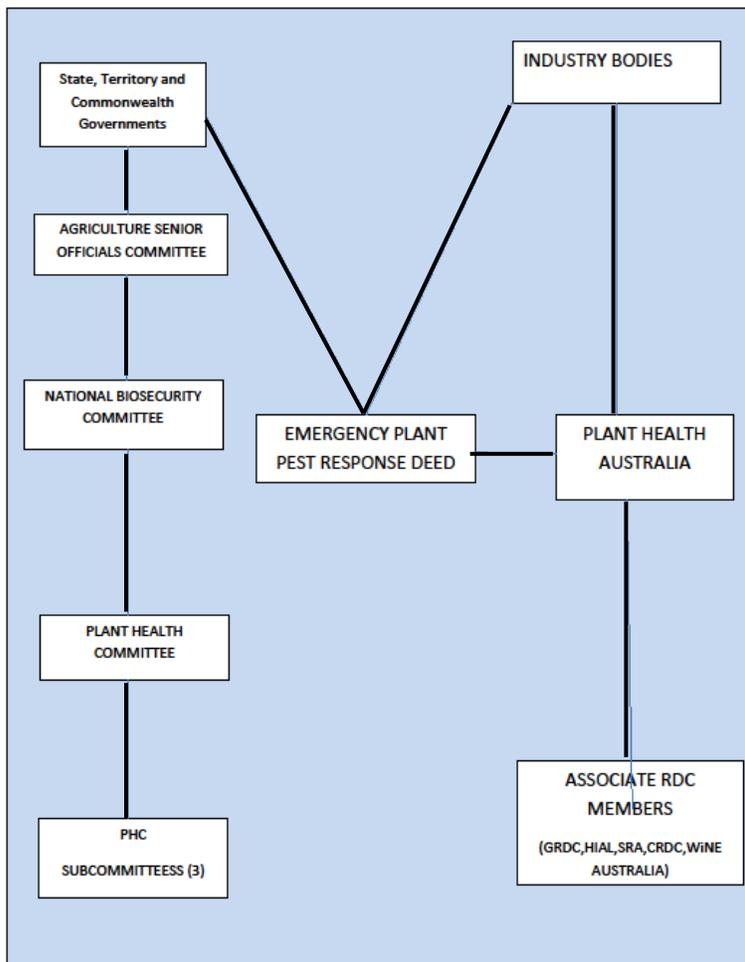
<sup>3</sup> Annual Report 2015 – Plant Health Australia

for discussion between industry and government parties on plant biosecurity. Whilst Deed issues are a primary focus, discussion also can cover other areas of biosecurity.

The Commonwealth also hosts an annual National Biosecurity Forum; however timing constraints often lead to a limited opportunity for interaction reducing the potential effectiveness of these meetings.

Figure 1 illustrates the formal interactions of the national plant biosecurity system and shows the important role played by PHA as a facilitator between industry and government. Note however that governments are usually represented at PHA meetings through officers from PHC and/or the NBC. Associate RDC members are listed as per PHA 2015 Annual Report. Note the linkages to PHA reflect the signatories to the Deed as well as participants.

Figure 1



The various bodies and committees described in Figure 1 operate within a National Strategy on Plant Biosecurity<sup>4</sup> which was developed by PHA. This strategy maps the national approach to plant biosecurity on a 10-year timeframe. The strategy was reviewed by PHA in 2014-15, with an implementation plan for 2016-20 developed. The 10 core strategies for plant biosecurity within the National Strategy include:

**Strategy 1** - Adopt nationally consistent plant biosecurity legislation, regulations and approaches where possible within each state and territory government's overarching legislative framework

**Strategy 2** - Establish a nationally coordinated surveillance system

**Strategy 3** - Build Australia's ability to prepare for, and respond to, pest incursions

**Strategy 4** - Expand Australia's biosecurity training capacity and capability

**Strategy 5** - Create a nationally integrated diagnostic network

**Strategy 6** - Enhance national management systems for established pests

**Strategy 7** - Establish an integrated national approach to plant biosecurity education and awareness

**Strategy 8** - Develop a national framework for plant biosecurity research

**Strategy 9** - Adopt systems and mechanisms for the efficient and effective distribution, communication and uptake of plant biosecurity information

**Strategy 10** - Monitor the integrity of the plant biosecurity system

Within the National Biosecurity system the phrase "shared responsibility" has been extensively used for over two decades since being coined in the Nairn Review of 1996. An examination of the current biosecurity system suggests that this phrase has not been translated into a working framework. Despite its widespread use by parties there has yet to be a discussion amongst all stakeholders around what "shared responsibility" actually means and its resulting obligations. In the context of this paper, shared responsibility is defined as partnerships and the term is used in this context throughout this report (Illustrated in Table 1).

In an attempt to improve co-ordination and develop a more national focus, a number of national Plant Biosecurity related strategies have been developed through PHA and government initiatives.

These strategies include:

- National Plant Biosecurity Strategy (and Implementation Committee)
- National Plant Biosecurity R & D Strategy (and Implementation Committee)
- National Plant Biosecurity Surveillance Strategy
- National Plant Biosecurity Diagnostic Strategy
- A National Bee Pest Surveillance Strategy
- National Fruit Fly Steering Committee

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<sup>4</sup> The National Plant Biosecurity Strategy - Plant Health Australia 2010

While some of these strategies can access and channel resources, this is not always possible. As a consequence some strategies are struggling to make an impact. The current system is challenged in a number of areas, some of which include:

- Lack of an integrated R,D & E model and an R,D&E strategy that interacts with on-ground activity as well as R & D formulation
- Lack of coordinated policy input
- An overall investment/funding model that can be relied upon
- No formal system for a co-ordinated program for pathogen management when eradication not an option
- Strategic planning
- Limited scope to work with other countries on areas of common interest, particularly in R&D

Notwithstanding the above, an examination of the National Plant Biosecurity system reveals that all the aspects of a plant biosecurity system are currently covered by existing organisations. This suggests that more complexity or more structures are not required. What is needed is a more formally coordinated enabling approach using existing structures and organisations.

**Table 1** The functional components of a plant biosecurity system and the direct involvement of existing organisations within each function.

