

PCN Harmonisation Meeting Ag-Challenge

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PT07045 - PCN Harmonisation Meeting
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Media Summary

The project to put together a National PCN plan was instigated by the Potato Growing members of the board of AUSVEG. The need for a National Plan has been paramount for the potato industry, but past attempts had failed for various reasons.

This time the project was designed to see a PCN Management document that will become a standard for the National industry.

The beginning of the project saw universal agreement amongst the invited members on the Working Group that now was the time to get something together to deal with PCN with a National focus. The meeting was based around identifying what needed to be done in order to get a National plan together. Various projects were identified, which include an investigation into the way PCN outbreaks would be handled interstate, and the main one being a risk management plan – the document that the Plan will be based around. The existing ‘PCN technical document’ that was developed by the National Technical Working group was designated to also be used as a base document that Scientific based arguments for certain parts of the Management plan can be argued against.

This project was centered around the fourth meeting of the PCN Management Plan Working Group. This meeting saw a draft management plan put together and tabled for discussion at the meeting. From this meeting there was a strong push continue project funding so that a National PCN Plan can go through to implementation stage at both State and grower levels.

The completion and enactment of a National plan for PCN should remain high on the priority list for both fresh and processing potatoes.

Technical Summary

The first detected Australian outbreak of potato cyst nematode occurred in Western Australia in 1986. It was detected in Victoria for the first time in 1991 and subsequent testing across all districts and perceived high risk areas in 1991 and 1992 identified a total of thirteen sites where PCN was found to occur. All thirteen sites were retested in late 2002 and 2003 and PCN was not detected in ten of these sites. Three had viable and potentially infective cysts. In 2003 and 2004, PCN was found in the Kooweerup region, and currently 10 paddocks are known to have infestations. Potatoes are grown throughout Victoria, and although the size of the individual PCN outbreaks has been small, all Victorian potato growers have been affected. Interstate buyers, potato growers, exporters and governments are demanding assurances of freedom from the pest.

A policy by industry on how to deal with current and future outbreaks is essential. Since 1991, all seed potato crops submitted for Certification have been surveyed for PCN using National Sampling Standards. PCN sampling procedures introduced for Certified Seed Crops include: All cropping areas of Generation 1 to 4 must be tested unless the class is submitted as Certified. Currently 25% of all areas of Generation 5 (crop for certification), and other areas submitted as Certified must be tested - generally the crop chosen is from the paddock with the shortest rotation.

Between 1991 and 1997, 241 properties and 8,062 ha of potato growing paddocks were surveyed across Victoria. The surveys have indicated that the outbreaks are confined to isolated pockets close to Melbourne. The overall goal is to ensure the continued viability of the Victorian Potato Industry through containing the pest yet allowing the industry to compete in domestic and export markets.

The initial 1995 draft Statement of Policy with regard to Potato Cyst Nematode was developed by the Potato Growers' Council, Victoria (a commodity group within the Victorian Farmers Federation) on behalf of all Victorian potato growers.

The Revised Statement of Policy 1998 was subsequently developed and endorsed by all sections of the Victorian potato industry: potato seed producers, growers of potatoes for processing, and fresh market potato growers and marketing sectors. It was intended that this revised statement of policy would lead to various regulatory changes within Victoria and interstate to facilitate a more rational approach to potato cyst nematode containment, control and eventual eradication. A project was created under the guidance of Horticulture Australia to facilitate this process in 1999 but by the end of 2003 no national plan or national approach to PCN had been achieved.

The Victorian Potato Growers Council resolved in late 2003 to review and update the revised statement of policy in conjunction with the Victorian government. This 2004 policy statement is the result of this review.

The Statement of Policy shall form the basis for administration of regulations to be included in the Plant Health and Plant Products Act (Vic) 1995, and assist in the development of a national PCN policy statement and an industry Code of Practice for all potato growers. This project aims to develop a National PCN trading protocol across

Australia by bringing together key players in the potato industry at a National workshop to develop a discussion paper that will be circulated to industry for broad consultation. Following consultation a final agreed protocol will be established via application to the Federal Government.

Introduction

The aim of the PCN management plan group is to formulate a plan to deal with PCN in Australia. This plan will not involve directives that will put growers out of business, nor will it involve significant changes to good farming practices that should already be standard across the industry. What it will do is provide growers across Australia with the knowledge and understanding of the nematode, and hopefully reduce the personal impact of a detection if and when another is made, by ensuring contingency plans and protocols are in place to deal with the pest when it is found.

The National PCN Management Plan Working Group is comprised of the six growers who are members of the AUSVEG potato board, the AUSVEG CEO, senior quarantine officials from each State, as well as representatives from Horticulture Australia, (HAL), Plant Health Australia (PHA) the Department of Agriculture, Fisheries and Forestry (DAFF), leading nematologists from around the country, as well as representatives from the processing industry and packing industries.

Currently Tasmania, Victoria and Western Australia are doing regular samples, with Western Australia seeking freedom from this pest and Victoria intent on ensuring that all outbreaks have been found and are being controlled. The other States have had some samples done in the past, and some are continuing to sample under certified seed schemes and requirements from processors or packers. It is imperative that this pest is found and dealt with before it gets out of hand, which may be too late already. It is better to find and control it now, and not wait until we have the numbers, and the species, that the rest of the world has to deal with.

The project to put together a National PCN plan was instigated by the Potato Growing members of the board of AUSVEG. The need for a National Plan has been paramount for the potato industry, but past attempts had failed for various reasons.

This time the project was designed to see a PCN Management document that will become a standard for the National industry.

The beginning of the project saw universal agreement amongst the invited members on the Working Group that now was the time to get something together to deal with PCN with a National focus. The meeting was based around identifying what needed to be done in order to get a National plan together. Various projects were identified, which include an investigation into the way PCN outbreaks would be handled interstate, and the main one being a risk management plan – the document that the Plan will be based around. The existing ‘PCN technical document’ that was developed by the National Technical

Working group was designated to also be used as a base document that Scientific based arguments for certain parts of the Management plan can be argued against.

Despite a feeling of negativity from the broader industry, the Management Plan Working Group went on to meet a second time, with the agreement from all State representatives that a recommendation of under grader sampling should be taken out to the broader industry. A document investigating the sampling methods was commissioned, and the document was deemed feasible by all on the Working Group, with only a few amendments suggested. The actual implementation of the sampling caused a halt in the industry however, with the question about who is to fund the project still unanswered.

Materials & Methods

The draft PCN plan was put together using information from previous PCN meetings, and was loosely based around the Victorian PCN Management Plan. The integral part of the plan was the Risk Analysis, which at the time of the meeting, had not been completed.

The aim of the meeting was to get all of the key industry people and representatives from the regulatory bodies throughout Australia together to discuss the current, and future direction of PCN management in Australia.

In order to bring together members of important and relevant sectors from around Australia, extensive communication was required to identify conflicting schedules and other meetings. There was also the difficulty in arranging the meetings to not coincide with growers peak busy seasons, which differ around areas of Australia.

The meeting dates were arranged via e-mail and telephone communication, with a range of dates offered and the most suitable one chosen after all members of the group came forth with feedback. Once the date for the meeting was set, the room was booked and conversations with the Hilton took place on a weekly basis to organise the meals, accommodation and the meeting room.

Flights for the IAC growers, booking rooms for interstate travellers and other arrangements that need to be made before the meeting, mostly administration also took place in the weeks before the meeting took place.

Electronic mail was used to send out the information relevant to the meeting, prior to the meeting date, and all documents were also available in hard copy on the day.

