**National Potato Industry Biosecurity Surveillance Strategy**

**2020 - 2025**

Prepared by Plant Health Australia, with funding provided through the Agricultural Competitiveness White Paper

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**Acknowledgements**

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<<BREAKOUT BOX >> Note that this is a design instruction for all break out boxes and won’t appear in the strategy

**Pest Definitions:**

**Plant Pest** - the definition of a plant pest used within this strategy covers any species, strain or biotype of invertebrate pest or pathogen injurious to plants, plant products or bees or impacting social amenity or the environment.

**National Priority Plant Pests (NPPP)** - a list of pests that have been identified by Plant Health Committee as priority pests that are either exotic to Australia, under eradication or have limited distribution within Australia.

**High Priority Pests** - pests identified as posing the greatest risk to the relevant plant industry based on an assessment of the risks of entry, establishment, spread and economic impact. Identification of High Priority Pests are carried out through the development of biosecurity plans specific to each industry. High Priority Pests for each industry are reviewed annually and may change as risks change.

**Exotic pests** are defined as those pests not currently in Australia.

**Established pests** are defined as those pests present in Australia.

**Notifiable pest** are plant pests that have invaded a distinct region of Australia, where they are contained via regulation and under government control.

# National Potato Industry Biosecurity Surveillance Strategy

# Overview

The potato industry within Australia is the single largest horticultural crop by volume and one of the largest horticultural industries, with an annual production of around 1.3 million tonnes worth $745 million in 2019. Structurally, the potato industry can be considered in three distinct sectors: processing potatoes, fresh or ware potatoes, and seed potatoes. While producing the same crop, these sectors are structurally unique, growing different varieties and with separate commercial relationships.

While pests may have different impacts on these sectors, in overall terms, the potato industry is free from many significant exotic pests that impact production and trade overseas, and Australia has a comprehensive biosecurity system that minimises the likelihood of their introduction and establishment. For some significant pests that are only present in certain regions in Australia, biosecurity measures serve to minimise their spread. Despite these systems, protecting the potato industry from new pest introductions remains a continual challenge, due to the ever-increasing volumes of people, cargo and mail reaching our shores every year.

New pest introductions can impact production and profitability in a variety of ways. These include quarantining of production facilities, disruption or closure of domestic and international markets, loss of livelihoods, an increase in production costs, changes to the complexity of crop management, increases in chemical usage and disruption to Integrated Pest Management systems. To minimise these impacts, surveillance and crop monitoring can improve the likelihood of early detection, providing the greatest chance of eradication before a pest becomes firmly established, or allowing containment measures to be put in place to limit its spread. Surveillance, and the collection of data and information on the presence or absence of pests, also provides vital evidence that supports international and domestic market access. From an individual grower’s perspective however, the consequences of the detection of an exotic pest can be financially and socially significant. Within the growing community, and the agronomists that support them, there is a level of reticence to report a suspected exotic pest because they are unaware of the support systems in place or they regard these systems to be inadequate. They also have a lack of faith in being adequately compensated for the true extent of damage incurred as the result of an incursion response.

The development of arrangements that identify, prioritise and coordinate surveillance activities and address and resolve existing impediments to surveillance and reporting will have long term significant benefits for the potato industry. The ability to capture, collate and share surveillance information will build knowledge that will drive greater efficiency in the biosecurity system, improve incursion response and support market access outcomes.

# Purpose of the Strategy

This National Potato Industry Biosecurity Surveillance Strategy (NPIBSS) has been developed to provide a framework for identifying and coordinating national surveillance priorities and activities in potato crops across stakeholders. The NPIBSS will aim to support surveillance and effective biosecurity to ensure the potato industry is informed, resilient, engaged and globally competitive.

Once implemented, this strategy will facilitate activities that capture and collate potato industry surveillance data nationally from commercial production, urban and peri-urban areas and high risk sites. Improving surveillance will provide valuable information to improve the response to exotic pest incursions, support domestic and international market access, and improve pest management.

# Scope

The NPIBSS provides a framework for implementation of industry pest surveillance activities in the ware, processing and seed sectors of the potato industry, and build partnerships with government across the continuum of pre-border, border and post border. For pest surveillance that crosses multiple industries, the NPIBSS priorities seek to develop linkages with government jurisdictions and other plant industries.

# Strategy goals and principles

Four interconnected goals, and their accompanying priorities and actions will form the basis of an Implementation Plan that will outline improvements to national surveillance. Implementation of the NPIBSS will improve engagement and communication, identify and reduce barriers to undertaking surveillance and reporting of new pests and promote national capture, sharing and consistency of surveillance data to improve efficiency within and between industry and governments.

For surveillance activities to be widely adopted, they must integrate as much as possible into existing crop monitoring undertaken by the potato industry and with support from tools and systems that harmonise and improve collection of information.

Success of surveillance outcomes will be measured by the ability to monitor, capture and analyse crop monitoring data, achieve early detection of new pests and provide evidence of pest status that supports market access. Activities will be delivered and monitored through an Implementation Plan that supports this strategy.

Figure 1 Potato industry biosecurity surveillance

**To support surveillance and effective biosecurity to ensure the potato industry is agile, informed, resilient, engaged and globally competitive.**

***Goal 1***

Early detection of exotic pests to provide greater opportunity for eradication

***Goal 2***

collaboration and coordination to support shared biosecurity surveillance outcomes and crop health management

***Goal 3***

communication, awareness and training to build capacity and capability for surveillance and biosecurity

***Goal 4***

Pest information to support market access, industry growth and business continuity

**Industry actively participating in biosecurity surveillance**

Australian Government

Other industries

State government

Urban and peri urban

Potato industry

**Stakeholders**

* On-farm biosecurity practices actively adopted and implemented in the potato industry
* Improved communication between government and industry, and specifically during an incursion
* Decision and reporting tools available and used
* Growers reporting suspect new pests and providing data to support market access
* farm biosecurity plans specific to each potato sector and/or business
* improve engagement between government and industry
* information to growers on the general processes of incursion management to support reporting and early detection
* mechanisms to address barriers to pest reporting and collection of surveillance data

**Skilled personnel able to undertake surveillance to support the potato industry**

**Improved decision making, support for crop health management and reduction in business risk**

**Vision statement**

**Goals**

**Long**

**Short**

**Medium**

* Improved diagnostic capacity to support surveillance efforts
* Improved industry capacity to perform surveillance
* Development and delivery of tools (training) and systems to support surveillance
* Implementation plan with sustainable funding in place to support surveillance in the potato industry
* Surveillance data captured, analysed and shared within and between plant industries and governments
* Minimal domestic market access closures
* Harmonized practices across all jurisdictions and industries

**Outcomes**

* Gap and stakeholder analysis to determine capacity and capability requirements for diagnostics to support surveillance
* Training and support materials provided to crop scouts / personnel doing surveillance in the potato industry
* Gap and stakeholder analysis to determine capacity and capability requirements for surveillance and data capture
* Road map with timelines, targets and measurements of success;
* Planning and prioritisation of key pest targets for surveillance and preparedness
* Identification and implementation of systems and tools for the capture of pest information
* Agreement between state jurisdictions and preparedness plans in place to support domestic market access