Function	Govt	Industry	RDC	PHA	Univ/CSIRO
Incurion Management	√	√		√	
Capacity Building	√		√	√	√
Diagnostics	√			√	
Surveillance	√		√	√	
Preparedness	√	√		√	
Quarantine/Trade	√	√		√	
R,D&E	√		√	√	√
Policy	√	√		√	
Pest/Disease Management	√	√	√	√	√

## Plant Biosecurity R, D&E

Within the broader Plant Biosecurity Framework, R,D&E cannot be considered in isolation. It needs to be considered as an important area of an overall Plant Biosecurity strategy which informs all the activities that are associated with biosecurity. These activities are:

- New incursions - eradication and s management
- Education
- Preparedness and Risk Management
- Diagnostics and Surveillance - including area freedom substantiation
- Pathogen management
- Trade and Quarantine
- Policy
- Capability maintenance, development and monitoring
- Funding
- Plant protection products – responsible government agencies and private companies

Fully funded R, D&E is the key process through which many of the issues linked with the activities listed above can be addressed. Without this R, D&E loses relevance. Whilst this may seem self-evident it needs to be stated as it helps frame the discussion about what a national approach should look like. Further creating an environment for a more integrated approach to R,D&E is the first step in the process towards a more integrated National Biosecurity Strategy.

## The National Plant Biosecurity R,D&E Strategy

The release of the AFI report has reinvigorated discussion about Australia’s National R,D&E strategy. This discussion had made it clear that a more comprehensive approach to national biosecurity R,D&E is required. Unfortunately, much of this discussion has lacked clarity and agreement on what industry is trying to be achieved through a national approach (ie what is the problem that needs to be fixed?). Without a clear statement on what needs to be achieved, there is real danger of creating further complexity and duplicating systems and process already in existence.

A number of reasons have been put forward by a wide variety of organisations as to why a national approach is needed. These include:

- A lack of strategic investment within existing RDCs,
- Declining capacity and little investment by parties, and
- Short term funding cycles and cumbersome structures.

Deeper interrogation of these reasons does not stand up to scrutiny and more than anything appear to demonstrate a lack of understanding as to how the RDC mechanism functions. Horticulture Innovation Australia’s funding model for example is based on investment in both strategic, long term and more applied research. An examination of other RDC investment portfolios reveals the same. If these investments are not in biosecurity, it is not necessarily a failing of the RDC investment model. More significant with regard to plant biosecurity, general investment in R,D&E has been declining at the at state/territory level.

There are a number of assumptions about what a national approach to biosecurity R,D&E should do or achieve. The closest to a clear definition is contained in the following sentence from the National Plant Biosecurity Research, Development and Extension Strategy 2013-16 which states:

*“The aim of this framework is to ensure Australia’s RD&E capacities are aligned nationally with future industry and community needs, to initiate collaboration that strengthens Australia’s position internationally and to ensure RD&E delivery is both efficient and effective.”*

To deliver on this, the R,D&E strategy proposed six strategic responses in a document that became the National R,D&E strategy. Originating through the Primary Industries Standing Committee (PISC), the strategy document was largely a government initiative and has been signed off by all government parties. However it has had little ownership amongst industry bodies. To deliver the strategy an Implementation Committee was initiated with membership drawn from some RDCs, state governments, the Commonwealth, PHA and CSIRO. It is presently chaired by PHA and has an annual operating budget of around \$225,000. The effectiveness of this committee has been challenged primarily as it does not have any capacity to direct funding. It can make recommendations or provide advice. The lack of ownership amongst levy payers has not helped this committee achieve its aims. This has created a disconnect between intent and resourcing which has limited an effective implementation of a National Plant Biosecurity R,D&E strategy. As a consequence, the industry parties with resources (i.e. Industry RDCs,) have set their priorities separately and generally with little alignment with the Implementation Committee. One of the essential aims of the committee was to achieve coordination of investment is therefore diluted. One could propose the Implementation Committee as just another entity in an already very crowded place with a limited ability to either direct or effect national outcomes of R,D&E. The most important work of the committee has been to provide data to help inform the discussion about plant biosecurity R,D&E.

Acknowledging the complexity of the biosecurity environment, there is still a significant investment in plant biosecurity R,D&E in Australia through RDCs, CSIRO, State and Commonwealth governments and Universities. Untied funding is also provided to the PBCRC for this purpose.

Whilst it is difficult to equate individual RDC investment in biosecurity R,D&E with variation in the definition of biosecurity when classifying RD&E activity, it is clear that it is substantial. The 2014-15 Annual Reports from the seven plant RDCs reveals that spending on biosecurity ranges from <1% up to almost 28% of the total research portfolio. Based on information supplied by the plant RDCs, the total annual spend on biosecurity related R,D&E is approximately \$55m, representing more than 10% of the total R,D&E expenditure across all RDCs. These investments cover the entire range of biosecurity activity, including numerous PhD candidates and other educational activities.

All single industry plant RDCs have industry biosecurity plans. The two plant RDCs that have multiple commodity groups, HIA and RIRDC, also have industry biosecurity plans or farm/orchard manuals for many of their stakeholders, accessible through the PHA website.

Important drivers of the discussion around cross-sectoral R,D&E investment is the need to improve research leverage by identifying areas of common interest where numerous industries have R&D programs in very similar domains. The review of cross-sectoral priorities by the National Plant Biosecurity R,D&E Strategy Implementation Committee notes that approximately one third of the sectoral R,D&E in biosecurity could be applied to other sectors and suggests a framework should be established to align other sectors of cross-sectoral opportunities.

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See:

<https://portal.biosecurityportal.org.au/rde/Documents/Cross%20sectoral%20plant%20biosecurity%20RDE%20priorities%20analysis.pdf>

A more recent development in the national plant biosecurity discussion has been the release of the Australian Farm Institute (AFI) report which recommends creation of a new RDC devoted solely to biosecurity with an annual budget of \$25m. The money is proposed to come from the States, Commonwealth and RDCs. In making this recommendation, AFI has not been able to clearly articulate what is lacking in the current system and what value a new RDC would add to the system. It would seem somewhat counter-intuitive to develop a new entity, given the current complexity in the plant biosecurity arena and the current challenges it brings. The AFI recommendation is not a viable option, as it is not cost-efficient or indeed workable.

