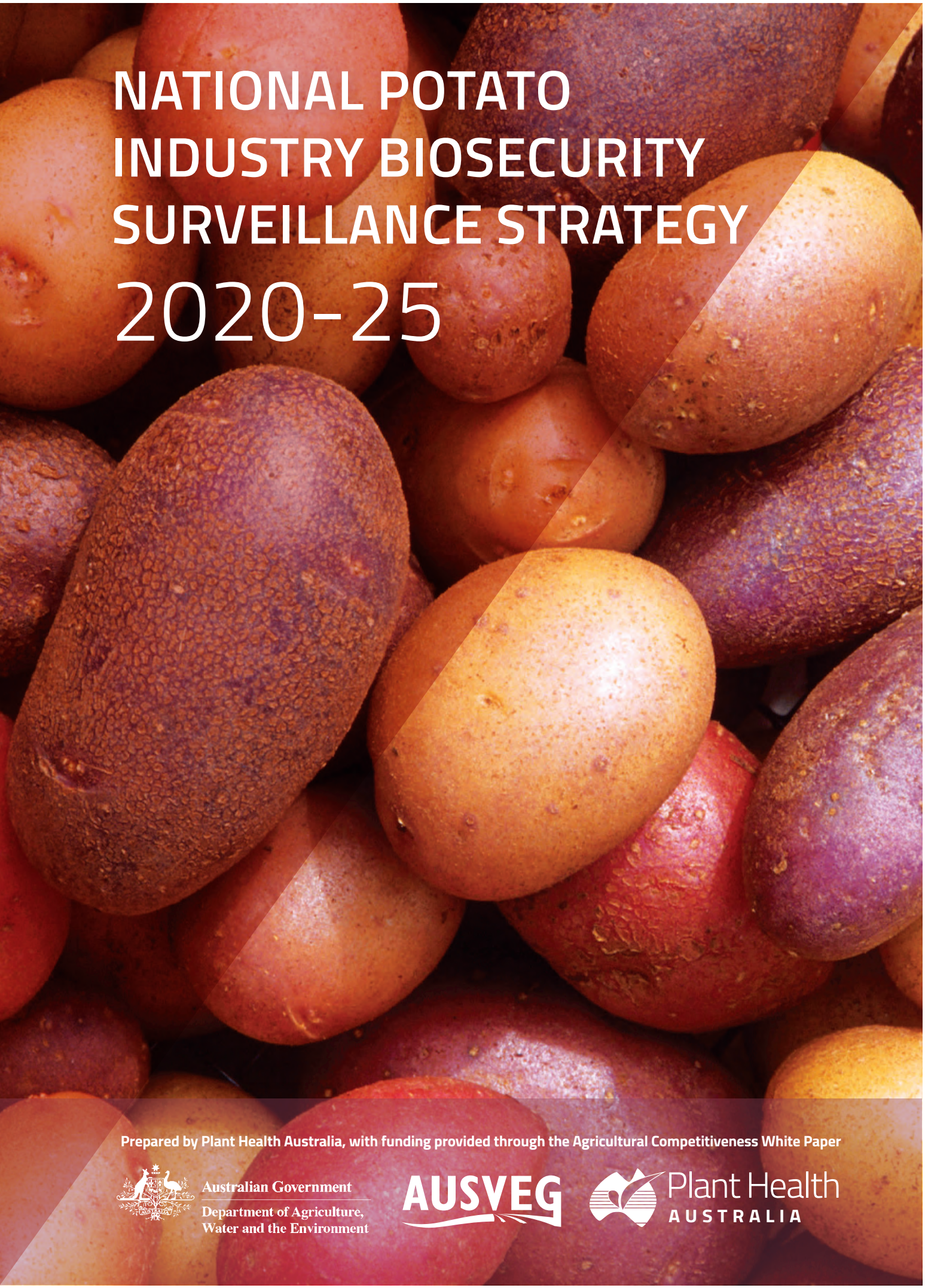


NATIONAL POTATO INDUSTRY BIOSECURITY SURVEILLANCE STRATEGY 2020-25

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

Australian Government
Department of Agriculture, Water and the Environment

AUSVEG

Plant Health AUSTRALIA

Australian Government
Department of Agriculture, Water and the Environment

AUSVEG

Plant Health AUSTRALIA

Phone: 02 6215 7700
E-mail: **biosecurity@phau.com.au**
Website: **planthealthaustralia.com.au**

An electronic copy of this manual is available from:
planthealthaustralia.com.au/strategies

ISBN 978-0-6482456-2-9

Contents

Acknowledgments

The National Potato Industry Biosecurity Surveillance Strategy and its accompanying Implementation Plan were prepared by Darryl Barbour, Daniela Carnovale and Sharyn Taylor from Plant Health Australia (PHA) and Zarmeen Hassan from AUSVEG.

PHA would like to acknowledge the assistance of AUSVEG in undertaking stakeholder consultation activities and pilot surveillance activities used to inform this strategy; in particular Callum Fletcher from AUSVEG and Doris Blaesing from RM Consulting Group. PHA thanks Ranjith Subasinghe and Susie Collins (Department of Agriculture, Water and the Environment) for their feedback on development of the strategy.

PHA and AUSVEG also wish to thank key stakeholders associated with the potato industry who shared their time, knowledge and viewpoints to make the strategy possible.

This strategy was funded by the Department of Agriculture, Water and the Environment through the Agricultural Competitiveness White Paper, the Australian Government's plan for stronger farmers and a stronger economy.

Summary

Overview

The potato industry within Australia is the single largest vegetable crop by volume and one of the largest vegetable/horticultural industries, with an annual production of around 1.3 million tonnes worth $745 million in 2019.