*Table 2 National Potato Industry Biosecurity Surveillance Strategy – Summary of Goals and Actions*

|  |  |
| --- | --- |
| GOAL 1: Early detection of exotic pests to provide greater opportunity for eradication | |
| ***Priority 1.1*** | Address barriers to surveillance and reporting |
| ***Priority 1.2*** | Identify and prioritise key potato pest threats, high risk areas and surveillance methods |
| ***Priority 1.3*** | Integrate surveillance for exotic and regionalised pests into existing commercial crop monitoring practices and systems |
| ***Priority 1.4*** | Improve surveillance for exotic and regionalised pests in urban and peri-urban communities |
| ***Priority 1.5*** | Improve consistency and efficiency of surveillance through development of tools, protocols, technologies and plans |
| ***Priority 1.6*** | Establish and maintain diagnostic skills, expertise and resources to support the National Potato Industry Biosecurity Surveillance Program |
| **GOAL 2: Collaboration and coordination to support shared biosecurity surveillance outcomes and crop health management** | |
| ***Priority 2.1*** | Establish a National Potato Industry Biosecurity Surveillance Program (NPIBSP) |
| ***Priority 2.2*** | Develop and maintain national collaborative arrangements including funding to support surveillance and diagnostics for potato pests |
| ***Priority 2.3*** | Establish partnerships to support surveillance for pests of the potato industry |
| ***Priority 2.4*** | Develop business continuity plans and establish market access arrangements for key potato industry pests |
| **GOAL 3: Communication, awareness and training to build capacity and capability for surveillance and biosecurity** | |
| ***Priority 3.1*** | Develop communication and engagement mechanisms to support surveillance |
| ***Priority 3.2*** | Develop training to improve capacity and capability for surveillance |
| **GOAL 4: Pest information to support market access, industry growth and business continuity** | |
| ***Priority 4.1*** | Establish mechanisms and systems for the national sharing, aggregation and management of data to support market access |
| ***Priority 4.2*** | Develop mechanisms, tools and protocols for consistent data capture and sharing |
| ***Priority 4.3*** | Improved diagnostic capacity to support surveillance efforts |

# The Australian potato industry

The potato industry within Australia is the single largest horticultural crop by volume and one of the largest horticultural industries based on the value of production. The Australian potato crop, grown on about 28,000 hectares of land, currently has a stable annual production of around 1.3 million tonnes estimated to be worth $745 million in 2019 (Hort Innovation 2019). The potato industry is represented by its peak industry body, AUSVEG, who provide expert advice and advocacy in key areas including biosecurity, market access, RDE coordination and crops forecasting and plantings.

Structurally, the potato industry can be considered in three distinct sectors: processing potatoes, fresh or ware potatoes, and seed potatoes. While producing the same crop, these sectors are structurally unique, with separate commercial markets that require different varieties with specific requirements for size, dry matter and sugar content. Different types of pest and disease management and crop monitoring can also be specific to these different sectors.

Potatoes are grown commercially in all states of Australia, but not the two Territories. Production is somewhat aggregated within specific areas as shown in Figure 2. Most of Australia’s commercial production occurs within South Australia, Tasmania, and Victoria as shown in Figure 3. Australian Bureau of Statistic figures for 2016-2017 indicated there were over 850 potato producing businesses within Australia. South Australia grows the majority of ware potatoes, Tasmania is the major producer of processing potatoes. Fresh and processed potatoes are mainly delivered to the domestic market, with a small proportion exported to international markets. Seed potatoes are largely produced in Victoria and Western Australia. Further information on the potato industry is provided in Appendix A.

In addition to commercial production, potatoes are also widely grown non-commercially across Australia, both in backyards and community gardens.



Figure 2 - Potato production areas within Australia by Statistical Area Level 2 (ABS 2016)



Figure 3: Potato production percentage by state (all sectors combined)

# Biosecurity and the Potato Industry

Australia’s geographic isolation and limited pathways for trade in potatoes, as only germplasm material can be legally imported which goes through a strict post entry quarantine process, means that many of the world’s most damaging potato pests have not yet entered and established within Australia. Absence of these pests and diseases, provide a relative advantage in terms of productivity, pest control costs, and market access opportunities.

However, the potato industry is not devoid of important pests. Pests such as the Potato cyst nematode (*Globodera rostochiensis*), Tomato potato psyllid (*Bactericera cockerelli*) and a strain of Potato spindle tuber viroid are regionalised, i.e. they occur only within parts of Australia. Management of these pests is a significant impost on growers and preventing their spread to all growing regions is a significant and ongoing task for industry and governments.

Biosecurity within the potato industry is also impacted by external factors. Potatoes are part of the Solanaceae family and share many of the pests and disease that affect other members of this family, including tomatoes, capsicum, chilli, and eggplant, and weedy plants such as nightshades. These plants can act as hosts and sources of pest and disease pressure for potatoes, just as potato crops can be a host and source of pests important to other crops.

Another important source of pest and disease risk is the presence of plants in urban and peri-urban and which can host potato pests. This can include plants grown in backyards or community gardens, as well as weeds or volunteer plants growing on roadsides and other public spaces.

<<Breakout box>>

**The Emergency Plant Pest Response Deed**While governments have particular statuatory responsibilities in the biosecurity system, the potato industry and growers also have an important role to play in biosecurity. The Australian potato industry signed up to the cost-sharing arrangements of the Emergency Plant Pest Response Deed (EPPRD) in November 2008 through AUSVEG, the industry representative body for vegetable and potato growers in Australia. While the EPPRD has a focus on eradication response arrangements, signatories to the EPPRD also have a commitment to an on-going process of risk mitigation and promotion of improvements to biosecurity measures, including improvements to surveillance. There is a need to provide a framework for how to best fund, coordinate and manage these activities for the potato industry.

## Impacts of new pest introductions

New pest introductions threaten potato production in several ways. One of the most direct impacts is through decreased productivity and increased management costs. With the introduction of a new pest, population levels often spike as initially there are few management practices or natural enemies to minimise their impact. Application of emergency control measures, while often effective against the newly introduced pest, may impact on established control programs, especially where integrated pest management is in place and where natural enemies are an important part of a pest management program. Over time, a new equilibrium will be reached, but often with increased pest and disease management costs, and potentially with ongoing yield and quality impacts.

Another impact of new pest incursion is the potential imposition of quarantine restrictions on affected properties. These can include destruction of host crops, implementation of costly pest control treatments, and restriction of movement or sale of certain produce. Staff and machinery may even be prohibited from coming onto the property. These measures could be in place for significant lengths of time until the pests have been eradicated or it is deemed unable to be eradicated.

Other flow on effects that impact growers as a result of new pest introductions include an increased call on levy arrangements either for eradication or research and development required to determine the most effective management systems to control the pest.

New pests can also have impacts on market access. As all importing states and/or countries seek to maintain freedom from exotic pests, the incursion of a new pest may result in market access restrictions, ranging from complete prohibition through to the introduction of additional import requirements. If knowledge on a pest’s distribution is poorly known, major disruption can occur to markets until information is available to support appropriate management or containment measures, and this can cause substantial impacts to producers, exporters and importers.

## High priority pests of potatoes

In the Biosecurity Plan for the Potato Industry (version 3.1, February 2019), a total of 207 pests and pathogens were identified and assessed as potential threats to the potato industry within Australia. Of these, 13 pests and pathogens were categorised as ‘High Priority Pests’ (HPPs), the most serious exotic threats based on the potential to enter and establish in Australia and the consequences if this were to occur. A summary of the identified HPPs and the other crops that can be affected by these pests and pathogens is included in Appendix B.

Given the importance of these pest threats, prioritising surveillance to improve early detection and support market access will contribute to long term growth and sustainability of potato production in Australia. The nature of these pests will require different surveillance techniques, ranging from visual inspection through to specific laboratory-based diagnostics. Planning, prioritisation and collaboration as part of a nationally coordinated surveillance program, will identify how surveillance can be integrated into existing systems and maximise effectiveness and efficiency of surveillance activities across different stakeholders.

# National approach to Biosecurity

<<Breakout box>>

To maintain freedom from exotic pests, Australia places a high priority on a biosecurity system that is made up of activities operating pre-border, at the border and post-border, collectively referred to as the biosecurity continuum. This system works through partnerships between government and industry, with support from the community, to reduce the risk of new pests entering and becoming established. Surveillance includes actions that involve determining the plant pest status in a business, crop, region or jurisdiction and is an important component of the biosecurity system.