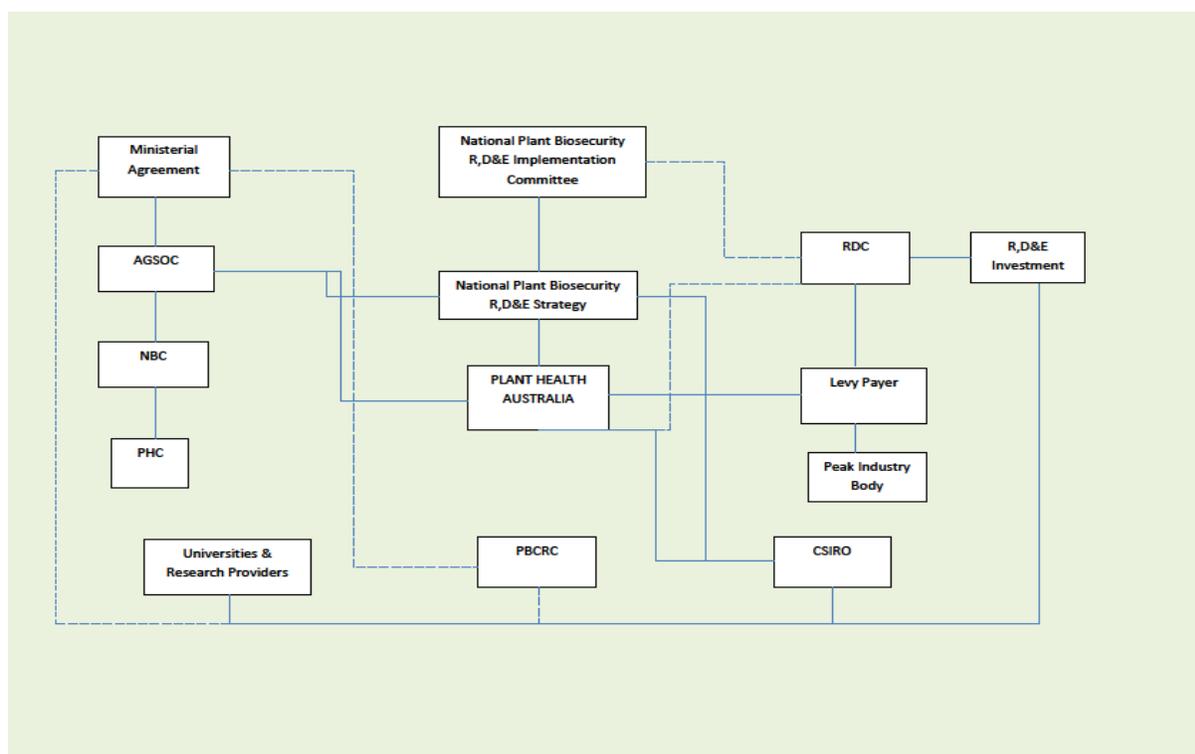
### **Defining the Plant Biosecurity R, D&E Issue**

The current national discussion around national Biosecurity R,D&E, including the IGAB review indicates that there is some dissatisfaction with the current biosecurity R,D&E system. Represented diagrammatically in Figure 2, it is difficult to escape the conclusion that the current system is complex and not conducive to coordination, especially considering that for plant based RDCs, the right hand side of the diagram needs to be replicated sevenfold. Figure 2 also clearly shows the lack of formal linkage between industry and government processes.

Figure 2 highlights the current structure in place. This structure already provides all the components required for national R,D&E investment with both government and industry having clearly defined processes for determining R,D&E investment. It is difficult to see what a new RDC or other entity could bring to the system except duplication.

Figure 2 is a diagrammatic representation of the current structure for plant biosecurity R, D&E. Note that the dotted line indicates that not all organisations illustrated may be involved in these interactions. For example, only two RDCs and two state governments are directly providing funds to the PBCRC. Similarly, governments may interact with research providers on an individual basis.

Figure 2



From this feedback it is evident that the two areas not well served by the current system are coordination and a vehicle for co-investment.

## Position Paper Approach

Given the already substantial investment in biosecurity by the plant based RDCs, the objectives that guided this paper were:

- Broadly describe what the current national biosecurity system has to offer and how it operates. This was seen as important with many submissions noting that any national framework needs to be built upon or utilise existing systems rather than developing a new one.
- Define what is missing (the issue) in national biosecurity R, D&E. Without a clear definition of what needs to be achieved it is difficult to devise any system or framework.
- Determine what role the PBCRC has filled, with specific focus on what was not happening prior to its creation, and investigate if those same pre-existing conditions still exist.
- Determine the RDCs approach to cross-sectoral work and the operating principles that need to guide successful cross-sectoral investment.
- Determine which government and other potential co-investors would be interested in investing in any cross-sectoral strategy.
- Explore the attitude of many of the plant RDCs key stakeholders (levy payer groups) to the above.
- From the responses, develop a suggested approach for plant RDCs to play a key leadership role in any national approach to biosecurity R,D&E.

Please note that identification of cross-sectoral research priorities of those consulted was not in the scope of this paper.

The following plant RDCs were consulted as part of this paper:

AGWA	Australian Grape and Wine Authority
FWPA	Forest Wood Products Australia
CRDC	Cotton Research and Development Corporation
GRDC	Grains Research and Development Corporation
HIA	Horticulture Innovation Australia
RIRDC	Rural Industry Research and Development Corporation
SRA	Sugar Research Australia

Given the importance of levy paying groups in the current plant RDC mechanism, their views on cross sectoral investment and the recommendation in the AFI report were also sought. The industry bodies consulted included:

AUSVEG

Grain Producers Australia

Cotton Australia

Voice of Horticulture

Nursery and Garden Industry Australia

Wine Grape Growers Australia

CANEGROWERS Australia

Vinehealth Australia

Other stakeholders and potential co-investors in biosecurity R, D&E consulted as part of this report include senior personnel from the Commonwealth, Victorian, South Australian and Tasmanian state governments, CSIRO and Plant and Food New Zealand. The nature of these discussions was informal and does not represent individual policy positions. A full list of those consulted is provided in Appendix 1.