Results

The Draft plan was put together in time for the National meeting. This plan has been attached in Appendix I.

At the time of the meeting, the Risk Analysis had not been completed, which meant there were significant gaps in the plan when it was presented to the meeting. The meeting was held with the knowledge that these gaps were there, and would be rectified when the Risk Analysis was completed.

The meeting saw a significant step forward in the progress towards a National Management plan.

With the presentation of the draft management plan to the group, there was agreement from the participants of the meeting that the general format of the management plan was acceptable. Suggestions were made throughout the meeting regarding more information to be added to the management plan, and a more streamlined approach to its presentation. Those suggestions were taken on board and another draft of the management plan will be circulated at the end of June.

There was also solid agreement from the group that under grader sampling would be the way to go for the industry. This was an important step in National cohesion in regards to moving forward in managing PCN in Australia. As a survey technique, under grader sampling was recognized by the group as a potential National standard for States not already involved in an intensive sampling program. Under grader sampling is a cheap, efficient and simple way to begin the survey process in Australia. Australia is currently considered 'PCN free' by international standards. However, by not testing and still declaring freedom from PCN, we are potentially setting up our *entire* potato export markets up for some significant negative repercussions. There are some concerns about where the cost will lie for detection and analysis of the samples, as well as the validity of being able to separate the samples for ease of trace-back.

The group recognised that seed is acknowledged internationally as the highest risk in transporting PCN to different areas. Victoria and Western Australia have strict protocols associated with the production of certified seed, which includes 100% soil sampling from each paddock that will be growing seed for sale that year. Victoria is also in the process of legislating for all seed that is to be sold – certified or not – to be PCN tested yearly. These samples come at a considerable cost to the seed grower but are invaluable in being able to build up a history of survey on the farm.

The use of resistant varieties of potatoes is recognized as of primary importance in relation to the effective control of PCN. Growers who have positive detections are encouraged to grow resistant varieties on both paddocks that have positive detections and paddocks that have no detections. A PCN cyst contains 100-500 eggs, each capable of hatching when stimulated to do so by potato root exudates. If no food is present when the nematode hatches, it will die within a couple of weeks. Resistant cultivars essentially 'kill

off' the nematode by allowing it to hatch, and then taking away its food source in the roots. The surviving nematodes have a significantly reduced fertility and the juvenile offspring have a low infectivity resistance.

With a defined focus on uniform hygiene plans, State regulations regarding the movement of ware, seed and processing potatoes as well as machinery, contingency plans for new detections and a push for open communication up and down the supply chain, the group believes that the opportunity for a unified approach to identify and control PCN infections in Australia should be achievable, sooner rather than later.

Despite the proposed plan not being accepted in its current form by the group, there was a definite agreement from all group members that the plan was the right direction to go in and that it would provide a good sound basis for the final plan.

Minutes of the meeting are attached as Appendix II.

Discussion

The meeting held on the 2nd May 2008, was successful in pushing the Management Plan to the next level. With the continued involvement of both interstate and local growers, and regulators, as well as National leaders in bio-security and plant health agencies, the plan is getting the best input possible from the different sectors of the industry.

The plan itself has come a long way since the initial draft, with it being based around the Risk Analysis that was undertaken by a sub-committee of the group consisting of those who were experienced in performing risk analysis. The risk analysis was an integral part of the plan, as it identifies the pathways of most risk, which must be taken into account when putting together a plan to negate risks associated with the pest.

There remains a distinctly positive attitude from all members of the group towards the project, and while that attitude is there it should be used to the advantage of the National industry. More meetings will be required for all States to sign off on the plan and be comfortable about taking it for promotion to their growers and industry.

There needs to be continued project funding so that a National PCN Plan can go through to implementation stage at both State and grower levels.

The completion and enactment of a National plan for PCN should remain high on the priority list for both fresh and processing potato industries.

Technology Transfer

The involvement of the AUSVEG communications plan was paramount to this project. Getting the information out to the growers is the key to this project and through the 'Potatoes Australia' magazine and the broader industry contacts has been invaluable in ensuring that the growers around Australia know what is being done for them with their R&D money.

State based organisations have been fed through information about the project so that it can be added to their publications.

There were also National media radio and newspaper interviews conducted regarding aspects of the project.

Recommendations

There needs to be continued project funding so that a National PCN Plan can go through to implementation stage at both State and grower levels.

The completion and enactment of a National plan for PCN should remain high on the priority list for both fresh and processing potato industries.

Appendix I

Australian Potato Cyst Nematode Management Plan

PCN Working Group 2008

Background

Berg, Merriman and Sully completed the first Australian PCN Management Plan in 2004. This was not accepted by industry due to fear that it may have increased the spread of PCN in Australia by loosening the existing severe national regulations on PCN. This present plan has, to a large extent, been based on the plan of Berg et al (2004), however it has been modified and simplified based on analysis by the National PCN Working Group, the PCN Pest Risk Analysis done by Washington et al (2008) and new technical data provided by Hodda et al (2006).

Experts from overseas have recommended that PCN needs to be managed carefully in Australia, otherwise it will become a widespread endemic pest with resulting production and market access difficulties as has happened in the UK. It is also highly likely that PCN occurs in parts of Australia other than the known infestations in Victoria. This because there has been no universal potato farm hygiene program in Australia, there is likely to have been movement from areas later found to be infested (at least 10 years for PCN to have escaped before it was first detected in Vic and WA), undetected new introductions such as happened in Idaho in 2006 and Alberta in 2008, and millions (10 million per year) of treated flower bulbs from tested land brought into Australia from the Netherlands where both PCN species are common. There is also likely to have been inadvertent or illegal movement of bins/bags/equipment and potatoes for seed from infested zones as happened in 2006.

Large areas of Australia (eg NSW, South Australia, and Queensland) have area freedom recognition for PCN despite a paucity of surveillance evidence. The Australian potato industry needs to develop area freedom protocols compatible with International Sanitary and Phytosanitary Measure Number 4 (Establishment of Pest Free Areas) otherwise overseas trading partners such as Korea in the future will reject market access if evidence of area freedom of PCN cannot be presented. A nationwide survey to be repeated every 5-10 years should be a high priority for Australian exporters and growers.

Pest Free Places of Production (International Sanitary and Phytosanitary Measure Number 10) should also be used as a strategy to more effectively manage PCN by allowing marketing of ware and processing potatoes from properties in quarantine zones if they have been tested and no PCN detected, there are no direct linkages and as long as other measures are also put in place to minimize risk (eg by removing contaminating soil).

The following Australian PCN Management Plan provides mechanisms to better manage PCN in Australia yet safely maximize market access for potatoes both within Australia and to overseas markets.

The plan includes six sections:

1. Managing PCN infested land
2. Managing a PCN outbreak
3. PCN Surveillance protocol for property freedom and area freedom (including PCN protection district protocol)
4. PCN Hygiene Strategy
5. PCN Pest Risk Analysis (used to develop all sections)
6. References

7. preventing spread of pcn

8. maintaining ability to trade

9. what is purpose of surveillance

seed production areas: must be free of PCN, 40% of seed is regulated.

Soil pathways are the main risk

is risk about soil or tubers. Definetly on soil and there are regulatory elements already in place.

Document Australian status.

Property freedom for seed production (and others if testing history supports this)

Definitions: check definitions with ISPM 5 if this is sufficient, then this does not need to be changed...