## The biosecurity continuum

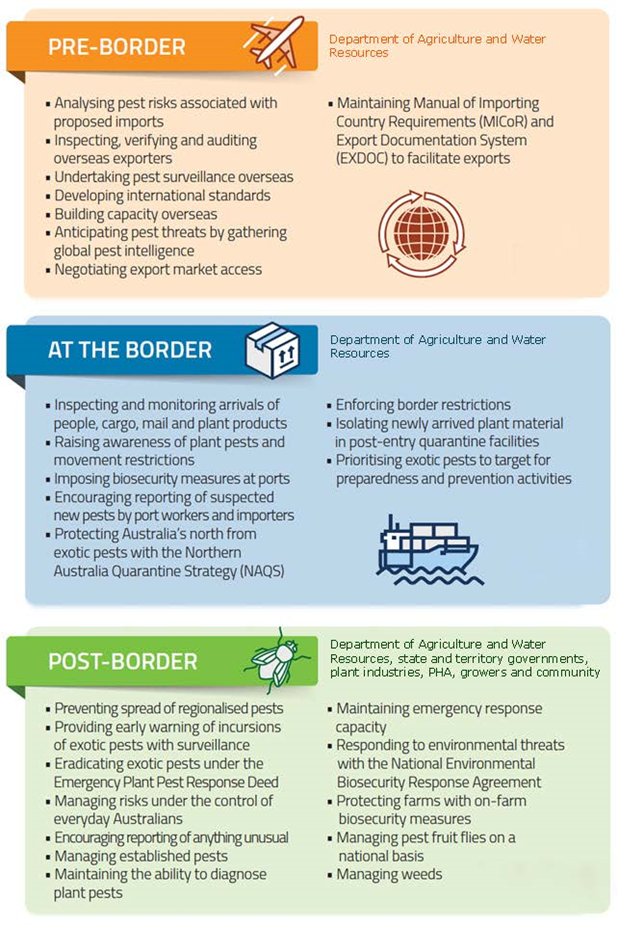
Horticultural production throughout the world faces many crop protection challenges, and Australia’s freedom from important exotic pests that affect production overseas provides advantages that assists to make Australian industries profitable and of high quality. Consistent with a shared approach to biosecurity, Australia places a high priority on a biosecurity system that operates through the biosecurity continuum of pre-border, border and post-border (Figure 4), assisting to protect Australia’s agricultural industries from pest threats. 

Figure 4 - Biosecurity activities that reduce the risk of entry and establishment of exotic pests

## National agreements and strategies that support biosecurity outcomes

The Australian Government and state and territory governments work under the principles set out in the Intergovernmental Agreement on Biosecurity (IGAB) which aims to strengthen partnerships and improve outcomes for biosecurity including national surveillance and diagnostic capacities. The National Plant Biosecurity Strategy, National Plant Biosecurity Surveillance Strategy and National Plant Biosecurity Diagnostic Strategy outline a vision for strengthening the plant biosecurity system. The NPIBSS will complement these activities through a partnership approach to surveillance for exotic pests and pests of market access concern.

To support surveillance, in the event of a new detection of a plant pest, response is managed under the guiding framework of the Emergency Plant Pest Response Deed (EPPRD), which is a legally binding agreement between PHA, the Australian Government, all state and territory governments and national plant industry body [signatories](http://www.planthealthaustralia.com.au/biosecurity/emergency-plant-pest-response-deed/epprd-signatories/). The EPPRD outlines roles and responsibilities of Australian governments and plant industries in the management and funding of responses to new plant pests, and provides mechanisms to support growers impacted in an eradication response through the Owner Reimbursement Costs (ORC) framework.

# Importance of Surveillance

Global biosecurity risks are increasing due to increased trade and tourism, the speed at which travel now occurs, agricultural expansion and intensification, urbanisation close to farmlands, and other factors such as climate change. The biosecurity system needs to be able to keep up with these challenges, and surveillance plays an important role at all stages of the biosecurity continuum. Surveillance and crop monitoring support early warning and early detection of new pests, to assist maintain or gain access to markets and to delimit the extent of spread of new pest detections. An understanding of pest status and distribution through surveillance and crop monitoring supports the delivery of more effective management practices for new and emerging pest issues

Surveillance is made up of a range of activities including crop monitoring and sampling, data collection and analysis, risk and pathway assessment, and communication and engagement, and these activities can be undertaken by a wide range of stakeholders in industry, government and the community. The aim of biosecurity surveillance is to look for pests and diseases that are not yet present in the country or the region/state. Given the large potential areas to be covered in Australia, and the number of pathways that can introduce new pests, the task of surveillance is larger than any one agency or group.

Biosecurity surveillance is used for:

* **Early detection** of pest incursions - early detection is important as, the smaller the area of pest incursion, the higher the likelihood of successful eradication, reducing the cost or overall impact of an incursion.
* **Delimiting** the distribution of a pest - determining the extent of the incursion or spread of a pest provides vital information to support the feasibility and cost of pest eradication or containment.
* **Market access** - Ongoing evidence that a pest or pathogen is absent is needed as export and interstate markets want assurance that important pests and diseases will not be introduced with traded commodities.

## Types of surveillance

According to the International Standards for Phytosanitary Measures (ISPM 6), surveillance is ‘an official process which collects and records data on pest presence or absence by survey, monitoring, or other procedures’. The international standards also focus on a few specific pest statuses: present; absent; restricted distribution; and low prevalence. Each status may have specific implications for market access, or the quarantine measures applied to consignments.

Surveillance can broadly be described as:

* **Specific surveillance** - defined as the gathering of information on pests and diseases through an active process targeting specific pests over a defined period of time. Such activities demonstrate which pests are present or absent in a region and are typically highly structured, with records captured on pest and host targets, date, location, pest levels (including pest absence).
* **General surveillance** - defined as the gathering of information on pests and diseases through activities such as reports from members of the public, and monitoring undertaken by growers, researchers and government bodies. General surveillance activities can vary significantly in their structure and the detail of information collected.
* **Crop monitoring** - at a property level surveillance is termed crop monitoring and is usually driven by the need to make decisions about crop management. Crop monitoring can either be specific (if activities are structured around target pests and appropriate records are gathered), or general (if activities are undertaken to broadly monitor pest levels to undertake management decisions).

While both types of surveillance can provide valuable information on the presence or absence of certain pests and diseases, the structured nature of specific surveillance often provides a higher overall level of confidence. However, specific surveillance can also incur substantial costs and for this reason will often be limited in duration and/or location.

In contrast, general surveillance can be more flexible and integrate with existing practices at the farm or community level. The confidence provided by general surveillance occurs through the large coverage and potentially large quantity of data collected. Thus, surveillance data collected by plant production industries and governments can strongly contribute to an overall “evidence of absence” and it is particularly valuable when there is information on whether and which exotic pests are included in crop inspection/monitoring programs.

## Integration of surveillance

A surveillance model which integrates specific surveillance and general surveillance in a stepwise introduction of surveillance allows all involved to learn and systems to improve. This is preferable to introducing a complex and rigid system that will not achieve buy in by industry and may fail to deliver biosecurity outcomes.

Crop monitoring to assess pest levels to support crop production practices can be either specific surveillance (if activities are structured and appropriate records are gathered), or general surveillance (if activities can be described but few formal records are gathered). Further development of surveillance through routine crop monitoring is expected to encourage participation. This participatory surveillance involves the use of trained people to conduct semi-structured or unstructured interviews / workshops with farmers, and the use of a variety of tools to get an overall assessment of the problems and needs of the growers for crop health management and ‘new’ pest and disease detection.

While the prime objective of participatory approaches remains surveillance i.e. gaining quantitative data on the occurrence of pests and diseases and detection of exotics, in order to promote and implement participatory surveillance initiatives, the purpose and business need must be defined and communicated. It is essential that data are reported back to growers to provide value for any additional effort in integrating surveillance and data collection into farm operations. It will also be necessary to define the purpose of data collection and spatial resolution at which the data are collected to allow agreements to be developed on the type and quantity of data to be shared between industry and government.

Breakout box

**CropSafe as a learning model**

CropSafe is a collaborative government / industry surveillance model run by Agriculture Victoria in the grain growing regions of Victoria. It is an active, self-help 'eyes in the field' surveillance system looking out for new pests and diseases. Agriculture Victoria delivers the CropSafe program in collaboration with a number of major agribusiness companies and a network of private consultants. Together, this cluster incorporates approximately 80 per cent of Victoria's grain agronomists.