## Findings

The consultation showed alignment amongst all parties as to what was desired of any national framework and the core basis on which it could operate. Clear feedback from all parties was that there was no enthusiasm for a new RDC or a new CRC. All parties noted that the necessary structures for a consolidated approach already existed within the current system. However, the key leadership and coordination was missing, making it difficult to find co-investment opportunities.

## RDC Feedback

A number of clear themes emerged in key areas, which are summarised below:

**Accountability** - Plant RDCs felt a very high degree of accountability towards their stakeholders. This is reflected in the formal and extensive consultative structures they have in place for determining R, D&E. They were very conscious of the need to ensure that their R, D&E investment was aligned with their strategic plan and that levy payers had a 'line of sight' to this investment. It is this accountability that is perhaps one of the difficulties that face plant RDCs when considering cross-sectoral investment because by definition, once other parties become involved then an individual RDC's investment becomes diluted. Depending upon the individual RDC, their Statutory Funding Agreements (SFA) or constitution may contain some quite specific notes on what R, D&E is permitted. For example, the constitution of SRA and HIA clearly states that funds must be used for the benefit of their respective growers. Under this criteria there is clearly a requirement on the RDC to be extremely prudent when it comes to cross-sectoral investment.

**Cross-sectoral Investment** - This was appreciated by all plant RDCs as an area that required a serious commitment. In the case of plant biosecurity, where threats or opportunities overlap, significant opportunities for collaborative investment are presented. Areas that received mention as potential cross-sectoral activities included diagnostics and surveillance, new technology, pesticide resistance, preparedness and community engagement. In particular a national approach to surveillance was seen as important by all plant RDCs.

As noted above, shareholder accountability was a common concern as was to how to manage cross-sectoral activity without increasing overheads. There was recognition that any cross-sectoral activity will require greater investment in communications in order to keep shareholders informed. Multi-part agreements are an example of area of contract management which can be very problematic when multiple RDCs are involved. Whether a cross-sectoral program is managed by a lead RDC or should each RDC manage its own portion, was discussed. In the former case there was concern that smaller plant RDC investments would be swamped by larger investments and that they may struggle to get value for money. In the latter case there was concern about how overall management would occur.

**Priority Setting** - Several RDCs noted that any cross-sectoral approach had to ensure priorities were adequately assessed and investments aligned with the individual RDCs priorities. It was acknowledged that although there have been a number of attempts to align pest priorities particularly by government agencies, there has been no attempt to look at and rank these in a cross-sectoral approach by industry. The closest approximation is shown as Appendix 2 in the paper entitled "Cross-sectoral priorities analysis of the Plant Biosecurity Research, Development and Extension System" which is found in the public access area of the PHA Biosecurity portal:

<https://portal.biosecurityportal.org.au/rde/Documents/Cross%20sectoral%20plant%20biosecurity%20RDE%20priorities%20analysis.pdf>

The development of such a list would be a precursor to any cross-sectoral approaches and an area where PHA could provide significant assistance, if not already doing so.

**Capacity** -All plant RDCs make significant investments in capacity building through the use of scholarships, training and leadership programs and see this as an important role. A number of RDCs noted

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the declining investment in capacity by state and commonwealth jurisdictions and an increasing reliance on the RDCs to maintain capacity. From information provided by the plant RDCs, over 50 post-graduate positions were currently active.

**Biosecurity** – In all plant RDCs, biosecurity has an increasing profile. For most RDCs, it was one of their top research priorities. This is reflected in the percentage of R,D&E spend which exceeded 10% in all but two RDCs. For RIRDC and FWPA their lower value merely reflects that these two RDCs have a broader remit outside of primary producers.

The IGAB definition of Biosecurity is the management of risks to the economy, environment and community, of pests and diseases entering, emerging, establishing and spreading. In practice, biosecurity can also have many meanings, however all plant RDCs saw it as encompassing much more than merely exotic incursions. Endemic pests of quarantine concern were also seen as a priority. Some RDCs noted that biosecurity R,D&E can also have a dual impact for management of endemic as well as exotic pests. For those RDCs where trade is in non-manufactured product the importance of whole of chain biosecurity was also emphasised. Market access and biosecurity were seen as critically linked.

**Lack of Formal Engagement** – Most plant RDCs noted that the biosecurity R,D&E system does not currently have active involvement of the RDCs. As highlighted in Figure 1 it is the PIB that operates directly in the biosecurity space as members of PHA and signatories to the EPPRD. The RDCs sit outside the current system, with the R,D&E Implementation Committee populated by non-industry personnel, with membership from only three plant RDCs (Industry engage through the RDC) and the CRRDC. This creates a number of difficulties when it comes to engaging directly with other stakeholders involved in biosecurity. It was also noted by some that the Deed appeared to be a very cumbersome in its deployment, often appearing to mitigate against quick and agile eradication responses, or transition to management, for which RDCs often play a role (i.e. SRA and CRDC). There was a feeling that the Implementation Committee was a largely inefficient body as its membership lacked the means by which to effect any substantial investment. The restructuring of the committee to reflect those parties who could bring money to the process and effect change was raised as a means of being more effective.

**Leadership** – All recognised the need for an entity to take the lead in pulling any cross-sectoral body together. The lack of leadership in the current national biosecurity R,D&E system was seen as a key reason for the current discussion about national biosecurity. Without this clear line of responsibility it will be difficult to effect any change. The non-mutual exclusivity of coordination and collaboration was made. PHA was discussed as a logical body to have a role in driving this, although RDCs acknowledged that they needed one of their own to be taking a lead role.

**PHA** – The role of PHA was seen as crucial in any biosecurity system. Despite the disconnect between plant RDCs and the active day to day biosecurity involvement of PHA they were still seen as a vital link in any future system. A view presented by some of the plant RDCs was that PHA should take a far more active role in driving this discussion.