PCN soil test: Current Australian standard is using a 10 x10 m grid and collection a composite sample of only 0.5kg per hectare (however the international standard is currently being changed and more soil will need to be taken depending on the level of risk)

Resistant cultivar: Cultivars resistant to *G. rostochiensis* can reduce soil populations of this species by up to 90%. NOTE: There are as yet relatively few cultivars with resistance (which is only partial resistance) to *G. pallida*.

2 km buffer or control zone: a regulated zone 2 km in radius around a PCN detection. Note this zone can be extended in appropriate places after consideration of topography, water courses and drainage patterns.

Directly linked (or exposed) properties: treat as within a 2 km zone until PCN testing demonstrates PCN below level of detection on that property. Restrict movements of risk machinery and other objects from the confirmed PCN positive property.

One-off seed: Potatoes grown for re-planting by the grower or sold as uncertified seed

Seed potatoes: Potato cultivars grown specifically to harvest for replanting by commercial growers

Certified seed: Seed produced under an accredited scheme designed to minimize pests and diseases

Processing potatoes: Potatoes grown for processing in factories (usually specific cultivars suitable for processing)

Ware potatoes: Potatoes grown for fresh market (usually specific cultivars suitable for fresh market)

Eradication is the permanent elimination of the introduced pest or pathogen from the ecosystem which, in practice, means that it can no longer be detected by recommended methods of survey and diagnosis.

Containment is the use of specified survey, inspection and control strategies to restrict the distribution of the introduced pest or pathogen to a defined area. Eradication is the preferred option, because it can eliminate the ongoing costs of a prolonged containment program and if implemented quickly can reduce losses to a minimum.

Authorised Person : An employee of the packing shed who is familiar with protocols such as piler dirt collection and testing and is responsible for record keeping, gathering, preparing and sending samples to the accredited laboratory for testing.

Composite Sample: A sample consisting of the soil from several regional growers which has been collected during the current sampling period and mixed together.

Individual Consignment Sample: A discrete soil sample which has been collected from one consignment that has come from a field belonging to an individual grower.

Potato Packing Shed: Any facility which grades and packs potatoes.

Properties: used USA definition of 'exposed land'

State Quarantine Authority: The government authority in charge of administering each state's quarantine regulations.

Soil: Any material adhering to potato tubers, roots, bins or transport which could potentially harbor any stage of the pest, PCN.

'Piler Dirt': For the purpose of this document, piler dirt can be: 1) an aggregate pile or sample of dirt that results from movement of a defined batch of potatoes from the field to a transport truck; or 2) a sample of dirt that was dislodged from potatoes during transit to a storage or packaging facility, 3) any soil collected from under a conveyor or bin associated with a defined batch of potatoes.

Part 1 - Managing PCN infested land

1.1 Objectives:

- To contain/eradicate outbreaks of PCN
- To minimize the risk of population build-up of PCN in affected sites
- To protect uninfested land from potential infection sources
- To minimize impact on affected businesses and people
- To ensure safe market access for farmers with infested land
- To develop long term strategies for future productive use of affected areas

1.2 Introduction

Because PCN cysts are extremely long lived in soil, even in the absence of suitable host plants, eradication of PCN from an infested site is not possible in the short term. Eradication remains however as the long term objective for all infested land. Overseas studies have shown that cysts may survive for as long as 20 years, even in the absence of suitable host plants. Fumigation of infested soil can depress levels, but not eliminate PCN populations. Similarly, in the case of *G. rostochiensis* infestations, resistant potato cultivars can also be used to reduce nematode populations as part of a management program.

Current sampling technologies are unable to detect very low levels of PCN. A conservative approach is required to minimize risks of transfer of contaminated soil and to ensure that infested sites do not pose unacceptable risks to other areas. This will also assist in the retention of market access for unaffected sites.

Ongoing management of PCN outbreak sites should aim to progressively reduce PCN populations, eventually to the point where PCN may be considered to be eradicated. This will require:

- Initial controls, such as crop and tuber disposal, soil fumigation, equipment hygiene, site security and restricted site access undertaken during an incursion response program
- Ongoing controls on the use of the PCN infested paddock. Use of a “PCN infested paddock” for the growth of non PCN resistant potato or other Solanaceous crops needs to be prohibited. The use of resistant potato cultivars or other solanaceous “trap crops” for the purposes of lowering population levels of *G. rostochiensis* is recommended.
- Similar restrictions on the use of other paddocks or properties for potato production which, because of their location with direct links to the affected land or property such as movement of potatoes, equipment, soil or water because there is a very high risk that PCN will have been spread to linked land.

1.3. Protocol for management of infested paddocks/properties (sections 1.3-1.5 to be used as the basis for regulatory harmonization throughout Australia)

The present PCN management plan assumes that only *G. rostochiensis* pathotype Ro1 occurs in Australia, and additional management measures will have to be put in place if other strains of *G. rostochiensis* or *G. pallida* are detected. Widespread use of Ro1 resistant potato cultivars will lead to the build up of *G. pallida* if it is present. All PCN testing needs to screen for presence of *G. pallida* as elsewhere in the world both species of nematodes generally co-exist. Testing for both species is to be carried out.

1.3.1. Infested paddocks/properties need to be put on a national/state register as being infested with PCN (not to go on land title declarations). Database to be held by regulators, obligations to inform if property is sold. Legislation is required, can this be incorporated into chemical residue act

1.3.2. No potatoes from infested paddocks/properties (see definition) to be harvested and used for seed. Using seed from infested land is certain to spread PCN. Thus potatoes from infested land must not be planted on land other than back into the same infested land, and then only if a PCN resistant cultivar.

1.3.3. All subsequent ware/processing crops on infested land to be grown in a way so as to reduce the PCN population, ie only using resistant cultivars, all self sown potato plants to be controlled using herbicide unless also known to be PCN resistant.

1.3.4. Potatoes for retail sale and table use from infested paddocks/properties to be marketed only after washing/brushing to ensure that they are practically free of soil (needs to be defined) on farm, and washed to remove all visible soil at a registered packing shed and not allowed to be planted, and to be kept segregated from unwashed and potentially infested potatoes. Only PCN resistant

cultivars to be grown (this would need to be reconsidered if *Globodera pallida* was detected). All batches (bags, bins, pallets, boxes and containers) be labeled with an infested property number for auditing and then individual containers clearly labeled 'Not for Planting'. All batches to be accompanied with a quarantine agency approved plant health certificate or equivalent documentation for marketing. No potato waste to leave the growing or packing properties without appropriate treatment including secure burial, sewer disposal, pit storage, or specified composting or heat treatment.

1.3.5. Potatoes for processing from infested paddocks/properties to be only allowed to be sent from properties after washing/brushing to ensure that they are practically free of soil on farm. Only PCN resistant cultivars to be grown (strategy to change if *G. pallida* is detected). All batches (bags, bins, pallets, boxes, truck loads and containers) must be labeled with an infested property number for auditing. Transport is only over designated routes which must not pass through PCN protected areas (certified area free for PCN following legitimate survey program (to be defined)) in clean trucks. All solid and liquid waste in the handling and processing chain including on the infested farm and at the factory to be securely disposed of by any of the following: deposition in moist anaerobic storage (eg pit), sewer disposal or composting or heat treating in moist conditions at above 50°C for at least 2 hours.

1.3.6. All washed potatoes to be kept from direct soil contact and segregated from potentially infested potatoes.

1.3.7. All affected potatoes received at a packing or processing facility must be accompanied by a Plant Health Certificate (PHC) or Plant Health Assurance Certificate (PHAC) which must be verified by the business and kept for auditing purposes.