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 people, 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 timely containment measures to be applied 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, 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 are challenges with surveillance, ranging from a lack of awareness about key pests, to 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. Growers 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 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 peak potato industry bodies and governments to identify and coordinate national surveillance priorities and activities across stakeholders for the benefit of the potato industry. The NPIBSS will support surveillance and effective biosecurity across the biosecurity continuum 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 the formation of partnerships with government across the continuum of pre-border, border and post-border. Responsibilities for pre-border and border lies with the Australian Government and post-border with state and territory governments and industries. For pest surveillance that crosses multiple industries, the NPIBSS actions seek to develop linkages with government jurisdictions and other plant industries.

Strategy goals and principles

Four interconnected goals, and their accompanying actions, will form the basis of the strategy 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 in biosecurity management 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, in conjunction with support from tools and systems that harmonise and improve collection of information.

Success of strategy implementation 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 the Implementation Plan that supports this strategy.

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.

The long-term outcomes sought through this strategy are:

- active support and participation of the potato industry in surveillance
- skilled personnel who 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.

Roadmap of biosecurity surveillance to support the potato industry

Vision statement	To support surveillance and biosecurity management to ensure the potato industry is agile, informed, resilient, engaged and globally competitive			
Goals	**Goal 1** Collaboration and coordination	**Goal 2** Early detection	**Goal 3** Communication, awareness and training	**Goal 4** Industry growth and business continuity
Objectives				
Long (5–8 years)	Shared decision making and collaboration to support biosecurity outcomes	Growers reporting suspect pests and providing data to support market access	Skilled personnel able to undertake surveillance to support the potato industry	Industry actively participating in biosecurity surveillance
Medium (3-4 years)	Implementation plan supported and monitored with sustainable funding mechanism in place Surveillance data captured, analysed and shared Harmonised practices across jurisdictions and industries	Reporting tools available and used Surveillance protocols developed and used Barriers to pest reporting and collection of data addressed Surveillance for exotic pests integrated into routine crop monitoring Surveillance undertaken in urban and peri-urban communities	Improved communication between government and industry Development and delivery of training to support surveillance	Improved diagnostic capacity to support surveillance efforts Decision-making and support for crop health management and reduction in business risk implemented Barriers to data capture and sharing addressed On-farm biosecurity practices adopted and implemented
Short (1-2 years)	Partnershops to support surveillance identified and initiated Agreement between state jurisdictions and preparedness plans in place to support domestic market access Development of incursion plans commenced	Planning and prioritisation of key pest targets and locations for surveillance commenced Information delivered to growers on incursion responses Mechanisms identified to address barriers to pest reporting and collection of surveillance data	Mechanisms identified to support engagement within industry and between industry and government Training and support materials developed for industry personnel	Gap and stakeholder analysis undertaken for diagnostics Systems and tools for data capture identified and implementation commenced Mechanisms to support sharing of data identified Development of farm biosecurity plans commenced

Stakeholders					
Australian Government	State governments	PHA	Potato industry, AUSVEG	Other industries	Urban and peri-urban communities

Summary of goals and actions

Goal 1

COLLABORATION AND COORDINATION

Action 1.1	Develop and maintain national collaborative arrangements including funding to support surveillance and diagnostics for potato pests
Action 1.2	Establish partnerships to support surveillance for pests of the potato industry
Action 1.3	Develop business continuity plans and establish market access arrangements for key potato industry pests

Goal 2

EARLY DETECTION

Action 2.1	Address barriers to surveillance and reporting
Action 2.2	Identify and prioritise key potato pest threats, high risk areas and surveillance methods
Action 2.3	Integrate surveillance for exotic and regionalised pests into existing commercial crop monitoring practices and systems
Action 2.4	Improve surveillance for exotic and regionalised pests in urban and peri-urban communities
Action 2.5	Improve consistency and efficiency of surveillance through development of tools, protocols, technologies and plans

Goal 3

COMMUNICATION, AWARENESS AND TRAINING

Action 3.1	Develop communication and engagement mechanisms to support surveillance
Action 3.2	Develop training to improve capacity and capability for surveillance

Goal 4

INDUSTRY GROWTH AND BUSINESS RESILIENCE

Action 4.1	Establish mechanisms, systems and tools for the national aggregation of data to support market access and inform biosecurity decision making
Action 4.2	Improve diagnostic capacity to support surveillance efforts
Action 4.3	Develop farm biosecurity plans to support preparedness and surveillance outcomes

The Australian potato industry

The potato industry in Australia is the single largest vegetable crop by volume and one of the largest vegetable/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.[1] Potatoes are a high value, high quality, staple food source for both Australia and many countries around the world. 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 crop forecasting.

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 1.