**Costs and Efficiencies** – Sentiment was strong that any costs associated with cross-sectoral activity need to be minimised and that any implementation advisory committee should be as small as possible. With large committees often being clumsy and costly to manage, a balance needed to be struck. Duplication of existing R, D&E investment structures was not supported.

*A new CRC or RDC* – There was universal view that such a step went directly against the RDC charter, should they be forced to give money to another entity or alternatively that Commonwealth funding should be reallocated. A compulsory appropriation to another body was seen as being completely contrary to the ‘line of sight’ required for levy payers. With the exception of those that contributed to the PBCRC, other plant RDCs had had almost no interaction with the PBCRC. It was noted by some however that the PBCRC had helped partly bridge the gap between industry and government through the Horticultural and Regulatory Advisory Panels.

*Government and External Investment* – It was felt important that any cross-sectoral activity should be sufficiently flexible to permit investment from other bodies and that governments should be part of the process.

### **Industry Views**

The consultation with various industry groups revealed little difference in their views from those of the plant RDCs. Industry groups emphasised the importance of utilising existing structures and systems and felt there was nothing that could be added to the existing biosecurity framework by creating a new RDC, except cost. The system was already seen as too complex.

There was also considerable surprise expressed that the final version of the AFI report did not differ greatly from the initial draft despite the prevalence of views that a new RDC was not supported.

PHA was seen as an important link in the system and it was felt essential that they be involved particularly as a coordinating influence for the R,D&E agenda.

### **Government Personnel**

There were some differences between Government and industry over expectations however there was no support expressed from Commonwealth personnel or SA for another RDC. AgVic had no preferred position but wanted any national system to provide an opportunity for strategic long-term investment and to enable the cross-discipline conversation that occurred in the PBCRC. A consistent theme was that Governments were looking for a vehicle that could provide for co-investment and that could enable alignment of industry and government priorities

Governments recognised that the PBCRC had performed worthwhile functions and it would not like to see these lost in any post PBCRC environment. They did acknowledge however that there was nothing in the current system outside the PBCRC that prevented these activities continuing. Governments also acknowledged that they have not been particularly good at setting their own priorities and that there is, as one would expect in a large and geographically diverse country, considerable variation between states as to what were priorities.

The NBC and IGAB review is currently devoting considerable effort as to how biosecurity can be nationally aligned and prioritised and in particular how it can engage with the broader biosecurity community, particularly industry. The Commonwealth is currently developing a list of priority areas for discussion amongst NBC parties.

The Commonwealth is also considering how big a role it should play in biosecurity R, D&E, acknowledging that it has been in part removed from this area. However, the Commonwealth was beginning to set priorities

that could be enacted through NBC.

## Plant and Food NZ

Plant and Food NZ expressed some dissatisfaction with the return on investment from their PBCRC expenditure. There was some frustration about the ability to direct or guide the R&D when funding was not tied. Notwithstanding issues around trade sensitivity Plant and Food NZ recognised many synergies by operating in an environment whereby NZ and Australia can combine their experiences. In regional terms, NZ brings more Pacific engagement to the table whilst Australia has a more Indo-Asian focus. There are also differentially distributed pests such as fruit flies, Psyllids, PSA and Varroa, allowing each country to learn from the other. Both countries have concerns over exotics not yet present such as Xylella and Brown Marmorated Stink Bug.

## CSIRO

CSIRO is both an investor and a provider. Through its Health and Biosecurity Business unit, (PHA is a member of the Health and Biosecurity advisory committee) CSIRO has devoted considerable resources into biosecurity, making it a high priority for the organisation. CSIRO did not invest in the PBCRC and would not be investing in areas where it would not have a say over the direction of its investment. New technologies such as gene editing and synthetic biology were seen as areas with direct relevance to plant biosecurity. Any structure or system that provided greater coordination and a vehicle for co-investment would be of interest.

The need for leadership was acknowledged by all.

*A Future System* –All those consulted expressed the view that improved leadership and coordination within the existing system would deliver a better approach to plant biosecurity R,D&E. The existing system required realignment rather than a new structure. There was no enthusiasm for the establishment of a new mechanism. Government did not want the added process and expense of dealing with multiple RDCs over fundamentally similar issues.

Having the ability to make longer term strategic investment decisions was also seen as a precursor to investment in any cross-sectoral work and investors needed to be part of the decision making process. The wide geographical representation of the plant based RDCs implies that a cross-sectoral approach is analogous with a national approach.

The balance between shorter term more applied R&D and longer term strategic investment that the RDCs manage needed to be reflected more accurately, to address some external misunderstandings in this area.

Governments were strongly bound to the 2013-2016 National R,D&E Strategy and saw this underpinning investments. Governments were committed to the National R,D&E Strategy and associated Implementation Committee, albeit acknowledging the challenges of the Committee and its inability to direct investment. The current RDC representation on the Implementation Committee was seen by some as appropriate.

Fundamentally governments want to co-invest with industry under a more responsive, appropriate system.

There was also acknowledgment of the important role played by PHA in biosecurity, despite some concern around PHA being distracted from its core activity around the Deed.

Significantly, no decision has been made as to what will happen to the money that the Commonwealth currently invests in the PBCRC (from Science and Innovation) post PBCRC. It has been made very clear however that additional funding will be made available for biosecurity.

## PHA

PHA plays a pivotal role in biosecurity and most plant based RDCs are associate members.

Currently PHA chairs the National Plant Biosecurity R,D&E Implementation Committee which runs on an annual budget of approximately \$225,000. The Committee's lack of ability to effectively coordinate, broker and direct investment and a lack of industry involvement input are seen as weaknesses. PHA believes that those who pay should have a say when it comes to biosecurity R,D&E investment. The issue of plant RDCs meeting their levy payer's expectations is recognised.

As an entity PHA would like to see a more coordinated and strategic approach to biosecurity and they see this is an area in which they can play an important role. However, their approach is flexible and they are waiting to see what comes of the plant RDC initiative in this space and what direction the Commonwealth is taking before making a commitment. PHA do not see the need for a new entity to be constructed but acknowledge that some restructuring may be necessary. The SITplus and National Fruit Fly Strategy were seen as examples of what could be achieved with the right approach.