1.3.8. No machinery or bins to be moved from infested properties without cleaning free of all visible soil and debris, inspection and relevant government quarantine permit.

1.3.9. No soil to be moved from property without relevant government quarantine permit.

1.4. Protocol for a two km radius buffer area (control area) including properties with direct linkages to an infested property (called exposed land in the USA).

1.4.1. A two kilometre buffer zone to be established around the perimeter of infested land in which no PCN hosts can be grown unless PCN resistant potato cultivars or other suitable trap crops to reduce population levels. All directly linked land needs to be treated the same as the 2km radius buffer area because

of the higher risk of being infested. The present management plan uses the USDA (2006) definition of directly linked (or exposed) land as land operated by a farmer who has farmed other infested land, land farmed with equipment used in a field with a history of infestation, land bordering a field with a history of infestation, land that receives direct drainage from a field with a history of infestation or land exposed as a result of a regulatory violation. Property freedom needs to be considered here. Risk zones areas need to be redrafted.

1.4.2. Seed can only be grown following an intensive PCN test with no infestation detection, washed to completely remove soil and soil stains, washed with chlorine (hypochlorous acid) and dried, PCN resistant cultivars only, no history of direct linkage to infested land.

1.4.3. Ware potatoes can be grown and harvested from the 2 km buffer zone following a negative PCN test (otherwise the infested land protocol would be appropriate), washed free of soil and soil stains, preferably PCN resistant cultivars, marketed in small bags labeled "not for planting"

1.4.4. Packing facilities accredited to receive, pack and market potatoes from 2 km buffer (control) areas product ensure that they are segregated from potatoes from PCN free areas.

1.4.5. Processing potatoes can be moved from the 2 km buffer zone following a negative PCN test (otherwise the infested land protocol would be appropriate), washed free of soil and soil stains, preferably PCN resistant cultivars, controlled handling, secure transport and disposal of all solid and liquid waste in the handling and processing chain including at the factory and ex factory using secure burial, sewer, pit storage, composting, heat treatment or securely sent accredited feed lots which are **not** in potato protection districts.

1.4.6. Interstate Director's approval to be obtained if required for movements interstate

1.4.7. All businesses supplying (irrespective of whether the potatoes have originated from affected or unaffected paddocks) packing facilities must be accredited by state quarantine authority and be issued with a unique identification or accreditation number as shown in the grower accreditation list kept by the authority.

1.5. PCN management in all other areas outside the buffer zone (areas free of PCN in Australia under ISPM #4)

1.5.1. No seed to be grown and sold unless a negative test for PCN provided for certified seed (Australia wide).

1.5.2. Area freedom and property freedom from PCN only recognized following an approved PCN survey program (Australia wide).

1.5.3 In areas

Part 2 - Managing a new PCN outbreak

2.1 Objectives:

- To rapidly eradicate/contain any new outbreak of PCN
- To minimise the risk of spread of PCN from a new outbreak site
- To facilitate trace-back and trace-forward investigations
- To minimise impact on market access and trade
- Assist grower to stay in business without increasing risk to industry

2.2 Introduction

A future outbreak of PCN may occur as a result of:

- A previously unrecognised infestation of *G. rostochiensis* (pathotype Ro1) possibly associated with earlier outbreak sites
- A new incursion of either *G. rostochiensis* (possibly a different pathotype to Ro1) or *G. pallida* and possibly associated with industries other than potatoes

In the event of an incursion by an economically important pest or pathogen such as PCN, a number of important actions would be implemented under PlantPlan and with agreed cost sharing under the Emergency Plant Pest and Disease Response Deed immediately following a positive diagnosis. These tactics apply to eradication and may apply to local containment and include:

- survey and sampling of affected areas to map the extent of the pest or disease
- implementing pro-active control measures including removal of infected crops, other sanitation measures, and application of selected nematicides and fumigants to ensure affected areas are no longer sources of spread
- monitoring to check the disease status of any previously affected areas (possible re-occurrence in those areas)
- monitoring unaffected areas as an assurance that area freedom is maintained
- completion of trace back and trace forward studies
- conducting a communication program to ensure stakeholders are well informed of the program

2.3 Protocols for managing a new outbreak are the same as for managing an existing infested paddock/property (see part 1.3)

The exception would be if the exotic nematode *G. pallida* or an exotic strain of *G. rostochiensis* was detected and additional measures would be:

- grower needs to report suspect PCN
- diagnosis of PCN confirmed
- quarantine controls will need to be put on property
- treatments for the eradication if feasible

- treatments on potatoes, machinery, bins etc to control PCN (as in infested land protocol –market access with conditions)
- communication and awareness program
- support from other growers and government agencies

If PCN is detected in a new area, all properties will be treated as infested until cleared by a recognised PCN test.

Make reference to Plantplan, and the Emergency Plant Pest and Disease Response Deed.

Risk assessment to provide details here; from paddock, farm and linked areas. Also need to determine the actions for associated zones.

PART 3. NATIONAL PCN SURVEILLANCE PROGRAM

Under grader Potato Cyst Nematode Sampling Protocol for ware and potatoes on grower's properties and in Packing Sheds.

3.1 Aim

This protocol's purpose is to determine if the pests golden potato cyst nematode or potato cyst nematode (*Globodera rostochiensis* or *G. pallida*) is present in any of the potato growing regions of Australia, and early detection will stop the pest becoming widely established. Potato pack houses will need to become registered with individual state quarantine authorities, and will each have a nominated person or persons to oversee collection of samples, maintain the appropriate records and get samples ready for collection by the relevant state quarantine authority.

3.2 Introduction

The AusVEG meeting on Potato Cyst Nematode in February 2007 laid out a plan for the development of a national management plan for PCN in Australia. One of the critical needs is to establish pest area freedom and property freedom guidelines following internationally accepted standards (WTO ISPM 4 and ISPM 10). The European Union (European Union New Directive PVNA/2002/655R8), New Zealand (property freedom and packing facility guidelines), USA (property and area freedom guidelines) and Western Australia (Area Freedom protocol) have all developed guidelines for defining pest area freedom or property freedom for PCN.

In addition, there is a high probability that PCN moved from infested properties in Victoria during the 10 or more years that it takes to build up to detectable levels. Several farms which were later found to be infested, produced and distributed seed potatoes in south eastern Australia before the pest was detected on their properties.

Currently, only Western Australia, Tasmania and parts of Victoria have comprehensive PCN testing programs. In addition, potato crops destined for export to Western Australia from South Australia, and for export into South Australia, NSW and Queensland from Victoria are tested in the field. To enable all states to test for the presence of these pests, representative potato crops from representative areas in all states will need to be tested. The traditional field testing of crops while they are still actively growing would be prohibitively expensive, however soil can be collected from ware potato packing and grading facilities which handle potatoes from particular growing regions. **This method is a legitimate tool for PCN analysis as Brodie (1993), using 18 years of data, showed that the level of PCN on soil attached to potatoes is highly correlated with PCN levels in the soil in the field from which the**

potatoes were harvested. Thus PCN levels in piler dirt which has been dislodged from potatoes is strongly correlated to the PCN levels in field soil in which they were grown. The recent detection of *Globodera pallida* in Idaho was the result of systematic targeted surveying of soil under grading lines (University of Idaho 2006). Piler dirt analysis, combined with appropriate tracebacks, has identified infested paddocks in Idaho and led to quarantine controls.