CropSafe has worked within the industry for 8 years to develop trust and collaboration with the industry, to build a network of over 200 experienced agronomists continually looking for new pests and diseases. The CropSafe program has streamlined sample submission, analysis, reporting and record keeping, with individual agronomists provided with results and the whole network provided with summarised monthly updates on disease occurrence and trends.

# Roles and responsibilities for surveillance

## The Australian Government

The Australian Government is responsible for identifying global risks and pathways for the entry of exotic pest threats of agriculture into Australia and working with trading partners to mitigate risks posed by the movement of goods and passengers entering Australia. Pre-border and border measures provide early warning for new and emerging pest threats for Australian potato production and are important components of identifying and prioritising targets for surveillance onshore. Activities aimed at reducing the risk of entry of pests include engagement in bilateral and multi-lateral forums, import risk assessments and audits, and offshore treatment and inspections to ensure that exporting countries meet Australia’s biosecurity requirements.

At the border, the Department of Agriculture (DA) has primary responsibility for border biosecurity activities such as screening and inspection of cargo, passengers, mail, plants and plant products for quarantine risk materials. In addition, Department of Agriculture (DA) has established border surveillance programs that monitor for incursions of exotic plant pests in and around major ports of entry. DA represents Australia in activities to develop and implement international agreements (phytosanitary agreements) that aim to prevent the global spread of plant pests while still allowing countries to trade. These international agreements underpin actions taken under Australia’s plant biosecurity surveillance system, and set requirements that must be met by Australian producers looking to trade overseas.

## State and territory governments

State and territory deliver the National Plant Health Surveillance Program, funded by DA. This program targets exotic high priority Potato pests including exotic Serpentine leafminer (*Liriomyza huidobrensis*) Vegetable leafminer (*Liriomyza sativae*), American leafminer (*Liriomyza trifolii*), Zebra chip complex (*Candidatus* Liberibacter solanacearum (haplotypes A and B)), Tomato potato psyllid (*Bactericera cockerelli*). Potato spindle tuber viroid (National Plant Biosecurity Status Report 2018). In addition, state and territory jurisdictions conduct a number of surveillance programs specific to their regions targeting exotic and established potato crop pests.

State and territory governments are also responsible for the delivery of plant biosecurity operations, including surveillance, delimiting the extent of pests, leading the response to the detection and spread of new plant pests and supporting legislation within their borders.

State and territory agriculture departments work closely with plant industries, each other and the Australian government to put sound biosecurity policies in place, and provide awareness material and information to that supports surveillance to maintain and expand market access for plant industries. State and territories provide diagnostic capacity to identify plant pests, as part of efforts for early detection, to determine pest presence or absence, or to determine the limits of establishment following detection of new pests.

## The potato industry

Current surveillance activities within the potato industry focus on addressing day-to-day crop management needs and ensuring that market expectations are met. This is best described as an ongoing “crop monitoring” approach and considers a wide range of issues including pests and diseases, nutritional aspects and product quality.

Crop monitoring includes assessing general crop health such as yield and signs of issues or nutrient deficiencies. Formal pest scouting activities may also be undertaken at specific stages of crop development or after weather events, through “crop walks” or “crop checks”, as general inspections of the crop. These are primarily for assessing if any Integrated Pest Management (IPM) measures are being effective or to assess whether an insecticide spray is necessary to control insect pests in the crop. Crop monitoring activities are usually undertaken by agribusiness companies, IPM consultants, independent crop advisers, or the producers themselves. In the largest businesses, crop inspection and monitoring activities may be conducted by dedicated staff or advisers.

Specific pest surveillance is undertaken at high disease pressure times, especially for key pests and diseases of concern such as early and late blight, botrytis and powdery scab. Records of targeted inspections/scouting or monitoring are recorded at varying frequencies and levels of detail and may be kept in diaries, in record sheets or electronically using spreadsheets, various apps or Farm Management Software. Proficiency of data capture and management varies depending on the type and size of the business.

In the certified seed sector, monitoring and surveillance for pest and disease is even more targeted, and highly trained field personnel will undertake surveillance and record information on specific pests and diseases at key times during the growing season. More detailed information on surveillance in the potato industry is provided in Appendix A.

## Other plant industries

Pests that affect potatoes may also be present or move into and within Australia on other host plants. As a result, surveillance and monitoring in other plant industries will contribute to a national picture of pest distribution or pest absence.

By identifying, capturing and collating the different types of monitoring activities being undertaken across different crops and regions, the overall quantity and quality of surveillance information is increased, creating efficiencies across industry sectors and governments.

## Communities

Many members of the Australian public grow potatoes or plants that are hosts of significant potato pests. Members of the public can also be a risk to potato production, providing a pathway for new pest introductions through inadvertent or deliberate movement of plant material into and within Australia. Increasing awareness about biosecurity and impacts of new pest introductions can be important in reducing the risks to potato production.

In addition, despite having no specific commercial driver to undertake surveillance, members of the community, especially those with an interest in gardening and food production, provide an opportunity to undertake monitoring that could support early detection of new pests.

# Barriers to surveillance, reporting and data sharing

Despite the many reasons and mechanisms for undertaking surveillance, there are currently barriers for potato growers, members of the potato growing supply chain and community to undertake surveillance and report new pests. These barriers include a lack of awareness about the need for surveillance and the impact of new pests, a lack of awareness about mechanisms for reporting, a lack of tools to assist surveillance and collection and sharing of data, lack of business drivers to undertake surveillance, fear of quarantine and loss of business and social standing, and above all, a lack of trust in compensation mechanisms during a response.

Biosecurity is currently seen as a government function of mainly border protection and facilitating international and interstate trade, not a shared responsibility by the industry. Within potato growers there is a lack of understanding and trust in the processes surrounding response to pest incursions and the use of surveillance data collected from farms, and this significantly impacts on willingness to contribute to surveillance, reporting and data sharing.

For potato growers, there are also few apparent business drivers to encourage surveillance and collection of information on pest absence of pests. Only the seed potato sector is currently exporting and interested in growing exports. Nevertheless, for the potato industry to expand its export markets, ongoing surveillance records may be needed to prove area freedom and engagement and awareness through the potato industry will be required to highlight these opportunities.

Historically, apart from the regionalised presence Potato cyst nematode (*Globodera rostochienisis*) since the 1980’s, and reporting detections of Potato spindle tuber viroid (PSTVd) there have been few requirements in the potato industry for declarations of pest freedom. More recently, a detection of Tomato potato psyllid (*Bactericera cockerelli*) in Australia in 2017 was not considered technically feasible to eradicate, and this has highlighted the need for early detection of new pests as well as the need to prove area freedom of pests from different regions in Australia.

### Challenges for improving surveillance to support the potato industry

For the greatest opportunity to eradicate or manage an exotic pest, it is imperative that pests are reported before they become widely established. If a potato grower doesn’t report a new pest, then the potential implications can be serious, not only for their business, but for the entire industry.

In Australia, processes to support response to pest incursions are prescribed within the EPPRD, a legally binding agreement between its plant industry and government signatories. The EPPRD provides a strong framework that defines shared responsibilities and decision-making across industry and government for management and funding of responses to new pest incursions in Australia. Through representation of their Peak Industry Body, AUSVEG, there is the potential for reimbursement costs to potato growers that are involved in cost-shared responses to incursions.

Despite these processes, from an individual grower’s perspective, the consequences of the detection of an exotic pest can still be financially and socially significant. For regional communities, growers and consultants, there can be reticence to undertake surveillance, allow access to a property or report a suspected exotic pest. This can occur because there is poor awareness of the support systems that will be provided, there is a lack of trust in these systems or they are regarded as being inadequate and will not fully compensate for losses to their livelihood or loss market access and opportunities. It is imperative that these support systems leave a business owner no better or worse off for having reported.

Within industry there can also be significant cultural factors to reporting, including ‘languages other than English’ speaking growers and for some sections of the community, a historical perception of government as authoritarian as a result of previous experience with persecution. In small regional communities, there can be a fear of social ostracism or loss of social standing as a result of having reported a new pest incursion in a region.