Notwithstanding the comments from the Commonwealth about PHA not being distracted from its core functions around the Deed, all other parties expressed the view that PHA needs to play a key role in any future national R,D&E system/framework.

## Summary

Several clear themes emerged from the consultation. Although the national plant biosecurity R,D&E system has all the ingredients to function, leadership is needed to enable greater coordination of activities across relevant sectors and to provide a vehicle for co-investment. All parties involved in the plant biosecurity R,D&E environment are currently considering how this can be best achieved.

The plant based RDCs are seen as being in ideal position to fill this requirement by developing a cross-sectoral investment model. For this to occur a number of criteria need to be satisfied. These are:

- **Accountability** – investors need to have 'line of sight' to investments and clear KPI setting procedures. The system needs regular reviews of processes, projects and programs to ensure it is delivering.
- **Complexity** – Any framework needs to reduce complexity not increase it. Wherever possible it should use existing structure and systems.
- **Costs** – These should be kept to a minimum and extra costs should be avoided by using existing systems.
- **Flexibility** – The process for cross-sectoral investment should not be compulsory and all investments do not have to involve all plant RDCs. Secondly, the process for determining and contracting investments needs to be as streamlined as possible. It must provide for additional investors to come into the system over time.

- **Governance** – Whilst a framework can operate as a non-legal entity (ie the CRRDC) it must have the capacity to have an investment protocol operating within a legal entity with appropriate corporate governance structures. RDCs clearly have this capacity.
- **International Partnerships** – There was recognition that a number of biosecurity issues go beyond Australia’s borders. Any framework should be able to allow international participation, with New Zealand in particular mentioned within this context.
- **Ownership** – All involved in the system must have a sense of ownership. Good communication and consultation will be critical to ensure that this occurs.
- **Size** – Decision making committees need to be small. The greater the size the more cumbersome and the greater the difficulty in achieving meaningful outcomes
- **Stability** – The systems should be insulated from short term volatility. Investors need to have confidence that investment conditions will not suddenly change, with all investors playing by the same rules.
- **Strategic** – Investment needs to be longer term and strategic in nature while maintaining an applied focus. Five years was a common co-investment timeframe mentioned.
- **Transparency** – Processes need to be transparent to all levy payers

## Proposed RDC Driven Approach

Noting the growing commitment of plant RDCs to greater cross-sectoral collaboration, this position paper proposes an approach that would see the plant RDCs playing a lead role in the coordination of national biosecurity R,D&E. Should a true collaborative approach be developed by the plant based RDCs, this will satisfy the need for governmental involvement and commitment.

Two models are proposed to meet this end. Within each of these models there is flexibility in management options for the RDCs to determine. Both models and their associated implementation steps have been designed to address the success criteria listed above. Whilst these models are designed to deliver a coordinated national plant biosecurity R,D&E framework, their implementation is seen as an incremental process. In particular, it is important that plant RDCs are not tied to either compulsory funding or participation as this would not be conducive to collaboration.

### Model 1: A Reconstituted R,D&E Implementation Committee

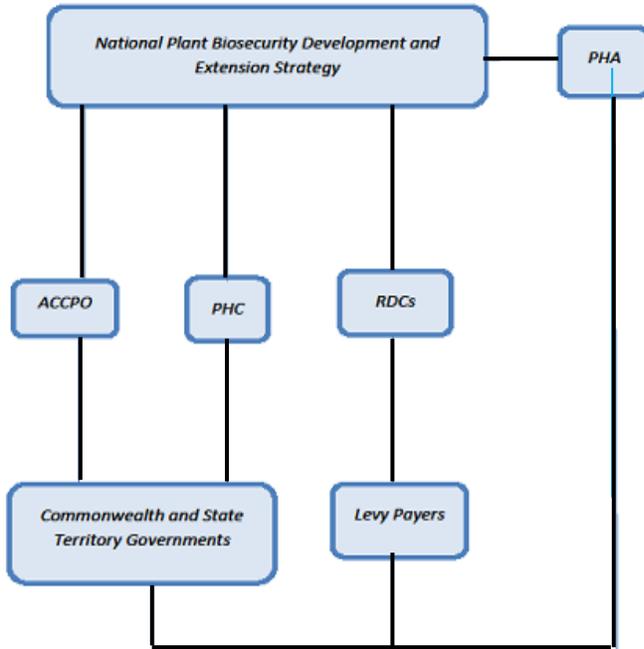
This model (Figure 3) would see the current National Implementation Committee reorganised so that membership comprises all seven plant RDCs and a representative from the Commonwealth (OCPHO) and the states through a PHC representative. CSIRO would be invited as a co-investor. As future potential investors are identified the committee would be expanded to include them. The Committee would be chaired by PHA as is the current Committee. Membership would be based upon two criteria:

- Ability to bring funding to the process
- Ability to make funding decisions

The members would bring their individual biosecurity R,D&E priorities to this committee. These would then be examined against both the National R,D&Es Strategy and the priorities of other RDCs and Governments to identify where opportunities for better R,D&E leverage can occur through collaboration. Whilst this is similar to the existing system, the advantage of this model is that all parties are interlinked through the Implementation Committee.

The strength of this model is that it would require little adjustment to the current system, merely a changing of personnel on the existing Implementation Committee. Those directly involved in plant biosecurity R, D&E will be directly involved in allocating resources. It formally ties all parties involved in biosecurity together.

Figure 3: A National Implementation Committee with a membership reconstituted to reflect those with money and authority to invest.