While the USDA has recommended that piler dirt analysis can be used as a low cost method for testing for PCN (USDA 2006), the organisation did not quote Brodie's 1993 study which clearly shows that it is a legitimate collection method. In addition, soil falling from potatoes is from the rhizosphere and is thus likely to have concentrated levels of PCN if it is present. Field sampling will collect soil that is not necessarily in the root zone which would dilute cyst numbers.

To prevent litigation problems and false declarations of outbreaks however, testing of piler dirt in sheds will require traceback systems, and potentially infested paddocks will require field confirmation of the presence of PCN as has been done following recent detections in Idaho.

3.3 Recommendation

Since piler dirt sampling is a statistically valid method of testing for PCN, the National PCN Working Group recommends that piler dirt analysis be used to determine where PCN occurs in Australia. If sufficient soil (greater than 2kg per hectare) can be collected, the method should also be considered for proof of area or property freedom.

3.4 Resourcing the program

The Australian potato industries need to set aside an appropriate amount of levy money to fund collection and processing of weekly samples during production seasons from approximately 70 collection packing sheds or similar facilities around Australia (70x 20 weeks x \$150 = approx. \$250,000).

3.5 Scope

The aim of this protocol is to determine if PCN occurs in any of Australia's potato growing regions. This protocol covers representative packing facilities within Australia that pack, grade or store potatoes grown in their local region. If the protocol is done with sufficient rigour, including taking sufficient amounts of soil and testing of all properties in a defined area, then the area could be declared as free of PCN.

3.6 Registration / responsibility

Potato packing facilities need to become registered with the relevant state government authority before sampling can take place. A person or persons

nominated by the packing shed will need to be in charge of administering this protocol and will be responsible for:

- Obtaining the required samples
- Taking and maintaining necessary records,
- Dispatching the samples for testing,
- Maintaining documentation and if necessary, and
- Training other people to complete the tasks in accordance with this protocol.

For the purpose of this protocol, such person will be known as the 'Authorised Person'.

3.7 Auditing

An auditing schedule will be implemented to ensure soil samples are being collected and dispatched in accordance with this protocol and to ensure receipt records and sampling documentation are maintained correctly.

3.8 Sampling

Packing facilities will need to take samples from representative potato consignments that are delivered to them for processing from crops within their local growing region. For the purpose of this protocol, the individual government state quarantine authorities responsible will define the sampling regions that apply for their own state.

3.8.1 Sampling Procedure

An authorised person will conduct sampling in each potato packing facility. This person must be familiar with the requirements of this protocol and will be responsible for all facets of the administering the protocol including:

- Gathering the required soil samples
- Recording the date, grower, region, variety and any other pertinent information relating to an individual consignment of potatoes;
- Responsible for storage of samples before sending them to be tested; and
- Preparing, packaging and sending the sample to the accredited laboratory for testing.

To collect suitable soil for the purpose of testing for PCN, samples must be taken before potatoes are washed. The most desirable source for collecting samples will be the soil adhering to potatoes while they are still in bins prior to being washed. These bins are also likely to contain clumps of soil and mini-tubers as well as stones and other debris. Another very good source of material for sampling purposes is soil that has fallen from bins as potatoes are being loaded onto conveyors at the grower's property or packing shed. These samples should contain a sufficient number of potato plant roots to enable testing for the

presence of PCN cysts. Soil may also be collected from the tray of the truck that has been used to transport bins to the packing shed.

3.8.2 Sampling Frequency

The USDA protocol for piler dirt surveillance for proof of area freedom recommends that 2.3 kg be collected for each 2 hectare of potato production land. This is a significant amount of soil to collect, especially if potatoes are brushed prior to leaving farms.

In order to help determine if PCN is present in a region, testing will need to take place on an ongoing basis by collecting at least 2 kilogram samples per property each week. Any positive samples will have to be traced back to paddocks which would only be given PCN infested status after confirmatory field testing.

If the piler dirt testing is to be done for proof of area freedom from PCN, then all properties within the defined area will have to be tested, and the amount of soil collected will have to be greater than 2 kg/hectare (WA is collecting 20 kg/hectare using a 5m x 5m grid which give over 90% probability of detection at low population levels).

3.9 Equipment and Technique

3.9.1 Equipment List

- Clean scoop, such as a plastic dustpan or alternatively clean garden trowel
- Plastic bucket to store soil samples as they are collected from soil which has fallen off potatoes during loading onto the packing shed conveyor belt
- Strong preferably zip-lock (at least 35cm x 35cm) plastic bags for storage and transport of soil sample
- Permanent marker for recording date, grower and variety details on plastic bag
- Strong cardboard container for packing samples to dispatch via courier to accredited laboratory for testing.

3.9.2 Technique for Collecting Individual Consignment Sample

As potatoes are being unloaded from transport and prior to being washed, examine bins and remove or brush off any large clumps of soil that are adhering to potatoes and place this in plastic sampling bucket. Attempt to target clumps of soil that are visibly associated with potato tubers and contain quantities of potato plant roots. If small mini-tubers are present these often have roots growing and are also a good target for sampling. Try not to collect soil that contains a large number of weed roots or stones.

Once a truck has finished unloading, check the tray to see if any loose soil associated with the consignment is present. If so, take samples from here as well. Check around the base of the conveyor belt where the bins are being

emptied. Soil, known as 'piler dirt' will drop out of the bins and off potatoes as they are being tipped onto the belt. Bins should be checked again as well after emptying, as soil clumps may be present adhering to the sides and base.

Once the sample has been gathered, place in a secure location when it is unlikely to be disturbed or contaminated. Record all details on copies of the form included in Appendix 1.

3.9.3 Composite Soil Sample Preparation

The numbers of samples to be sent in for testing will vary according to the size of the paddock of origin. The USDA recommends collecting 2 kilograms of soil per hectare of growing area. However this will not always be possible, especially in light sandy soils. Samples sent to accredited laboratory for testing must be composite of the soil samples gathered since the last sample was dispatched.

Ensure samples have been thoroughly mixed together, and using accurate scales weigh out the one kilogram of dry soil. If samples are still damp at this stage weigh out an additional 500 grams to allow for soil moisture. Any additional soil should be collected, bagged and labelled for future analysis if required. Pack the sample into a strong plastic bag, label with grower, region, date and variety using a permanent marker and place into a rigid cardboard box for transportation to accredited laboratory. Complete the form included in Appendix 2 that pertains to the composite sample also the sample record data form that is included in Appendix 3. This form must be placed in the box and dispatched to the accredited testing laboratory with the sample.

The package should then be dispatched to the persons and address detailed in Appendix 3.

3.10 Records

Record the date soil sample was collected and the variety and name of the grower in the table shown in Appendix 1. Please also record the region the consignment originated from. This information will be required in case PCN is detected and the grower needs to be advised.

3.10.1 Documentation (Packing Facility Records)

To ensure traceability, records must be kept showing where, when and who individual consignments of potatoes were delivered in case PCN is detected in a sample. Details including the time of arrival of a sample, the variety of potato, quantity delivered and area the consignment has come from all need to be recorded.

For each individual consignment that is delivered to the packing shed, the form in Appendix 1 should be filled in.

For each composite sample, which is going to Knoxfield for testing the form in Appendix 2 must be completed.

3.10.2 Auditing

Copies of all records must be kept for auditing purposes. Packing facilities operating under this protocol will be audited periodically to ensure that all protocol requirements are being met.