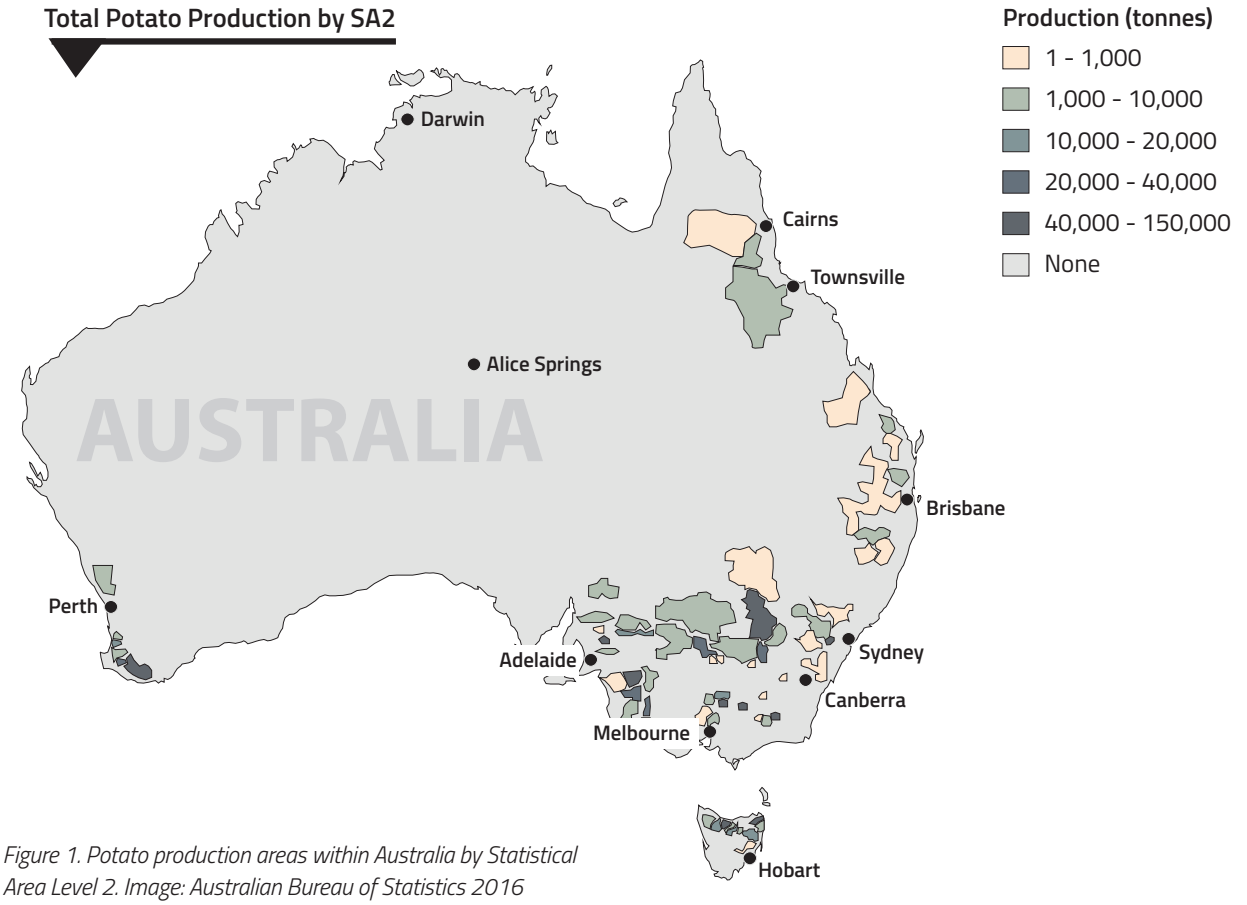


Figure 1. Potato production areas within Australia by Statistical Area Level 2. Image: Australian Bureau of Statistics 2016

1. *Hort Innovation (2020) Australian Horticulture Statistics Handbook 2018-19. Available from: https://horticulture.com.au/resource/australian-horticulture-statistics-handbook/*

Most of Australia's commercial production occurs within South Australia, Tasmania, and Victoria as shown in Figure 2. Australian Bureau of Statistic figures for 2016–17 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, South Australia 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.

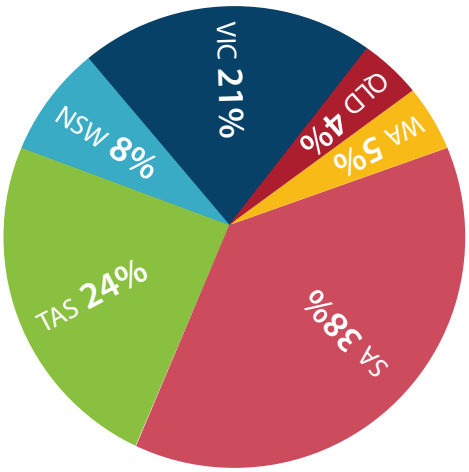


Figure 2. Potato production percentage by state (all sectors combined). Data source: AUSVEG

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, mean that many of the world's most damaging potato pests have not yet entered and established within Australia.

Absence of these pests provides a relative advantage in terms of productivity, pest control costs, and market access opportunities.

However, the potato industry is not devoid of important pests. Potato cyst nematode (*Globodera rostochiensis*), tomato potato psyllid (TPP, *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 are hosts and can act as 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 potato and related plants in urban and peri-urban areas that 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.

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 incursions 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 new pests, an incursion 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. Examples of these issues have been seen with the detection of TPP in Australia in 2017, and zebra chip in the United States (Figure 3), caused by *Candidatus* Liberibacter solanacearum (CLso).

Figure 3. Symptoms of zebra chip, caused by Candidatus Liberibacter solanacearum. Image: MPI NZ

High Priority Pests of potatoes

In the Biosecurity Plan for the Potato Industry (version 3.1, February 2019),[2] a total of 207 pests and pathogens were identified and assessed as potential threats to the potato industry within Australia. Of these, 13 pests were categorised as High Priority Pests (HPPs), identified as 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 is included in Appendix B.

The range of crops that may be affected, or could act as hosts of these HPPs highlights that a surveillance system that supports the potato industry must also include collaboration and linkages with growers and plant industries producing other crops. These industries include Greenlife Industry Australia (representing nursery and garden production), vegetable industries covering production of Solanaceae (e.g. tomatoes, capsicums and eggplant), Cucurbitaceae (e.g. cucumbers and melons) and Allium (e.g. onions), as well as grains and cotton.

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 both potato production as well as plant industries 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.

Pest definitions

Pest – the definition of a 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) – 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 or new pests – pests not currently in Australia, or pests new to a jurisdiction or region.

Established pests – pests present in Australia.

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

Regionalised pests – pests that are confined, contained or found only in parts of Australia.

2. *Plant Health Australia (2019) Biosecurity Plan for the Potato Industry (Version 3.1)*

National approach to biosecurity

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 and environment from pest threats.