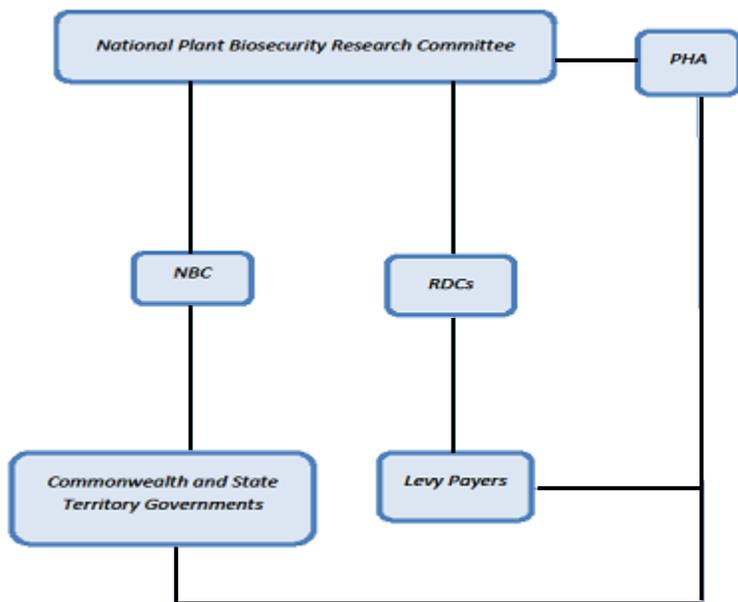
### Model 2: A Plant Biosecurity Cross-Sectoral Committee engaging with NBC

This model (Figure 4) would see the plant RDCs form a co-ordination and planning committee. This committee would operate in a similar manner to that described in Model 1 however it would work with the NBC under the chairmanship of PHA.

Compared with Model 1, it is a cleaner and more powerful structure. It would be a significant shift in how Biosecurity R,D&E strategy is currently operating and would put some genuine meaning behind the words “shared responsibility” or partnership.

This option would see Governments and plant RDCs set their own priorities and then come together to approach R,D&E. The model would be coordinated by PHA. The structure is clean and would provide the most streamlined approach to R, D&E with the key decision makers and enablers being present, as is shown below.

Figure 4: A model where plant based RDCs would work directly with NBC members to align and coordinate areas of common interest.



Model 2 has a number of advantages over Model 1, with Model 2 being:

1. More streamlined, giving NBC members the ability to make investments using a nationally agreed cost-sharing mechanism.
2. Providing a good forum for co-investment with the key decision makers present.
3. Enabling senior personnel from both industry and NBC to operate together in R, D&E which would have direct and indirect benefits to the broader biosecurity system. NBC operates across all aspects of biosecurity, therefore presenting the future possibility of including animal based RDCs.
4. Allowing NBC to overcome its current struggle of achieving broader engagement in biosecurity, and see R, D&E fully integrated within the overall biosecurity framework, meeting the NBC charter.
5. Greatly strengthening the overall National Biosecurity Framework by enabling all key parties involved in the entire Plant Biosecurity System to work together.
6. Facilitating the opportunity to bring in extra investors and provide the ability to undertake a flexible approach to both investing and contracting (ie a true co-investment approach). This is something identified both by RDCs and governments as important. It would also enable engagement with other bodies such as Australian Centre for International Agricultural Research (ACIAR). ACIAR has an interest in biosecurity through their overseas aid programs and food security.

Model 2 has been received favorably by potential investors (Plant and Food New Zealand and CSIRO). One disadvantage however is that it may require longer to implement than Model 1. Adoption of this model will also require a change as to how NBC operates.

Both models will require the RDCs and government parties to bring a prioritised investment strategy to the discussion. Funding that currently supports the Implementation Committee would need to be redirected to support this model.

While Model 2 is favoured, the stakeholders consulted conceded that this may be too great an initial jump from the current industry position. Model 2 should serve as a goal toward which any future framework should be aiming. Therefore, both models proposed in this paper should not be seen as mutually exclusive. It would be possible to start with the Model 1 and progress toward Model 2. There is also potential to develop a hybrid model whereby the Implementation Committee in Model 1 interacts with PHC with the resulting advice feeding into the joint NBC/RDC meeting.

### *A Rationale and Implementation Strategy*

With both of these models there is no requirement for all parties to collaborate on all, or any projects. The main purpose is to ensure that shared purposes or common interests among various parties are clearly articulated then addressed. While the main focus would be to collaborate on strategic projects, there is no reason why specific more applied R,D&E could be focused on. HIA and CRDC for example may have identified a common research interest in whitefly research which may also be of interest to PHC members. Other plant RDCs would not be expected to be part of any such project. Similarly government jurisdictions may be interested in a particular investment area. However, the guiding philosophy would be that strategic investment can often achieve better outcomes when coordinated.

Conversely it may be that all plant RDCs would like a national approach to surveillance of a particular group of pests or can identify areas where unused surveillance capacity at one time of the year for one pest can be utilised at other times by other industries. Capacity building where required can also be addressed under this model with joint funding of scholarships.

Under both models, the plant RDCs will still maintain in-house biosecurity investment in areas that are of concern to only their constituents. However, even with these “in-house” investments the ability to share information adds greater value. An example here could be in surveillance whereby different sectors have needs for surveillance at different times. GRDC and HIA may see value in sharing spore trap costs as their respective periods of interest are complementary.

The key operational attribute present in both models is the flexibility in how parties can allocate funds in order to maintain accountability to their constituents. There is no compulsion to fund all activities by all parties. However once a commitment is made it needs to be fully supported and agreement reached on minimum investment times. Furthermore, both models allow additional investment parties to join the committee provided they satisfy the two criteria stated earlier.

Investments would be clustered into broader programs that wherever possible align with the current National R,D&E Strategy (Appendix 3). This will make access to longer term investment possible. The flexibility around contract management would not require a ‘one size fits all’ approach. How an investment is contracted can be determined at time of project definition and should be up those who are investing. Contracts could be managed by a lead agency, or by all parties having their own contracts separately with a provider or being handled by a third party.

The deployment of these models would be incremental. Development of a charter of operation or terms sheet would be an important first step in framing any committee's activities as would identification of success measures around individual investments and the committee's operation.

Regardless of the final model chosen, it will be necessary for each plant RDC to clearly develop and explain its biosecurity RD&E priorities and how they align with the National Plant Biosecurity R,D&E strategy. Whilst it is acknowledged that the current R,D&E Strategy is not seen as critical by the plant RDCs, it is seen as very important by government. Greater alignment will foster greater interest from governments.

Similarly the plant RDCs will need to prioritise specific pests and diseases, and develop an integrated document which collectively determines areas of shared interest. These shared areas of interest can be then used in seeking other investors.