APPENDIX 1 Sampling Record Sheet (Individual Consignment)

Date	Grower	Variety	Tons	Area of origin	Name (Person Collecting sample)	Signature

**APPENDIX 2 – Sample Collection and Dispatch Record Form
(Composite sample dispatched to Knoxfield)**

Date Sample Processed (prepared for dispatch)	Date Sent	Sample Weight (If sample is moist, please allow + 250 grams)	Tons	Area of origin (Area crop was grown)	Name (Person preparing sample)	Signature

APPENDIX 3

PCN Soil Sample Data Sheet

This form is to be completed in full and must accompany the sample to the accredited laboratory.

**Eg MR CON SKYLLAS
CROP HEALTH SERVICES
INSTITUTE FOR HORTICULTURAL DEVELOPMENT
AGRICULTURE VICTORIA
612 BURWOOD HIGHWAY
KNOXFIELD VICTORIA 3176**

Packing Shed to Complete

Date _____

Name (Authorised Person) _____

Contact telephone number: _____

Packing shed location address:

Post Code _____

Packing shed postal address:

Post Code _____

Grower Details

Grower Name _____

Region _____ **Potato**
Variety _____

Part 4 - PCN Hygiene Strategy

4.1 Objectives

- To minimise the risk of new introductions of PCN
- To minimise the risk of potential build-up of unrecognised populations of PCN
- To minimise the risk of spread of PCN
- To protect Australia's ability to trade in potatoes domestically and internationally
- To identify any new infestations of PCN quickly

Note: applies to non-PCN affected properties. Additional protocols will apply to PCN affected properties (see infested property protocol in section 1.3).

4.2 Strategy

To minimise the risk of Potato Cyst Nematode (PCN) being introduced into cropping soils do not bring foreign soil into areas where potatoes are being grown. All foreign soil should be regarded as a potential source of PCN.

Foreign soil is any soil not known to be free of PCN.

The most effective way of spreading PCN cysts is with soil. Soil containing cysts can move by wind and water, but in most cases it is moved in the greatest quantity through the movement of contaminated seed potatoes, machinery, bags and bins. Therefore any strategy to reduce the movement of foreign soil onto the farm reduces the risk of infestation from PCN.

4.3 What can be done

4.3.1 - Avoid bringing foreign soil onto the farm

- Do not bring foreign soil to areas where potato crops could be grown or stored on the farm or to areas that could expose cropping soils such as drainage lines above a paddock.
- Protect paddocks from runoff from areas containing foreign soil - especially if they are eroding or involved in high risk activities such as growing bulbs, corms or tubers from areas where PCN is known to occur. Test areas for PCN that could pose a risk.
- Restrict movement of off-farm machinery and vehicles to a small area of the property to reduce the chance of foreign soil contaminating paddocks where crops are grown. Where this is not practical, inspect and where necessary, clean down machinery and vehicles. Where practical, locate loading points at the edge of the property. Have an area prepared for the wash down of vehicles and machinery that need to enter the property. Use signage to indicate where people should or should not go.

- Prevent soil moving from potentially contaminated areas of the property (where foreign soil is present) to clean areas. Do not use farm machinery for the home garden.
- Remove foreign soil from bins, bags, trucks, machinery, irrigators and other vehicles and equipment before entering paddocks. Equipment shared between farms poses a considerable risk if it is not cleaned down properly.
- Ensure visitors (eg. farmers, sales representatives, agronomists) have cleaned their footwear before entering a paddock. Have boot cleaning gear available or plastic over boots for visitors to use.
- No potato bins and bags that are sent back to farms should contain any foreign soil or have been used for other purposes such as storage of waste or other products. Preferably use new bags. Return bags and bins to farm of origin.
- New paddocks to be leased, share farmed or on loan for cropping should be tested for PCN if there is any doubt about whether it is present. Clean down any machinery before moving between properties.
- Waste foreign soil from packing sheds, handling areas and processors should not be spread onto paddocks used for potatoes when produce is received containing soil from other properties. Document where the soil goes for future reference.
- Waste water from packing sheds and processors should not be discharged into waterways without an appropriate time of settling to kill cysts (1-2 months) or when receiving produce from other properties, on paddocks used for potatoes.
- Farmers should not allow foreign soil originating from overseas onto their farm. Businesses should prevent foreign soil from overseas contaminating packaging, equipment, potatoes and other produce going to potato farms. Farmers should also not accept imported farm machinery, equipment or other goods that have soil with it that originated from overseas. If a business receives anything from overseas with soil in it they should contact AQIS.
- Seed should have minimal levels of soil on it. It should not be dug when the soil is wet. Seed is *brushed* or even washed to remove most of the soil prior to its delivery to the buyer.
- The amount of soil carted on potatoes and in the vehicle should be kept to a minimum.
- Rotate stock so they graze in a paddock not used for potato growing before entering a paddock that will be used for potatoes.

4.3.2 - Use seed from paddocks that have been tested for PCN and found to be free from PCN

- Purchase seed that can be demonstrated (ie. laboratory test results available) to be from paddocks that have been tested for PCN (eg. Certified seed).

4.3.3 - Prevent PCN becoming established in an area

- Learn how to identify PCN and when crops have similar symptoms, promptly identify the cause. Seek professional assistance if there is any uncertainty.
- Report any suspected PCN outbreaks immediately to the local Department of Agriculture, so that if its presence is confirmed, every attempt can be made to eradicate the pest.

The above practices will also assist in restricting the spread of a wide range of soil-borne diseases.

PART 5. Summary of Pest Risk Analysis-Yellow or Golden Potato Cyst Nematode movement from infested areas in Australia to non-infested areas

5.1 Introduction

This summary of the PCN Pest Risk Analysis (PRA) examines the risks associated with the movement of yellow potato cyst nematode via natural spread, via the production and marketing of processing, ware and seed potatoes and via other pathways from infested sites into non-infested sites. The full version is available from the PCN Working Group. The PRA concludes that such movement would not meet the appropriate level of protection, and would require the application of additional phytosanitary measures. These measures are described in detail in the complete PRA document and are summarized here.

5.2 Risk assessment

Risk assessment comprises six steps, namely pest categorization, determination of likelihood of entry, determination of likelihood of establishment, determination of likelihood of spread, assessment of consequences, determination of risk.

The risk level indicated by the matrix is interpreted against the risk level specified for Australia's Appropriate Level of Protection (ALOP) which is 'very low'. If the estimated risk lies in a category above 'very low', the threat from the particular pest posed by the unrestricted import of the particular commodity is considered unacceptable.

5.3 Method for determining the unrestricted risk estimate

The unrestricted risk estimate for each pest is determined by combining the likelihood estimates of entry, of establishment and of spread with the overall expected consequences, using a risk estimation matrix (explained in full text version). The unrestricted risk is then compared with Australia's ALOP to determine the need for appropriate risk management measures.

The purpose is to devise risk mitigation measures that will collectively reduce the estimated unrestricted risk to an acceptable level – ie. defined by the ALOP, as 'very low'. Thus unacceptable unrestricted risk is transformed into acceptable restricted risk. In addition, risk mitigation must attempt to avoid reducing the estimated risk to a level **below** the ALOP. A regime of mitigation measures that yields 'negligible' risk may contravene international rules and expose states to charges of protectionism or failure to minimise negative effects on trade. There may be cases where risk management to a 'negligible' level is unavoidable and for these, transparent documentation of the process that produced such an outcome is critical.

Turner and Evans in Marks and Brodie (1998) consider that most movement within a field or to new localities is by passive transport from soil movements from (presumably in order of importance):

1. Contaminated seed potatoes
2. Farm machinery
3. Livestock (hooves)
4. Farm workers (boots and shoes)
5. Soil (eg. from building schemes)
6. Contaminated crops (root crops, nursery stock)
7. Water runoff
8. High winds blowing soil and cysts.