This system works through partnerships between governments and industry, with support from the community, to reduce the risk of new pests entering and becoming established. Surveillance is an important component of the biosecurity system, and includes actions that involve determining the plant pest status in a business, crop, region or jurisdiction.

National agreements and strategies that support biosecurity outcomes

The Australian Government and state and territory governments work under the principles set out in the Integovernmental Agreement of 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 Plant Health Australia, the Australian Government, all state and territory governments and national plant industry body signatories. The EPPRD outlines roles and responsibilities of Australian governments and plant industries in the management and funding of responses to pest incursions and provides mechanisms to support growers impacted in an eradication response through the Owner Reimbursement Costs (ORC) framework.

The Emergency Plant Pest Response Deed

While governments have particular statutory 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, which can include 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.

The biosecurity continuum

PRE-BORDER

- Analysing pest risks associated with proposed imports
- Inspecting, verifying and auditing overseas exporters
- Undertaking pest surveillance overseas
- Developing international standards
- Building capacity overseas
- Anticipating pest threats by gathering global pest intelligence
- Negotiating export market access
- Maintaining Manual of Importing Country Requirements (MICoR) and Export Documentation System (EXDOC) to facilitate exports
- Prioritising exotic pests to target for preparednesss and prevention activities

AT THE BORDER

- Inspecting and monitoring arrivals of people, cargo, mail and plant products for quarantine risk material
- Enforcing import restrictions to mitigate exotic pest risks
- Raising awareness of plant pests and movement restrictions
- Imposing biosecurity measures at ports
- Encouraging reporting of suspected new pests by port workers and importers
- Protecting Australia's north from exotic pests with the Northern Australia Quarantine Strategy (NAQS)
- Enforcing import restrictions to mitigate exotic pest risks
- Isolating newly arrived plant material in post-entry quarantine facilities and monitoring for pest and disease infestations
- Conducting pest risk analyses to support decision making on import processes

POST-BORDER

- Preventing spread of regionalised pests
- Collating and analysing pest status information and maintaining pest free areas to support trade and market access
- Providing early detection of incursions of exotic pests with surveillance
- Responding to exotic pests
- Australians managing risks under their control
- Encouraging reporting of anything unusual
- Managing established pests
- Managing the ability to diagnose plant pests
- Maintaining emergency response capacity
- Protecting farms with on-farm biosecurity measures

Figure 4. Biosecurity activities that reduce the risk of entry and establishment of exotic pests. Image: Plant Health Australia

Importance of surveillance

Global biosecurity risks are constantly changing due to increased trade and tourism, the speed at which travel now occurs, agricultural expansion and intensification, urbanisation close to farmlands, and 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 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 which are undertaken by a wide range of stakeholders in industry, government and the community. The main aim of biosecurity surveillance is to look for pests that are not yet present in the country or a region. 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 is absent is needed as export and interstate markets want assurance that important pests will not be introduced with traded commodities.
- **Crop management**
  Assessment of population levels of pests in crops provides information needed to support management decisions.

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 standard also focuses 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 commodities.

Surveillance can broadly be described as:

- **Specific surveillance**
  Defined as the gathering of information on pests 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 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 (specific and general) can provide valuable information on the presence or absence of certain pests, the structured nature of specific surveillance often provides a higher overall level of confidence in pest presence or absence. However, specific surveillance can also incur substantial costs and for this reason will often be limited in duration and/or area.

In contrast, general surveillance can be more flexible and integrate with existing practices at the farm or community level. The confidence in detection provided by general surveillance occurs through the large coverage and potentially large quantity of data collected.

Thus, surveillance data from a wide range of sources can strongly contribute to an overall 'evidence of absence' and is particularly valuable when exotic pests are included in crop inspection/monitoring programs.

Integration of surveillance

For any new surveillance initiative, a surveillance model which integrates specific surveillance and general surveillance into existing activities, and introduces components that support progressive improvement, will have the best likelihood of implementation.

In the potato industry, crop monitoring to assess pest levels to support crop production practices is undertaken on a routine basis and provides the opportunity to incorporate specific surveillance (if activities are structured and appropriate records are gathered), or general surveillance (if activities can be described and information gathered). Further development of surveillance through routine crop monitoring is expected to encourage participation.

For the success of the NPIBSS, 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.

Surveillance stakeholders

The Australian Government

The Australian Government is responsible for identifying global risks and pathways for the entry of exotic plant pest threats 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, Water and Environment (DAWE) 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, DAWE has established a national border surveillance program that monitors for incursions of exotic plant pests in and around major ports of entry. DAWE 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 governments are responsible for monitoring for exotic pests and deliver the National Plant Health Surveillance Program, funded by DAWE. 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, and a suite of other high impact exotic pests.[3] In addition, state and territory governments 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, maintaining pest area freedom, 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, and the Australian Government to develop and implement sound biosecurity policies, and provide awareness material and information to enhance surveillance and encourage pest reporting to support, maintain and expand market access for plant industries. State and territories provide diagnostic support to identify plant pests, as part of surveillance efforts for early detection, to determine pest status, or for delimitation in response to a new pest incursion.

3. *Plant Health Australia. National Plant Biosecurity Status Report (2019) Available from: www.planthealthaustralia.com.au/national-programs/national-plant-biosecurity-status-report/*

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

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.

Other plant industries

From the HPP list for the potato industry (Appendix B), it is apparent that pests that affect potatoes also impact or are carried on other host plants. As a result, surveillance and monitoring in other crops and plant industries will contribute to a national picture of pest distribution or pest absence.

These industries and crops include those producing Solanaceae (e.g. tomatoes, capsicums and eggplant), Cucurbitaceae (e.g. cucumbers and melons) and Allium (e.g. onions), as well as grains and cotton. In addition, the nursery and garden industry represented by Greenlife Industry Australia (which produces and distributes seedlings and seed for all of these crops) are an important part of national partnerships that support surveillance.