An alternative to PHA chairing the Committee would be for an independent chair with PHA being a member of the Committee. The independent chair could come from the CRRDC or some other body of the Committee's choosing.

Resistance to change from existing members of the Implementation Committee may not be an issue, with many consulted in the preparation of this paper recognising the current challenges.

Both models address the criteria identified for successful cross-sectoral collaboration. The models enable the RDCs to play a leading role in National Plant Biosecurity R,D&E and ensure a coordinated approach to investment. The models are additive and can accommodate growth in membership. With not all members being bound to all investments, a larger committee operating in this environment will still function.

To implement either of these models will require an organisation to lead and champion the process. This organisation should have the responsibility for success. HIA is the current designated lead plant based RDC for biosecurity, fitting with the current CRRDC cross-sectoral plans.

The Rural R&D Profit program was discussed as an appropriate vehicle for seed funding. Initial enquiries suggest that this will require a creative approach as the fund is designed to support specific R&D initiatives and this proposal whilst addressing R,D&E, is not about a specific scientific research project.

### **Next Steps**

Harnessing in a timely manner the renewed commitment from the plant RDCs to cross sectoral investment is critical. The plant RDCs need to meet, agree or otherwise on progressing this position paper. Should either of the two recommended models put in this paper be accepted (or an alternative proposed), it is suggested that the plant RDCs will then need to formally engage with the NBC working group and the IGAB review team.

## Appendix 1

### Stakeholders interviewed in the preparation of this Report

Jessica	Lye	AUSVEG
Matt	Kealley	Cane Growers
Fran	Freeman	Commonwealth Government
Marion	Healy	Commonwealth Government
Matthew	Koval	Commonwealth Government
Kim	Ritman	Commonwealth Government
Nicola	Cottee	Cotton Australia
Ian	Taylor	CRDC
Bruce	Finney	CRDC
Susan	Mass	CRDC
Tim	Lester	CRRDC
Gary	Fitt	CSIRO
Chris	Lafferty	FWPA
Barry	Large	Grain Producers
Andrew	Weidemann	Grain Producers
Tanya	Pittard	Grain Producers
Ken	Young	GRDC
David	Moore	HIA
Anthony	Kachenko	HIA
Peter	Vaughan	NGIA
Greg	Fraser	PHA
Philippa	Stevens	Plant and Food New Zealand
John	Harvey	RIRDC
Will	Zacharin	South Australian Government
Michael	O'Shea	SRA
Peter	Allsopp	SRA
Lloyd	Klump	Tasmanian Government
Simone	Warner	AgVic(Victorian Government)
Gabrielle	Vivian-Smith	AgVic(Victorian Government)
Brendon	Rodoni	AgVic(Victorian Government)
Inca	Pearce	Vine Health Australia
Tania	Chapman	Voice of Horticulture
John	Dollisson	Voice of Horticulture
Liz	Waters	Wine Australia
Sharon	Harvey	Wine Australia

## Appendix 2

### National Plant Biosecurity R,D&E Strategies and Priorities<sup>5</sup>

R&D Priorities	Objectives	Benefits
(1) Minimise the risk of entry, establishment, or spread of exotic and emerging pests and diseases	<p>1A. Develop the knowledge base for assessing and managing the risks of new pests and diseases, invasion pathways, and the susceptibility of ecosystems to invasion, in a changing global environment</p> <p>1B. Enhance detection, surveillance and diagnostic systems</p> <p>1C. Understand the sociological factors associated with the adoption or lack of adoption of risk mitigation measures by stakeholders</p> <p>1D. Develop knowledge and strategies to prevent incursions and contain the spread of pests and diseases within national borders (off shore)</p> <p>1E. Develop tools and decision-making capability for prevention and response</p> <p>1F. Understand the risk factors that drive emergence of new pests and diseases</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> More cost effective allocation of limited resources for biosecurity risk management</li> <li><input type="checkbox"/> More cost effective responses to incursions</li> <li><input type="checkbox"/> Economic and social benefits from quicker return to normal trade and productivity</li> <li><input type="checkbox"/> All parties involved in the biosecurity system are committed and contribute to early warning systems</li> <li><input type="checkbox"/> More accurate, cheaper, faster diagnosis.</li> <li><input type="checkbox"/> More cost effective surveillance systems</li> <li><input type="checkbox"/> More effective control or eradication of pre-border threats</li> <li><input type="checkbox"/> Reduced risks to Australia and the region</li> </ul>
(2) Eradicate, control or mitigate the impact of emerging and established pests and diseases	<p>2A. Understand the movement of pests and diseases through environments</p> <p>2B. Develop effective and integrated approaches to managing established pests and diseases of national priority</p> <p>2C. Improve understanding of the life history/ecology of pests and diseases and the invaded system</p> <p>2D. Understand the interaction of pests and diseases with the invaded system</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Increased market access</li> <li><input type="checkbox"/> Increased productivity</li> <li><input type="checkbox"/> Decreased cost of control</li> <li><input type="checkbox"/> Public health benefits (zoonotic diseases)</li> </ul>
(3) Understand and quantify the impacts of pests and diseases	<p>3A. Improve understanding of the environmental, economic, and social impacts of pests and diseases and management activities</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> More cost effective allocation of limited resources for biosecurity risk management</li> </ul>

<sup>5</sup> SOURCE – National Plant Biosecurity Research, Development & Extension Strategy 2013-216 (page 19)  
[http://www.npirdef.org/files/resourceLibrary/resource/90\\_PlantBiosecurityRDEStrategy\\_DEC14\\_PRINT.pdf](http://www.npirdef.org/files/resourceLibrary/resource/90_PlantBiosecurityRDEStrategy_DEC14_PRINT.pdf)

	3B. Develop the knowledge base and protocols for managing the invasion risks posed by one sector for others	
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(4) Cost effectively demonstrate the absence of significant pests and diseases	4A. Develop tools that can cost effectively demonstrate the absence of national priority pests and diseases including area or regional freedom	<input type="checkbox"/> Maintenance and growth of trade and market access <input type="checkbox"/> Reduced costs for disease control <input type="checkbox"/> Increased competitive advantage
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