The CABI data sheet on quarantine pests "*Globodera rostochiensis* and *Globodera pallida*", (Editors Smith et al 1997), details the means of spread of PCN in order of importance as:

- cysts on seed potatoes
- nursery stock
- soil
- flower bulbs
- potatoes for consumption or processing.

5.4 Probability of Entry

Entry involves the pest entering the PRA area, being distributed to the endangered area and transferred to a host plant.

5.5 Probability of Establishment

Establishment involves the pest being able to survive and reproduce on a host in the PRA area. This depends on factors such as availability, quantity and distribution of suitable hosts, environmental suitability, pest survival ability, pest reproductive potential and other factors.

Once cysts have been moved into the PRA area they can survive as infective propagules for up to 30 years (Turner 1996) without being in contact with a host plant. Because PCN cysts each containing 100's of eggs can survive in a viable state for very long periods, even without infecting a host and reproducing, PCN could be considered to have established in an area once viable cysts have been introduced. This means that establishment is favoured even where relatively few hosts occur. The chance of a host plant growing into contact with viable cysts of PCN is high in commercial production areas growing suitable high risk hosts (potatoes, tomatoes, eggplants), and lower in other areas where only infrequent weed hosts or backyard cultivation of hosts occurs.

The probability of establishment in the PRA area is **high**.

5.6 Probability of Spread

Spread involves the dispersal from a host to other hosts in the PRA area.

Once PCN has established within the PRA area, there is a moderate probability that it will spread efficiently and widely. PCN movement on anything which can be contaminated with soil can occur readily over long distances e.g. on farm or other machinery, equipment, packing material, on harvested farm produce grown in soil (ornamental bulbs, onions, on the roots of planting stock, turf), on soil being moved for horticultural or other purposes.

A “**Moderate**” probability of spread is estimated.

5.7 Probability of entry, establishment and spread for potato production

The probability of establishment in the PRA area is **high**.

Spread involves the dispersal from a host to other hosts in the PRA area.

Once PCN has established within the PRA area there is a moderate probability that it will spread efficiently and widely. PCN movement on anything which can be contaminated with soil can occur readily over long distances e.g. on farm or other machinery, equipment, packing material, on harvested farm produce grown in soil (ornamental bulbs, onions, on the roots of planting stock, turf), on soil being moved for horticultural or other purposes.

5.8 Consequences:

The overall consequences are considered for PCN are “high” as it has impact at the national level. (See: Biosecurity Australia (2006b).

Table 5.1. Unrestricted Risk Assessment Conclusion

Pathway	Unrestricted Risk (range)
Natural spread	Very low - Low
Seed potato production	High
Ware potato production	Moderate
Processing potato production	Low
Potato production associated practices	Moderate
Non-potato production on farm	Low-Moderate

5.9 Unrestricted risk estimate summary

The unrestricted risk estimates from all the pathways except the natural spread via movement of juvenile PCN nematodes and wild animals are above the ALOP of Very Low, and therefore require management (Tables, 5.1 and 5.3).

The highest risks are associated with:

- use of untested potatoes as seed, and
- use of tested (certified) potatoes as seed.

The next highest risks are associated with:

- ware potato production, and associated equipment and practices
- bulb production and sale
- and livestock movement off-farm

5.10 Recommended phytosanitary measures:

Refer to Table 5.2, Summary of mitigation measures for the key produce - seed, ware and processing potatoes - grown in different proximities to a PCN detection, and Table 5.3, Unrestricted risk estimate summary and management measures for recommended management measures for each pathway.

General summary of possible risk management measures for PCN:

- On-farm biosecurity protocols. These should restrict the introduction of PCN onto an uninfested property via human activities, and reduce the likelihood of spread from an infested field to a clean field on an infested property.
- Soil testing for PCN to establish Pest Free Areas and /or Pest Free places of production and/or Areas of Low Pest Prevalence. A negative soil test of soil sampled from an area of potato production land indicates that, on average, PCN is below a certain level in the tested soil. A negative soil test result reduces the likelihood that soil and potato tubers from that tested soil will carry PCN cysts, compared with the same material from a location with no soil test.
- Washing for soil freedom of all potatoes from infested areas. Evidence indicates that such washing can reduce the likelihood that tubers are carrying PCN cysts by at least 80%.
- Regulations to ensure no seed potatoes are moved from infested properties. Infested potatoes for planting are the highest risk of spreading PCN and are almost certain to successfully introduce the pest into previously uninfested areas.
- Application of a 2 km zone around confirmed infestations of PCN. Such a zone will reduce the risk from natural spread, in particular the risk of spread from wind or water borne cysts of PCN, as well as reduce the risk of spread by human activities.
- Equipment, bin and transport hygiene and phytosanitary measures will reduce the likelihood of soil, plant debris and other waste being spread via these means.
- Mandatory use of resistant varieties in infested areas. Cropping with a cultivar resistant to the yellow PCN (*G. rostochiensis*) will reduce soil populations of that nematode species by around 80% each year. (This strategy depends on the absence of the white PCN (*G. pallida*), which

could be present in Australia but in very low levels and as yet undetected due to inadequate surveillance.)

- Rotations with non-host crops. This leads to an estimated annual reduction of 20% in soil PCN density, but depends on good control of self-sown potatoes, and avoidance of other hosts such as tomatoes, eggplants and certain solanaceous weeds.
- Marketing ware potatoes in small bags to restrict their use as commercial seed potatoes.
- Secure waste disposal, hygiene and segregation of different lines of potatoes in processing facilities (and grading and packing sheds). This reduces the likelihood that waste infests otherwise uninfested sites, and the likelihood that cross contamination of clean and infested lines of potatoes occurs in sheds.
- Water runoff and dust minimisation protocols can reduce the likelihood of natural spread of PCN cysts, but a more practical alternative is establishment of a 2 km zone around confirmed PCN infestations (see above) which also reduces the risk from human-assisted movement.

Table 5.2. Summary of mitigation measures for the key produce - seed, ware and processing potatoes - grown in different proximities to a PCN detection.

MEASURES	SEED			WARE			PROCESSING		
	<i>OUTSIDE</i>	<i>2 KM ZONE¹</i>	<i>INFESTED PROPERTY/PADDOCK</i>	<i>OUTSIDE</i>	<i>2 KM ZONE</i>	<i>INFESTED PROPERTY/PADDOCK</i>	<i>OUTSIDE</i>	<i>2 KM ZONE</i>	<i>INFESTED PROPERTY/PADDOCK</i>
POTATOES ALLOWED?	YES	YES WITH CONDITIONS	NO	YES	YES WITH CONDITIONS	YES WITH CONDITIONS	YES	YES WITH CONDITIONS	YES WITH CONDITIONS
CERTIFICATION? *	(IDEALLY CERTIFIED)	CERTIFIED		NIL			NIL		
SOIL TEST?	(IDEALLY NEGATIVE SOIL TEST)	NEGATIVE SOIL TEST ²	(TESTED)		NEGATIVE SOIL TEST	(TESTED)		NEGATIVE SOIL TEST	(TESTED)
WASHED?		WASHED FREE OF SOIL/DRIED			WASHED FREE OF SOIL OR MARKET IN LABELED BAGS	WASHED FREE OF SOIL		WASHED FREE OF SOIL	WASHED FREE OF SOIL
RESISTANT CV?		(RESISTANT CV ONLY)			(RESISTANT CV ADVISABLE)	RESISTANT CV ONLY		(RESISTANT CV ADVISABLE)	(RESISTANT CV MUST BE GROWN ON IP)
OTHER CONTROLS?		NO LINKAGE HISTORY			MARKET IN SMALL (LABELED) BAGS OR WASHED FREE OF SOIL	MARKET IN SMALL (LABELED) BAGS		CONTROLLED HANDLING AND WASTE DISPOSAL AT FACTORY	CONTROLLED HANDLING AND WASTE DISPOSAL AT FACTORY
		(SODIUM							