Peri-urban and urban communities

Many members of the Australian public grow potatoes or plants that are hosts of significant potato pests in their backyards in urban and peri-urban areas. Members of the public can therefore provide a pathway for new pest introductions or pest movement through inadvertent or deliberate movement of plant material into and within Australia. For example, TPP was detected in an urban environment in Perth in 2017. The original source of this detection is unknown but it resulted in border closures for growing regions and movement of potatoes. There are similar examples in other crops of pests being detected in urban environments and moving to growing regions or impacting movement of produce.

Urban environments, therefore, represent both a risk to growing regions, as well as an opportunity for early detection of exotic plant pests potentially enabling a faster response to eradication or management.

Urban residents are generally unaware of the threats of new pest incursions or the impact they can have on production regions. Despite having no specific commercial driver to undertake surveillance, members of the community, especially those with an interest in research, gardening and food production, have the ability to undertake monitoring that could support early detection of new pests. As a result, targeted selection of individuals and groups in urban and peri-urban communities can identify those that are eager to assist, support and report when given tailored information and opportunities to contribute to surveillance efforts.

Increasing awareness about biosecurity and impacts of new and emerging pest threats, including the need for providing training and support material for those urban and peri-urban communities have been identified as an important opportunity for early detection of invading exotic potato pests thus reducing the risks to potato production.

Barriers to surveillance, reporting and data sharing

Despite the many reasons and mechanisms for undertaking surveillance, there are currently barriers for industry 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 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 with the industry.

For growers there can be 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.

Exports of potatoes are relatively modest, with around 36,000 tonnes of fresh potatoes and 10,000 tonnes of processing potatoes exported annually.[4] The seed potato and processing sectors are currently exporting and interested in growing exports.

For the potato industry to expand its export markets, ongoing surveillance records are needed to prove area freedom and engagement and awareness through the potato industry will be required to highlight these requirements for export opportunities.

4. *Hort Innovation (2019) Australian Horticulture Statistics Handbook 2017-18. Available from: https://horticulture.com.au/resource/australian-horticulture-statistics-handbook/*

Historically, apart from providing evidence for the regionalised presence of potato cyst nematode (*Globodera rostochienisis*) since the 1980s, and reporting detections of potato spindle tuber viroid (PSTVd), there have been few requirements in the potato industry for declarations of pest freedom.

For governments, while there is generally high levels of awareness about surveillance and reporting, there are declining resources and limited capacity to undertake surveillance activities.

Challenges for improving surveillance to support the potato industry

For the greatest opportunity to eradicate or manage an exotic pest, it is imperative that pest detections are reported before they become widely established. If adetection is not reported, then the potential implications can be serious, not only for individual businesses, but also for the potato industry and governments.

In Australia, processes to support response to pest incursions are prescribed within the EPPRD, a legally binding agreement between PHA and 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.

As potatoes are represented under the EPPRD, there is the potential for reimbursement costs to potato growers who are impacted as a result of actions taken in responding to a pest. Despite these processes, from an individual grower's perspective, the consequences of reporting the detection of an exotic pest can still be financially and socially significant.

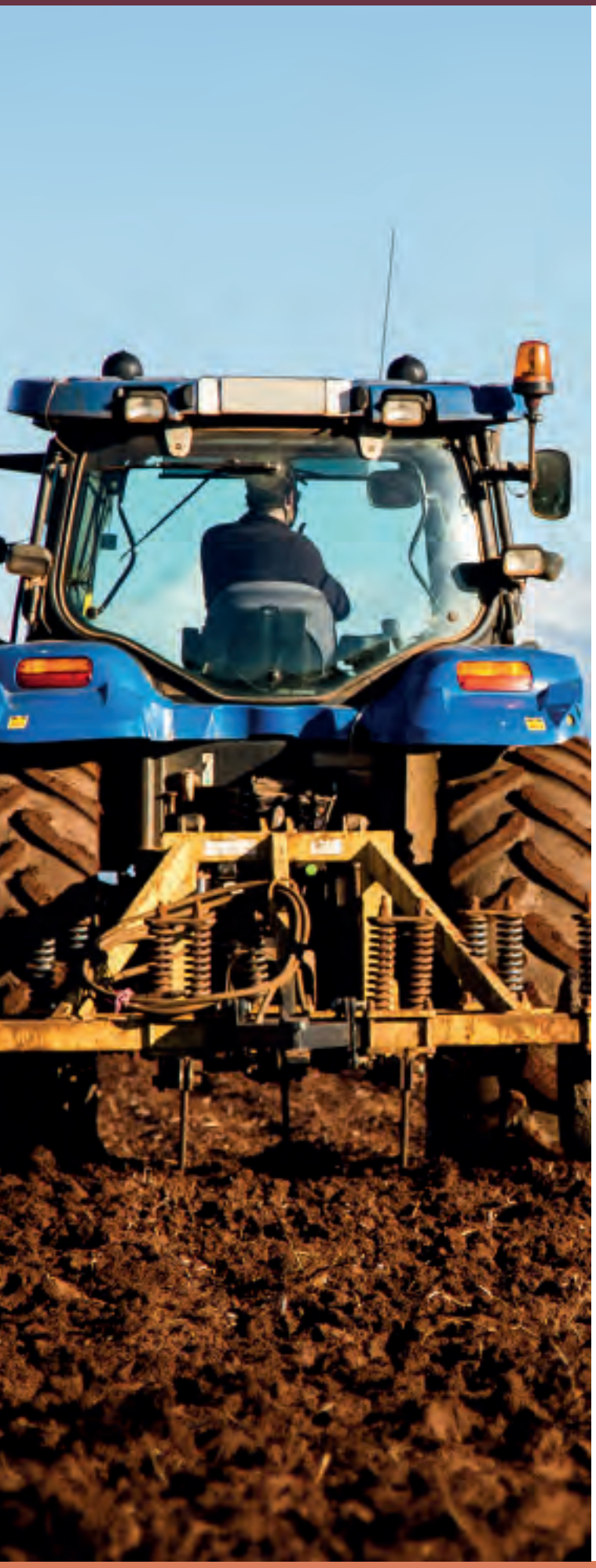
For regional communities, growers and consultants, there can be reticence to undertake surveillance, allow access to a property or report a suspected exotic pest. This can occur because there is poor awareness of the support systems that will be provided relating to an incursion response, there is a lack of trust in these systems or the support systems are regarded as being inadequate and will not fully compensate for losses to their livelihood, or loss of market access and opportunities. It is imperative that these support systemsminimise the impacts as much as possible.