An opportunity for addressing these cultural issues and improving resilience for individuals or communities is through improvements to mechanisms that support the recovery phase associated with pest incursions, in a similar way that we have learnt from natural disaster emergency responses in Australia. Identification of mechanisms to support recovery will have a positive impact on willingness to both contribute to surveillance efforts and report potential new pest detections.

The establishment of systems that both recognise and promote the contribution of industry surveillance data, as well as support recovery should a new pest be detected will assist resolve current challenges in improving surveillance in the potato industry. These improvements will provide the incentive or business drivers for growers to contribute to surveillance programs, especially when coupled with information on the benefits of early detection and trade opportunities.

### Barriers to data sharing

Uncertainties around data recording, management, ownership and protocols are also a critical barrier to reporting, even for general surveillance findings. Data is usually proprietary to each business and is commercially important, hence growers and consultants can be hesitant to share specific property level data. This is an even larger issue for the major agronomy companies as having sole access to crop monitoring and trend data contributes to their competitive advantage. Consequently, all parts of the potato supply chain could be unwilling to share this valuable information without clear data sharing agreements and guarantees on data confidentiality.

Processes are also required to support and recognise the value of data collected from industry sources. Historically, surveillance has been undertaken by government staff, but with ongoing reduction in government resources, mechanisms to broaden the number and type of personnel who undertake surveillance must be identified. Growers and their consultants are best placed to undertake surveillance through operations for day to day management of established pests, however additional efforts to identify exotic pests and/or pests of market access concern and record this information must be supported by recognition and trust by government in both the effort and statistical value of data collected by industry. Industry also needs a clear understanding of how data will be used and shared and the potential consequences of a pest detection.

In addition to requiring a clear purpose to share data, for the bulk of smaller potato growing enterprises, operations are conducted by a single person, family or a small staff. For most, the purpose of crop monitoring is to detect any pest or disease issues before they become a significant issue and affect yield and historically, few consistent records may have been kept. Over time however there has been an increasing need for records to be captured and maintained for a range of reasons including chemical usage, IPM programs, food safety and traceability of products. For surveillance, it is also expected there will be an increasing importance on the collection and maintenance of structured records for market access. The development of tools and systems that support national consistency of surveillance and data capture as well as the resolution of barriers to sharing and reporting this data form an important component of this strategy.

Where data collection can occur through already existing pathways rather than creating additional paperwork, data entry or other processes will promote greatest uptake through the potato industry. Hence data collection needs to be integrated, where possible into a “business as usual” approach.

### Moving forward

Development of an effective surveillance framework will require identification of specific business and social drivers that outline the value that surveillance and data collection provides to each business and region, as well strong engagement between government and industry. Improvements in engagement, and collaboration will be needed to create a whole-of-industry mindset to create an industry that is informed, resilient, engaged and globally competitive.

The development and implementation of this strategy will provide a framework to identify, address and resolve some of these existing impediments to surveillance and reporting, promoting greater trust and more effective surveillance outcomes.

# National Potato Industry Biosecurity Surveillance Strategy

The vision of the strategy is to support surveillance and effective biosecurity to ensure the potato industry is informed, resilient, engaged and globally competitive.

To address the short, medium and long terms outcomes identified in Table 1, the following four goals of the National Potato Industry Biosecurity Surveillance Strategy (NPIBSS) have been identified:

**Goal 1**  Early detection of exotic pests to provide greater opportunity for eradication

**Goal 2** Collaboration and coordination to support shared biosecurity surveillance outcomes and crop health management

**Goal 3** Communication, awareness and training to build capacity and capability for surveillance and biosecurity

**Goal 4** Pest information to support market access, industry growth and business continuity

A range of priorities for each goal have been identified which develop and build on existing activities in surveillance.

Goals and priorities in the NPIBSS will improve engagement and communication, build trust as well as support the development of tools for potato industry surveillance such as surveillance protocols, training material and diagnostic methods. Success of surveillance outcomes will be measured by the ability to monitor, capture and analyse data to support early detection of new pests and provide evidence of pest status. Activities will be delivered and monitored through an Implementation Plan that supports this strategy.

## Goal 1 Early detection of exotic pests to provide greater opportunity for eradication



A range of surveillance related activities take place within Australia’s potato industry, undertaken by growers, processors, certification bodies, and government agencies. The purpose of these activities varies greatly, ranging from crop monitoring to support crop health and productivity, through to surveys to confirm area freedom from specific pests, but all have the potential to support early detection of new pests. There is significant potential to improve these activities however, ranging from tools and systems to capture information through to removing barriers to reporting new pests.

Recognising that many exotic pest incursions are first detected within urban and peri-urban areas, and that potential entry pathways most commonly involve major population centres, increasing awareness, communication and engagement within these areas is expected to have significant benefits for early detection of new pests. Other stakeholders such as nurseries, government officers, researchers, crops scouts, crop consultants, packing shed personnel, community and special interest groups and local government officers should also be contributors to an effective and integrated surveillance system. There are significant opportunities to improve surveillance from this range of stakeholders, ranging from tools to support reporting to programs that target individuals and groups best placed to undertake surveillance.

Whatever the approach, early detection will be improved in both commercial plant production and urban and peri-urban communities, by targeting and prioritising efforts in areas of highest risk and by ensuring that diagnostic services are available to support surveillance.

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| *Goal 1 - Early detection of exotic pests to provide greater opportunity for eradication* | | |
| **Priority** | **Rationale** | **Description** |
| **1.1 Address barriers to surveillance and reporting** | Current barriers to surveillance and reporting include a lack of awareness about new pests and about mechanisms for reporting, and a lack of tools to assist surveillance and collection and sharing of data. For potato growers, there is a lack of understanding or trust in processes surrounding response to new pest incursions, and this impacts on willingness to contribute to surveillance and reporting. | * Raising awareness of the importance of surveillance and biosecurity and the processes for responding to pest incursions * Removal of barriers for ‘first reporters’ through improvements to Owner Reimbursements costs for potato growers * Investigation and implementation of mechanisms to support a Recovery Phase for pest incursions to support industry and promote trust |
| **1.2 Identify, prioritise and coordinate pest targets, areas and surveillance methods** | Planning and prioritisation are needed to undertake surveillance on pests of most importance and in areas of highest risk and greatest return. | * Surveillance schedules and plans for key pest threats or pest groupings developed based on risk, impact and benefit that incorporates important pest pathways and high risk areas * Establish arrangements to provide, report and analyse interception and pathway data * Identify pathways for pests to enter and spread within Australia * Identify and prioritise areas that pose high risk for the entry and establishment of potato industry pests * Investigate cost effective solutions for surveillance, using a risk based approach * Prioritise pest targets based on potential impact, ability to conduct surveillance and purpose of surveillance * Ensure surveillance activities are ‘fit for purpose’ |
| **1.3 Integrate surveillance for exotic pests into existing commercial crop monitoring practices and systems** | Significant effort is undertaken in crop monitoring in commercial potato production that can support surveillance for new pests. Provision of training to raise awareness and undertake surveillance for important exotic pests, coupled with diagnostic support, will support the integration of surveillance for new pests with existing crop monitoring activities. | * A stocktake of surveillance activities and/or capture of surveillance data to identify mechanisms to ensure that key surveillance priorities are covered * Establishment of a system to support training, awareness and diagnosis of new pests in commercial production * Establish a collaborative network between industry and government that supports improved triage of pests and symptoms to build capacity and capability in the potato industry * Identify opportunities and establish mechanisms to integrate surveillance for exotic or regionalised pests into crop monitoring for established pests * Investigate data collection within existing data capture tools and digital platforms e.g. AgWorld, Muddy Boots |
| **1.4 Improve surveillance in urban and peri-urban communities to support early detection of new pests** | Urban and peri-urban communities can be high risk pathways for entry of new pests, and surveillance in these areas is challenging. A focus on members of the community/areas that are most interested in plants and plant health such as community gardens, garden clubs, government staff, and researchers will assist target messages and create sentinels for potato surveillance. | * Provision of tools that support reporting of suspect pests * Establish surveillance high priority areas within in peri-urban and urban areas * Development of awareness campaigns targeted to members of the community with an interest in plant health * Develop and implement programs that target members of the community with an interest in plant health and plant production * Establish a program of Blitz campaigns that includes key pest threats of the potato industry |
| **1.5 Improve consistency and efficiency of surveillance through development of tools, protocols, technologies and plans** | The ability share data and collaborate across regions and programs will support greater efficiency and reduce duplication of effort. | * Develop National Surveillance Protocols and surveillance plans for key pest targets * Identify, prioritise and deploy tools, technologies and systems to support the development of an efficient surveillance system |
| **1.6 Establish and maintain diagnostic skills, expertise and resources to support early detection** | Without a coordinated national approach to the maintenance and improvement of skills for diagnosis of potato pests, there is a risk that expertise, resources and capacity may not be available to detect and diagnose key pest threats. | * Identify and address gaps in the diagnostic capability for potato pests * Establish systems to support better detection of potato pests from images * Develop and maintain national collaborative arrangements to support diagnostics for potato pests |