Within industry there can also be significant cultural factors to reporting, including growers who speak languages other than English 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.

In the urban and peri-urban environment, community gardeners can be willing and enthusiastic participants in surveillance . While knowledge on new pests is naturally limited (which can be a significant barrier to detection), the interest level of urban environmentalists and community gardeners can be high and, given that fewer challenges on property quarantining exist, gardeners are generally willing to report new or unusual pests or symptoms.

An opportunity for addressing these cultural issues and improving resilience for growers or communities exists 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 and support recovery should a response be initiated for a new pest 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 are usually proprietary to each business and are 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 data contributes to their competitive advantage. Consequently, 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 the 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.

For the bulk of smaller potato growing enterprises, operations are conducted by a single person, family or a small set of staff. For most of these smaller growing enterprises, the purpose of crop monitoring is to detect any pest or disease issues before they become a significant issue and affect yield. Historically, few consistent records may have been kept by these growers.

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.

Left: Image courtesy of AUSVEG

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 practices rather than creating additional work, automated data entry will promote greatest uptake through the potato industry. Hence, data collection needs to be integrated, where possible, into a 'business-as-usual' approach.

Resourcing

Development of a national surveillance program that provides improvements in early detection of new pests, underpins domestic market access arrangements and builds international markets for Australian potatoes, will require an ongoing resource base for coordination, support for surveillance and diagnostic capacity and capability, and development of tools for data capture and collation. In addition, resources will be required to establish and maintain collaborative arrangements between the potato industry, other plant industries and governments.

While providing important opportunities for improving surveillance along pathways for potato pests, the expansion of surveillance and awareness in urban and peri-urban communities will also require coordination, awareness, training and surveillance material as well as ongoing engagement to establish and maintain long-term programs.

Given the wide range of pests, crops, and regions that need to be addressed in a national surveillance program, no single agency or jurisdiction can address all of the resourcing needs and ensure the implementation of all surveillance activities: a shared model for resourcing and delivery will therefore be essential to ensure success.

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 as 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.

Goals and actions

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-term objectives identified in Table 1 (page 9), four goals have been identified.

A range of actions for each goal have been identified which develop and build on existing activities in surveillance, and are described in the following section.

Goals and actions in the NPIBSS will improve engagement and communication, build trust and support the development of tools for potato industry surveillance such as surveillance protocols, training materials 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

COLLABORATION AND COORDINATION TO SUPPORT SHARED BIOSECURITY SURVEILLANCE OUTCOMES AND CROP HEALTH MANAGEMENT

Improvement in national coordination of efforts across industries and governments offers significant potential to identify duplication and gaps, improve efficiency, and maximise benefits. A nationally coordinated approach is required to encourage participation in surveillance by governments, growers, agronomists and other stakeholders to gain benefits from the activities that they undertake.

In addition, coordination will effectively facilitate collation of data from multiple data sources that exist across the biosecurity continuum – through industry supply chains, government regulatory activities, and seed or export certification systems – to inform biosecurity decision making and support trade and market access.

National collation of data from these multiple sources and systems will greatly increase the confidence regarding pest status. However, it will require collaboration and sharing of these data for collective analysis. 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. Coordination will facilitate better information sharing, and that will result in a more strategic and collective approach for early detection and providing evidence of pest absence.

Development of a National Potato Industry Biosecurity Surveillance Program (NPIBSP) that links with other industry and government programs will strengthen existing arrangements, prioritise activities and reduce potential duplication of effort. Coordination and collaboration will also be required to identify and establish an ongoing resource base to maintain surveillance capacity and capability, improve communication and support diagnostics and tools for data capture and collation. Governance will be required comprising representation from government and the potato industry, with the engagement and support of community to support implementation of a NPIBSP with required collaboration.

Actions to deliver Goal 1		
Actions	**Rationale**	**Tasks**
1.1 Develop and maintain national collaborative arrangements including funding to support surveillance and diagnostics for potato pests	Improvement in national coordination through establishment of a National Potato Industry Biosecurity Surveillance Program (NPIBSP), offers significant potential to identify duplication and gaps, improve efficiency, maximise benefits and improve information sharing. The establishment of a NPIBSP will require the active involvement of industry, government and other stakeholders, identifying priorities, locations, surveillance timeframes, targets and establishing coordination. A NPIBSP will also recognise and develop a partnership approach with other plant industries.	▪ Establish a National Potato Industry Biosecurity Surveillance Program (NPIBSP) ▪ Support an implementation plan with activities, timelines and priorities ▪ Establish mechanisms for coordinating surveillance efforts between potato industry sectors and government
1.2 Establish partnerships across plant industries and governments to support surveillance for pests of the potato industry	No single business, government or industry can undertake effective surveillance covering all aspects of potato industry biosecurity, and therefore a partnership approach 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 or forums to improve engagement between the potato industry and government
1.3 Develop business continuity plans and establish market access arrangements 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 governments and potato growers identify key risks and put in place systems that can support a more rapid return to market in the event of a pest incursion.	▪ Develop incursion preparedness plans for high priority potato pests ▪ Establish mechanisms to discuss potential market access impacts that may result from the detection of key pest threats ▪ Develop business continuity plans to support production and market access in the event of a pest incursion