## Goal 2 Collaboration and coordination for shared biosecurity surveillance outcomes and crop health management

The primary outcome of surveillance is to provide information that informs decisions. Multiple data sources exist across the biosecurity continuum through industry supply chains, government regulatory activities, and seed or export certification systems. Improvement in national coordination of efforts, across industries and governments offers significant potential to identify duplication and gaps, improve efficiency, and ensure maximum benefit. Coordination will also facilitate better information sharing and, through analysis, a more strategic collective effort for early detection and evidence of absence for exotic pests and diseases.

National collation of data from these systems will generate greatly increased confidence regarding presence or absence of pests, however it will require collaboration and sharing of these data. A multi-purpose approach where government, growers, agronomists and other stakeholders clearly benefit from the activities undertaken will be required to encourage participation in surveillance. This includes the ability to review, analyse and share data at a regional or national level. Improving the way in which data are captured, recorded and reported will ensure that relevant information is aggregated and made available when needed.

Governance will be required that will need to comprise government and the potato industry, with the engagement and support of community. Development of a National Potato Industry Surveillance Program that links with other industry and government programs will strengthen existing arrangements, prioritise activities and reduce potential duplication of effort.

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| *Goal 2 - Collaboration and coordination to support shared biosecurity surveillance outcomes and crop health management* | | |
| **Priority** | **Rationale** | **Description** |
| **2.1 Establish a National Potato Industry Biosecurity Surveillance Program (NPIBSP)** | The establishment of a NPIBS will help coordinate surveillance efforts. This will require the active involvement of industry, government and other stakeholders, and the development of a surveillance timeline, targets and coordination | * Establish coordination and leadership structures to oversee the NPIBSS * Establish mechanisms for coordinating surveillance efforts and data capture * Develop an implementation plan with activities, timelines and priorities |
| **2.2 Develop and maintain national collaborative arrangements including funding to support surveillance and diagnostics for potato pests** | Multiple data sources exist through industry supply chains, government regulatory activities, and export certification systems. Improvement in national coordination of efforts, across industries and governments offers significant potential to identify duplication and gaps, improve efficiency, ensure maximum benefit and improve information sharing | * Establish mechanisms for sharing information between potato industry sectors and government * Develop and maintain national collaborative arrangements for funding to support surveillance and diagnostics for potato pests |
| **2.3 Establish partnerships to support surveillance for pests of the potato industry** | No single business, government or industry can undertake effective surveillance, and a partnership will be needed to support surveillance for early detection and market access | * Identify and promote cross-industry surveillance partnerships to improve early detection of pests and support surge capacity * Establish annual meetings/forums to improve engagement between the potato industry and government |
| **2.4 Develop preparedness and business continuity plans for key potato industry pests** | Developing preparedness plans for key potato industry pests can support more rapid and appropriate response to new pest incursions. Development of business continuity plans will help potato growers identify key risks and systems that can support a more rapid return to market in the event of a pest detection. | * Assess exotic pest impacts, establishment potential and entry pathways into and within Australia to design surveillance programs to cost effectively mitigate risks * Develop incursion preparedness plans for key potato industry pests * Establish mechanisms to discuss potential market access arrangements that may result from the detection of key pest threats |

## Goal 3 Communication, awareness and training to build capacity and capability for surveillance and biosecurity

To effectively implement the NPIBSS, major stakeholders will need to be identified, and communication and engagement tools and systems put in place to raise awareness and provide and gather information. By engaging with stakeholder groups, the NPIBSS will increase the capacity of the surveillance system to detect new pests and support pest status claims for potato crops. Engagement will also assist Actions aligned with Goal 1 to promote and facilitate partnerships amongst stakeholders to support a long-term and sustainable surveillance program for the national potato industry.

Communication and engagement mechanisms are required to assist raise awareness and provide and gather information and data. By engaging with stakeholder groups, the NPIBSS will develop partnerships and increase the capacity of the surveillance system to detect new pests and support pest status claims for potato crops.

Communication, awareness and engagement will promote the need for collection and capture of information on the systems and data records across commercial production as well as urban and peri-urban communities. Identifying and implementing cost-effective mechanisms to raise awareness and support community-led surveillance, particularly in areas identified as highest risk, will increase the likelihood of early detection of new pests before they reach areas of commercial production.

To support an effective surveillance program, it is necessary that activities are supported by the appropriate tools, processes and training. These surveillance tools, protocols and plans must be specific to pests, pathways and areas of influence. Training will also be required to ensure that people conducting surveillance have suitable skills and understand how to detect and carry out surveillance for exotic pests.

**Priorities to deliver Goal 3**

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| *Goal 3 - Communication, awareness and training to build capacity and capability for surveillance and biosecurity* | | |
| **Priority** | **Rationale** | **Description** |
| **3.1 Develop communication and engagement mechanisms to support surveillance** | Effective communication and engagement with stakeholders is critical to the success of a nationally coordinated potato industry surveillance system. It is therefore critical that communication and engagement mechanisms and materials are developed to support the early detection of exotic pest | * Develop material to support communication and engagement * Establish a portal of information for urban and peri-urban communities to improve biosecurity awareness and surveillance * Improved capacity and capability for surveillance through online communications |
| **3.2 Develop training to improve capacity and capability for surveillance** | It is important that personnel involved in the collection of surveillance data have been given appropriate training in the required techniques and surveillance methods. By providing surveillance training the overall capacity and capability for surveillance of temperate fruit pests will be improved. | * Identify and develop training needs for surveillance in potato crops * Develop training and awareness material aimed at specific stakeholder groups (e.g. growers, government staff, crop monitors and members of the public) to support potato industry relevant surveillance * Develop training to support improved triage of pests and symptoms to build capacity and capability in the potato industry * Develop field guides for pest of the potato industry |

## Goal 4 Pest information to support market access, industry growth and business continuity

There is a growing need to document the activities, systems and processes that support production. Surveillance (crop monitoring) is just one of these processes, and the ability to document and record the outcomes of activities that record pest levels and importantly, the absence of key pests is becoming increasingly important for both domestic and international market access arrangements. Deployment of tools and systems that support the capture and analysis of data through growth, harvest and packing of potatoes, will assist ‘future proof’ plant industries for requirements from all markets for pest information.

To ensure that surveillance activities can provide confidence in the early detection of exotic pests and provide proof of freedom for pests of market access concern, a range of surveillance activities will be required across all sectors of potato production as well as high risk in urban and peri-urban areas.

The success of any surveillance program must be underpinned by a suitable diagnostic system which includes the ability to triage and submit suspect samples as well as deliver appropriate, robust and efficient laboratory diagnosis methods. It is therefore critical for an ongoing National Potato Industry Biosecurity Surveillance Program that skills, expertise and resources exist to support triage and diagnosis of exotic pests.

**Priorities to deliver Goal 4**

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| *Goal 4 - PEst information to support market access, industry growth and business continuity* | | |
| **Priority** | **Rationale** | **Description** |
| **4.1 Establish mechanisms and systems for the national aggregation of data to support market access** | For most effective evaluation of pest status, data capture and management systems will be needed that provide a regional and national picture of the presence or absence of pests. It will also be necessary to identify what data capture tools currently exist and if needed develop and promote suitable data capture tools that can be used by a National Program. Improving the way in which data are captured, recorded and reported will ensure that relevant information isaggregated and made available when needed to support market access. | * Address barriers to reporting of new pests * Address barriers for collection of surveillance data to National Minimum Data Specifications * Identify mechanisms to capture and aggregate data into national databases such as AUSPest*Check*TM |
| **4.2 Develop tools for consistent data capture and collection** | To be most effective and efficient surveillance should be conducted in a consistent and risk based manner. This will require the development of surveillance protocols/plans, tools and technologies that can be used across Australia for the surveillance of potato pests. Collection of data to National Minimum Dataset Specifications and aggregation into a national system will ensure that data are captured, recorded and reported in a consistent manner and can be made available when needed. | * Determine the appropriate mechanism for coordinating surveillance efforts and data capture between potato industry sectors * Develop Nationally consistent protocols for data collection * Identify mechanisms to support sharing of data from industry and government sources |
| **4.3 Improved diagnostic capacity to support surveillance efforts** | The success of any surveillance program must be underpinned by a suitable diagnostic system. This includes the ability to triage and submit suspect samples as well as deliver appropriate, robust and efficient laboratory diagnosis methods. It is therefore critical for an ongoing National Potato Industry Biosecurity Surveillance Program that skills, expertise and resources exist to support triage and diagnosis of exotic pests. | * Gap and stakeholder analysis to determine capacity and capability requirements for diagnostics to support surveillance * Establish, coordinate and maintain a diagnostic network and diagnostic triage systems to support surveillance in the potato industry |

# Strategy Implementation

The associated NPIBSS Implementation Plan details how this strategy will be implemented, including the importance of strong support from stakeholders, governance arrangements, and secure funding arrangements. Also detailed within the Implementation Plan are the challenges posed and opportunities presented for developing stakeholder support and giving effect to the strategy.

The long-term outcomes sought through this strategy are

* That the potato industry actively supports and participates in surveillance
* Skilled personnel are available to support surveillance for key pest threats of the potato industry
* Improved decision making, support for crop health management and reduction in business risk

Once implemented, this strategy will support these outcomes and facilitate the capture and collation of potato industry surveillance data nationally including regions, farms, urban and peri-urban areas.

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# Appendix A: Details of the Potato industry

## Sectors

Of the approximate 1.35 million tonnes of potatoes produced in Australia each year, processing potatoes accounts for the greatest proportion, or approximately 900,000 tonnes (67% of total production). Ware (fresh) production accounts for approximately 450,000 tonnes (33% of total production), including the volume of potatoes produced for seed. Exports of potatoes are relatively modest, with around 36,000 tonnes of fresh potatoes and 10,000 tonnes of processing potatoes exported annually (Hort Innovation 2019).

Beyond monitoring activities for pests, diseases and other crop health issues, a range of other individuals also work within the crop and are potential contributors to ongoing crop monitoring. Amongst these are contractors applying crop protection products, chemical suppliers, government officers and training and extension providers.

### Processing potatoes

Processing potatoes are defined as potatoes that are primarily grown for fries or chipping. In Australia, the majority of growers are contracted to one of four major processing companies. Processing or cooking facilities are located in Queensland, New South Wales, Victoria, Tasmania and South Australia, with the majority of process potatoes are transported interstate in order to reach the specific processing contractor’s factory. While potatoes for frying may be stored for up to x months/days, potatoes processed for chipping are usually only stored for approximately x days, indicating disruptions to the supply chain could have potentially significant impacts on growers.

Processing potato growers typically obtain the seed potatoes used to produce their crops directly or facilitated through the processing company with whom they have contracts. This will include specific potato varieties, many of which are subject to plant breeder’s rights.

### Ware potatoes

Ware, or fresh potato production, is primarily for the domestic market, whether going direct to one of the major supermarkets, or to the various state wholesale markets. As with processing potatoes used for chipping, there are significant time constraints on the storage of fresh potatoes as they usually need to be at market within x days of harvest. Exports of ware potatoes represent only approximately 8% of fresh production (or 2.5% of total potato production), with the major export market being South Korea (Hort Innovation 2019) to coincide when there is a gap in supply from the USA. The majority of fresh exports come from South Australia and New South Wales.

### Seed and mini tuber potatoes

Mini tuber production is an important first step in potato production and production of healthy planting stock (seed potatoes). There are three main mini tuber producing companies located in Victoria, Tasmania and South Australia; mini tubers are also produced at a smaller scale in NSW. Usually new potato varieties from overseas arrive as germplasm and are put through the Post Entry Quarantine grow-out process for either three or six months, depending on the source. They are then grown on and multiplied by mini tuber producers once released from quarantine. Mini tuber producers follow strict plant health measures that include monitoring, testing and record keeping.

Seed potato production refers to the tubers grown specifically for further propagation, rather than true seed deriving from above ground fruiting bodies. True seed is primarily of interest in breeding programs which seek to develop new varieties. In contrast, vegetative propagation from tubers ensures that subsequent generations are true to type. Like mini tubers, certified seed potatoes are grown under closely monitored conditions.

The first generation of seed potatoes are grown in laboratory environments under strict quarantine conditions. This is referred to as ‘Generation 0’ and has a very high health status. Subsequent generations of seed potatoes are grown in the field which allows for progressive multiplication of the number of potato tubers. Up to five generations of field generations are recognised in the ‘National Standards for Certification of Seed Potatoes’ (HAL 2007). This specifically refers to certified seed which must meet quality and plant health parameters.

Many growers of fresh and process potatoes also grow their own seed potatoes (farm kept seed). Production of seed potatoes can be certified through one of four certification systems that operates within Australia, providing confidence about the health status of the supplied seed potato. Estimates of the proportion of field grown seed potatoes used nationally that originate from certified seed crops vary. It has been reported that it as low as approximately two-thirds of seed potato produced is not certified through one of these systems, being either an additional generation grow out of certified seed, or the selling of undersized by-product.

Seed potatoes grown within the certification systems are sourced from clean mini-tubers and are assessed according to disease prevalence with higher grades attracting higher prices. Mini tuber production is an important first step in potato production and production of healthy seed potatoes. Little data are available on the value of the seed trade within Australia. Some of the fresh export volume captures seed trade, with markets in Indonesia, Mauritius and other South East Asian countries.

## Surveillance activities in the potato industry

Crop monitoring is currently undertaken as part of a regular farming business. It is a critical component of a production operation and is primarily focussed on established pests which are of immediate concern to growers. It can be seen as a form of general surveillance.

In the smaller scale farming operations, crop monitoring is undertaken by the grower or a family member. If an issue is found that growers cannot name or understand, they will usually contact their local reseller agronomist for advice.

The larger growing businesses employ agronomists as part of their operations or contract external agronomists they trust to monitor crops. These agronomists are responsible for ongoing crop monitoring, usually on a weekly basis. They recommend preventive and remedial actions to control pests and diseases. These agronomists commonly produce a crop health management plan and spray program at the start of the season based on known risks at defined crop stages. This plan is adjusted as required based on findings from crop monitoring. Usually agronomists and growers in a production region, also exchange observations to better manage risks. This information exchange happens amongst groups that trust each other e.g. agronomists that work for a certain reseller and their key clients, neighbours, friends, family.

Potato seed operations have more defined and structured methods of crop monitoring. Crop monitoring is conducted by trained Seed Certification Officers who are employed by organisation in charge of seed potato certification. Agronomists play a major role in systematic crop monitoring.

### Common surveillance practices

Smaller scale growers mostly monitor on a weekly basis and are generally out looking at the overall crop health – “does my crop look ok” or for symptoms like stunted growth, leaf yellowing, necrotic lesions, feeding damage. At key stages of the crop, and sometimes post a weather event, the grower will look out for specific symptoms and pest and diseases in their crop. If an issue is found that the grower cannot name or understand, he or she will contact a local reseller for advice. This informs their crop protection and spraying decisions.