Goal 2

EARLY DETECTION OF EXOTIC PESTS TO PROVIDE GREATER OPPORTUNITY FOR ERADICATION

A range of surveillance related activities take place within Australia's potato industry. These activities are 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 existing activities to support early detection of new pests through developing tools and systems to capture information and 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 are expected to have significant benefits for early detection of new pests. Contribution from other stakeholders such as nurseries, government officers, researchers, crops scouts, crop consultants, packing shed personnel, community, special interest groups and local government officers should also be considered in developing an effective and integrated biosecurity surveillance system for the potato industry. There are significant opportunities to improve surveillance through improving surveillance capacity and capability of these stakeholders. By working with individuals and groups who have a commercial interest and/or a desire to contribute to surveillance activities, early detection can be improved in both commercial plant production and urban and peri-urban communities. Targeting and prioritising efforts in areas of highest risk, as well as working with those who will benefit most from surveillance outcomes or are keen to support surveillance activities, will ensure the greatest likelihood of detecting new pests. Providing pest reporting tools such as MyPestGuide™ to individuals and groups who are best placed to undertake surveillance will greatly enhance their collaboration for biosecurity surveillance programs.

Actions to deliver Goal 2		
Actions	**Rationale**	**Tasks**
2.1 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.	▪ Raise awareness of the importance of surveillance and biosecurity and the processes for responding to pest incursions ▪ Remove barriers for 'first reporters' ▪ Investigate and implement mechanisms to support the industry recovery after a pest incursion
2.2 Identify, prioritise and coordinate pest targets, areas and surveillance methods	Planning and prioritisation are needed to undertake surveillance targeting pests of most importance in areas of highest risk and greatest return. Modelling on impacts and pest pathways is required to determine the highest risk areas and pest priorities.	▪ Develop surveillance schedules and plans for key pest threats or pest groupings based on risk, impact and benefit ▪ Identify and prioritise areas that pose a high risk for the entry an establishment of potato pests ▪ Prioritise pest targets based on potential impact, ability to conduct surveillance and purpose of surveillance

Goal 2 (continued)

EARLY DETECTION OF EXOTIC PESTS TO PROVIDE GREATER OPPORTUNITY FOR ERADICATION

Actions to deliver Goal 2		
Actions	**Rationale**	**Tasks**
2.2 Identify, prioritise and coordinate pest targets, areas and surveillance methods	Planning and prioritisation are needed to undertake surveillance targeting pests of most importance in areas of highest risk and greatest return. Modelling on impacts and pest pathways is required to determine the highest risk areas and pest priorities.	▪ Establish arrangements to provide, report and analyse interception and pathway data ▪ Identify and mitigate pest entry and spread pathways in Australia ▪ Develop models on potential impacts to identify highest risks and priorities ▪ Investigate cost effective approaches for surveillance, using a risk-based approach ▪ Ensure surveillance activities are 'fit for purpose'
2.3 Integrate surveillance for exotic and regionalised 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.	▪ Conduct a stocktake of existing crop monitoring activities to assess the ability of these activities to support biosecurity surveillance ▪ Identify mechanisms to ensure that key surveillance priorities are covered ▪ Establish a collaborative network between industry and government to improve triaging of pest identification to enhance diagnostic 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 collation of surveillance data from tools and digital platforms used routinely in the potato industry

Actions to deliver Goal 2		
Actions	**Rationale**	**Tasks**
2.4 Improve surveillance for exotic and regionalised pests in urban and peri-urban communities	Urban and peri-urban communities can be high-risk pathways for entry of new pests. However, surveillance in these areas is challenging. A focus on members of the community or organisations in the area that are most interested in plant production and health such as community gardens, garden clubs, government staff and researchers will assist in providing a targeted message and create sentinels for potato surveillance.	▪ Provide tools that support reporting of suspect pests in urban and peri-urban communities ▪ Identify and establish surveillance high priority areas within in peri-urban and urban areas ▪ Develop awareness campaigns targeting members of the community with an interest in plant health ▪ Develop and implement training programs that target members of the community with an interest in plant production and health ▪ Establish a program of 'blitz' campaigns that includes key pest threats of the potato industry
2.5 Improve consistency and efficiency of surveillance through development of tools, protocols, technologies and plans	Use of the standardised protocols and plans will ensure consistency in surveillance efforts and support the ability to share information between stakeholders. Investigation of innovative and new tools and technologies will drive efficiency and effectiveness of surveillance and support a system of continual improvement.	▪ Develop National Surveillance Protocols and surveillance plans for prioritised pest targets ▪ Identify, prioritise and deploy tools, technologies and systems to support the development of an efficient surveillance system

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. Stakeholder engagement will increase the NPIBSP's capacity for detecting new pests and supporting 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, awareness and engagement will promote the 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.

Actions to deliver Goal 3		
Actions	**Rationale**	**Tasks**
3.1 Develop communication and engagement mechanisms to support surveillance	Effective communication and engagement with stakeholders are 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 pests.	▪ Develop material to support communication and engagement ▪ Develop online communication tools and mechanisms to improve capacity and capability for surveillance
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 potato pests will be improved.	▪ Identify training needs and develop and deliver training for surveillance in potato crops ▪ Develop field guides for identification of pests of the potato industry

Goal 4

PEST INFORMATION TO SUPPORT MARKET ACCESS, INDUSTRY GROWTH AND BUSINESS RESILIENCE

There is a growing need to document the activities, systems and processes that support businesses and the potato industry. Surveillance (crop monitoring) is just one of these processes, and the ability to document and record the outcomes of activities, record pest levels and, importantly, the information on 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 to meet pest information requirements for all markets.