The larger scale growers hire agronomists to survey their crops. They monitor, usually weekly, for established pests and diseases and overall crop health and if any paddock needing attention because a pest, disease, weed infestation or disorder is detected, they will inform the grower or field manager in charge and recommend a management option. At key stages of the crop, and post weather events, the agronomists may check for specific diseases like powdery scab, black leg, Sclerotinia or leaf diseases such as target spot or late blight as well as virus diseases. If those whom check the crop are not sure about some symptoms they find, they may send samples to a diagnostic lab or ask others to assist with identification.

### Processing potatoes

Processing crops are each grown from specific varieties and in different production regions. Variety selection includes pest and disease resistance or tolerance, however aspects important for productivity, storage, dry matter, shape and colour may be considered the more important selection criteria. Most processing potatoes are grown under contract for companies that undertake or oversee variety and site selection, seed production, production programming, crop agronomy, postharvest activities and marketing of the final product. They conduct in-house and externally funded Research and Development (R&D). Processors employ field officers to organise production and harvest with contract growers, and check on crops’ progress, management and health.

### Ware potatoes

Most varieties grown for the fresh market (ware potatoes) are produced from varieties that are protected by Plant Breeders Rights (PBR). These varieties have generally been bred overseas and are brought into Australia as in vitro plants under quarantine regulations to ensure freedom from diseases. Supermarkets have considerable impact on the fresh market varieties grown in Australia and this market influence can mean varieties susceptible to pests and diseases may be grown for the fresh market. Some of the largest ware potato producers oversee the production of seed to ensure they receive tubers that meet their quality standards. These seed crops usually originate from certified seed.

### Seed potatoes

Mini tuber and certified seed potatoes are grown under closely monitored conditions that ensure freedom from established pests and diseases. Weeds are controlled as these can harbour pests and diseases. All mini tubers and about 40% of Australian potato seed are grown under Quality Assurance (QA) seed certification schemes. Crops grown under a QA scheme are monitored by independent certification officers. Seed crops are usually grown in distinct areas away from commercial production to better protect seed potato crops from pests and diseases.

Seed potato production is a special case for crop monitoring, due primarily to the established standards for seed potato health. Seed certification inspectors have fixed inspection plans based on the prescriptive seed certification standard. Monitoring is undertaken for certain pests and diseases at predetermined times during crop growth and after harvest. Diagnostics are used as prescribed in inspection plans and records are kept in databases by the certification providers. Diagnostic testing is usually undertaken for 3-5 virus diseases and potato cyst nematodes (PCN). Even though a National Certification Standard exists, most certifiers have adapted the standard to their regions.

## Data collection and record keeping

Data collection and record keeping practices and standards vary widely depending on type and size of operation, purpose and attention to detail of those who monitor. Smaller businesses often have little or no record keeping on findings of crop monitoring. However, spray diaries indicating the crop protection treatment applied are often maintained for compliance reasons.

Larger potato growing businesses that have more formalised operations and hire agronomists also have more formalised records of their crop monitoring results, though the level of sophistication varies from a piece of paper recording the inspection of the crop to a app recording the inspection or cloud based databases such as Muddy Boots, BackPaddock or Agworld.

Seed certification agencies have sophisticated data management systems with detailed crop inspection records in line with certification standards. Individual growers may or may not have a copy of the detailed inspection records held by certification agencies.

# APPENDIX B: High Priority Pests of the potato industry identified

Table 2 - High Priority Pests of the potato industry identified in the Biosecurity Plan for the Potato Industry (Version 3.1, February 2019)

|  |  |  |  |
| --- | --- | --- | --- |
| Common name | Scientific name | NPPP  (2019) | Other hosts |
| Colorado potato beetle | *Leptinotarsa decemlineata* |  | Solanaceae including tomato, potato and eggplant |
| Serpentine leafminer | *Liriomyza huidobrensis* | ✓ | Polyphagous including potato, beets, spinach, lupin, faba bean, field pea, cow pea, common bean |
| Vegetable leafminer | *Liriomyza sativae* | ✓ | Wide host range including potato, *Allium* spp., bean, pea, eggplant, pumpkin, cucumber, beets, lettuce, celery |
| American serpentine leafminer | *Liriomyza trifolii* | ✓ | Wide host range over 400 species of plants in 28 families. The main host families and species including Alliaceae, Cucurbitaceae, Fabaceae and Solanaceae (including potato) |
| Black bean aphid | *Aphis fabae* |  | Very broad host range with over hosts including cabbage, cauliflower, radish, celery, capsicum, eggplant, cucumber, beets, broad beans, bean, peas, cucurbits, chilli, potato, grain, legumes |
| Cotton aphid | *Aphis gossypii* |  | Highly polyphagous including potato, cotton, papaya, citrus, capsicum, melon, cucumber, pumpkin, carnation, sunflower, jasmine, lettuce, lychee, macadamia, apple, passionfruit, avocado, tomato, maize |
| Zebra chip | *Candidatus* Liberibacter solanacearum | ✓ | Haplotypes A and B affect Solanaceae (potato, tomato, tobacco, capsicum etc). Haplotypes C, D and E affect Apiaceae (carrots and celery) |
| Bacterial wilt | *Ralstonia syzygii* subsp. *indonesiensis* |  | Potato, tomato, chilli pepper and clove. |
| Late blight (exotic strains of the A1 and A2 mating types)[[1]](#footnote-2) | *Phytophthora infestans* | ✓ | Solanaceous species including potato, tomato, eggplant, tobacco |
| Pale potato cyst nematode | *Globodera pallida* | ✓ | Potato, tomato, eggplant |
| Golden potato cyst nematode | *Globodera rostochiensis* | ✓ | Potato, tomato, eggplant |
| Root knot nematode | *Meloidogyne enterolobii* |  | Wide host range including potato, tomato, onion, tobacco, cabbage, wheat, corn, eggplant, capsicum, coffee, cucumber, soybean, lettuce, guava |
| Potato spindle tuber viroid (exotic strains) | *Potato spindle super viroid* |  | Solanaceae (including Potato, tomato) |

# Definitions, Acronyms and Abbreviations

Table 3 Definitions, Acronyms and Abbreviations

|  |  |
| --- | --- |
| Term/ abbreviation | Definition |
| ABS | Australian Bureau of Statistics |
| AUSVEG | Industry Representative Body for vegetable and potato growers |
| DAWR | Department of Agriculture and Water Resources |
| EPPRD | Emergency Plant Pest Response Deed |
| Established pest | Pests present in Australia |
| Exotic pest | Pests not currently in Australia |
| General surveillance | A range of crop monitoring activities outside of specific surveys that can be used to detect the presence or absence of pests, including the presence of new or unusual pests or symptoms |
| HPP | High Priority Pest - a pest that the potato industry has identified in its Biosecurity Plan as posing a significant threat to the industry |
| IGAB | Intergovernmental Agreement on Biosecurity |
| ISPM 6 | International standards for phytosanitary measures |
| IPM | Integrated pest management |
| National Surveillance protocol | A national document that contains the key information about how to conduct surveillance for a pest in different situations |
| NPIBSP | National Potato Industry Biosecurity Surveillance Program |
| NPIBSS | National Potato Industry Biosecurity Surveillance Strategy |
| NPPO | National Plant Protection Organization |
| NPPP | National Priority Plant Pests – these are pests are a list of pests identified by Plant Health Committee as posing the greatest risk to Australia’s plant industries. These pests were arrived at via a consultation process managed by the Department of Agriculture and Water Resources in 2016. |
| NRM | Natural resource management |
| PCN | potato cyst nematodes |
| Pest | Any species, strain or biotype of invertebrate pest or pathogen injurious to plants, plant products or bees or impacting social amenity or the environment. |
| Pest status | The presence or absence of a pest in the country, region or property |
| PHA | Plant Health Australia |
| R&D | Research and development |
| RDC | Research development corporation |
| Specific survey/ surveillance | A surveillance activity conducted over a defined period of time that records the detection of, or confirms the absence of, specific pests. |

1. Australia’s *P. infestans* population consists of a single “archaic” strain of the A1 mating type [↑](#footnote-ref-2)