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 in high-risk 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 NPIBSP that skills, expertise and resources exist to support triage and diagnosis of exotic pests.

Actions to deliver Goal 4		
Actions	**Rationale**	**Tasks**
4.1 Establish mechanisms, systems and tools for the national aggregation of data to support market access and inform biosecurity decision making	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, NPIBSP. Improving the way in which data are captured, recorded and reported will ensure that relevant information is aggregated and made available when needed to support market access.	▪ Address barriers for collection of surveillance data based on National Minimum Dataset Specification ▪ Identify and/or develop mechanisms to capture and aggregate data into the national system ▪ Develop nationally agreed standards to improve consistency in data collection ▪ Identify and/or develop mechanisms to support sharing of data from industry and government sources
4.2 Improve 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 NPIBSP that skills, expertise and resources exist to support triage and diagnosis of exotic pests.	▪ Conduct gap analysis to determine capacity and capability requirements for diagnostics to support surveillance ▪ Address diagnostics gaps to improve potato pest identifications ▪ Establish, coordinate and maintain a diagnostic network and diagnostic triage systems to support surveillance in the potato industry
4.3 Develop farm biosecurity plans to support preparedness and surveillance outcomes	The identification of potential biosecurity risks to individual businesses, will assist growers understand the types of pest threats, and the actions that should be undertaken at a farm level to mitigate these risks. Adopting and implementing risk mitigation activities, including collection of surveillance data to support early detection or market access outcomes, will form the foundations for industry to actively participate and support the biosecurity system.	▪ Farm biosecurity plan decision support tool developed that identifies potential biosecurity risks and mitigation actions at a farm level ▪ Training and awareness to support adoption and implementation of farm biosecurity plans

Definitions, acronyms and abbreviations

Term/ Abbreviation	Definition
ABS	Australian Bureau of Statistics
AUSVEG	Industry representative body for vegetable and potato growers
DAWE	Department of Agriculture, Water and the Environment
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
High Priority Pest (HPP)	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
National Priority Plant Pests (NPPP)	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, Water and the Environment in 2016
NRM	Natural resource management
PCN	Potato cyst nematode species
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.

Appendices

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.[5]

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 eight months, potatoes processed for chipping are usually only stored in transit for approximately 2.5 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.

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. Processors employ field officers to organise production and harvest with contract growers, and check on crops' progress, management and health.

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 24-48 hours 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[6] 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.

Most varieties grown for the fresh market (ware potatoes) are produced from varieties that are protected by Plant Breeders Rights. These varieties have generally been bred overseas and are brought into Australia as in vitro plants under quarantine regulations to ensure freedom from diseases. 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.

5. *Hort Innovation (2019) Australian Horticulture Statistics Handbook 2017-18. Available from: https://horticulture.com.au/resource/australian-horticulture-statistics-handbook/*

6. *Hort Innovation (2019) Australian Horticulture Statistics Handbook 2017-18. Available from: https://horticulture.com.au/resource/australian-horticulture-statistics-handbook/*

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 a 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 (HI 2016).[7] This specifically refers to certified seed which must meet quality and plant health parameters. Multiple certification schemes operate in Australia. Lack of agreement on a national scheme has caused issues with movement of product and consistency of treatments and controls. This lack of coherence has resulted in fewer growers using certified seed.

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 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. 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.

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.

Image courtesy of AUSVEG

7. *Horticulture Australia Limited (2007) National Standard for Certification of Seed Potatoes. Available from: https://ausveg.com.au/app/uploads/2017/05/National-Standard-31Jul07.pdf*

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 focused 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 and 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 an organisation in charge of seed potato certification. Agronomists play a major role in systematic crop monitoring.

Surveillance and crop monitoring

Smaller scale growers mostly monitor on a weekly basis and are generally out looking at the overall crop health – 'does my crop look okay' – or for symptoms like stunted growth, leaf yellowing, necrotic lesions or feeding damage. At key stages of the crop, and sometimes after a weather event, the grower will look out for specific symptoms of pests 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, and virus diseases. If those who check the crop are not sure about some symptoms, they may send samples to a diagnostic lab or ask others to assist with identification.

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. 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, although the level of sophistication varies from a piece of paper recording the inspection of the crop to an 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 in the Biosecurity Plan for the Potato Industry (Version 3.1, February 2019)

Common Name	Scientific Name	NPPP (2019)	Hosts
Colorado potato beetle	*Leptinotarsa decemlineata*		Solanaceae including tomato, potato, eggplant
Serpentine leafminer	*Liriomyza huidobrensis*	Yes	Polyphagous including potato, beets, spinach, lupin, faba bean, field pea, cow pea, common bean
Vegetable leafminer	*Liriomyza sativae*	Yes	Wide host range including potato, *Allium* spp., bean, pea, eggplant, pumpkin, cucumber, beets, lettuce, celery
American serpentine leafminer	*Liriomyza trifolii*	Yes	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	Yes	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, clove
Late blight (exotic strains of the A1 and A2 mating types)*	*Phytophthora infestans*	Yes	Solanaceous species including potato, tomato, eggplant, tobacco
Pale potato cyst nematode	*Globodera pallida*	Yes	Potato, tomato, eggplant
Golden potato cyst nematode	*Globodera rostochiensis*	Yes	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)

**Australia's P. infestans population consists of a single 'archaic' strain of the A1 mating type*

Plant Health
AUSTRALIA

Phone 02 6215 7700
Email biosecurity@phau.com.au
planthealthaustralia.com.au

PHA 20-020