		HYPOCHLORITE)							
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- *PCN testing as part of a certification scheme is a risk mitigation step.
- ¹ 2 km zone adjusted to include properties with linkages to known infested properties, as well as adjusted for topography especially drainage patterns.
- ²More intense PCN soil testing in seed production areas, including history of freedom including minimum of 3 years negative testing.
- Soil test all potato production within 2 km zone of a confirmed PCN detection (adjusted for topography).
- Growing resistant cultivars on infected properties will only be effective in reducing PCN populations if the appropriate resistant cultivars are grown. To meet this requirement, populations of PCN must be tested and typed regularly to ensure that race and species (*G.pallida* and *G. rostochiensis*) distribution of PCN throughout Australia are understood.

Table 5.3. Unrestricted risk estimate summary and management measures for all pathways.

PATHWAYS				PROBABILITY OF EES ^A	CONSEQUENCES	UNRESTRICTED RISK ^B	MANAGEMENT NEEDED	MANAGEMENT	MANAGED RISK
	ENTRY (IxD)	ESTABLISHMENT	SPREAD						
NATURAL SPREAD NOT PRIORITY									
1. JUVENILE NEMATODES	EXTREMELY LOW	HIGH	MODERATE	EXTREMELY LOW	HIGH	VERY LOW	No	<ul style="list-style-type: none"> • APPLY 2 KM ZONE AROUND PCN DETECTIONS TO PATHWAYS 1-4 (REPLACING OTHER MEASURES, WHICH SHOULD BE ENCOURAGED) 	
2. WIND	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH	Low	Yes	<ul style="list-style-type: none"> • APPLY 2 KM ZONE AROUND PCN DETECTIONS • (DEVELOP AND APPLY DUST REDUCTION CODE OF PRACTICE AROUND INFESTED AREA. • AVOID BARE FALLOW OR • USE WINDBREAKS.) 	VERY LOW
3. WATER RUNOFF	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH	Low	Yes	<ul style="list-style-type: none"> • APPLY 2 KM ZONE AROUND PCN DETECTIONS • (DEVELOP AND APPLY WATER RUNOFF TRAPPING CODE OF PRACTICE AROUND INFESTED AREA. • DIVERSION DITCHES AND • AVOID BARE FALLOW WHICH WILL MINIMISE WATER EROSION FOLLOWING RAINFALL OR APPLICATION OF IRRIGATION) 	VERY LOW
4. WILD ANIMALS	EXTREMELY LOW	HIGH	MODERATE	EXTREMELY LOW	HIGH	VERY LOW	No	<ul style="list-style-type: none"> • APPLY 2 KM ZONE AROUND PCN DETECTIONS (FENCE INFESTED LAND TO PREVENT GROUND ANIMALS MOVING FREELY OVER THIS AREA.) 	
POTATO PRODUCTION									
5. UNTESTED POTATOES AS SEED	HIGH	HIGH	MODERATE	MODERATE	HIGH	HIGH	Yes	<ul style="list-style-type: none"> • SEED PRODUCTION FOR OFF-FARM USE MUST BE CERTIFIED IN VICTORIA? • MOVEMENT OF SEED IS PROHIBITED OUT OF A PCN CONTROL AREA (2 KM? AROUND 	VERY LOW

								<p>INFESTED PROPERTY).</p> <ul style="list-style-type: none"> • MOVEMENT OF SEED IS PROHIBITED FROM ASSOCIATED PROPERTIES AS DEFINED BY BINS, EQUIPMENT, POTATOES AND ALSO FROM PROPERTIES ADJOINING INFESTED PROPERTIES. • NO UNREGULATED POTATO PRODUCTION ON FARMS TESTED POSITIVE FOR PCN (I.E. NO BACKYARD PRODUCTION). • GROW ONLY RESISTANT CULTIVARS 	
6. TESTED (CERTIFIED) POTATOES AS SEED	HIGH	HIGH	MODERATE	MODERATE	HIGH	HIGH	YES	<ul style="list-style-type: none"> • SEED PRODUCTION FOR OFF-FARM USE MUST BE CERTIFIED IN VICTORIA. • PCN SOIL TESTING, AND PAST FREEDOM. • WASHED TO PCN WASHING STANDARD TO REMOVE MOST SOIL? (STORAGE ISSUES) • SECURE TRANSPORT. • SECURE WASTE DISPOSAL IN APPROVED SITES (COMPOSTING, SECURE ACCREDITED FEEDLOTS, OR SECURE LANDFILL). <p><i>ORIGIN OUTSIDE VICTORIA:</i> MINIMUM:</p> <ul style="list-style-type: none"> • ALL SEED PRODUCTION AREAS TESTED FOR PCN UNDER NATIONAL GUIDELINES. 	
7. WARE POTATOES	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<p>WITHIN 2 KM OF PCN</p> <ul style="list-style-type: none"> • GROW ONLY RESISTANT CULTIVARS IN INFESTED ZONES • PCN SOIL TESTING • WASHED TO PCN WASHING STANDARD TO REMOVE MOST SOIL. • MARKET IN SMALL BAGS. 	VERY LOW
8. PROCESSING POTATOES	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH	LOW	YES	<p>WITHIN 2 KM OF PCN</p> <ul style="list-style-type: none"> • GROW ONLY RESISTANT CULTIVARS IN INFESTED ZONES. • PCN SOIL TESTING 	VERY LOW

								<ul style="list-style-type: none"> WASHED TO PCN WASHING STANDARD TO REMOVE MOST SOIL. SECURE TRANSPORT. SECURE WASTE DISPOSAL IN APPROVED SITES (COMPOSTING, SECURE ACCREDITED FEEDLOTS, OR SECURE LANDFILL). 	
EQUIPMENT									
9. ON-FARM MACHINERY	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<p>WITHIN 2 KM REGULATED MOVEMENT WASH DOWN AT APPROPRIATE POINTS APPLY FARM HYGIENE PRACTICES</p>	VERY LOW
10. SHARED FARM MACHINERY INCLUDING CONTRACTORS	MODERATE	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<p>WITHIN 2 KM</p> <ul style="list-style-type: none"> REGULATED MOVEMENT WASH DOWN AT APPROPRIATE POINTS <p>APPLY FARM HYGIENE PRACTICES</p>	VERY LOW
11. OTHER OFF-FARM MOVEMENT OF MACHINERY FOR REPAIR/SALE/OTHER	MODERATE	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<p>WITHIN 2 KM</p> <ul style="list-style-type: none"> REGULATED MOVEMENT WASH DOWN AT APPROPRIATE POINTS <p>APPLY FARM HYGIENE PRACTICES</p>	VERY LOW
12. TRANSPORT VEHICLES	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<ul style="list-style-type: none"> SECURE VEHICLES LOADED AND UNLOADED ON CONCRETE, NO CONTACT WITH SOIL. CLEAN VEHICLES ON AND OFF FARM SECURE ROUTES 	VERY LOW
13. BAGS AND BINS	MODERATE	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<p>WITHIN 2 KM</p> <ul style="list-style-type: none"> USE CLEAN BINS AND BAGS ONLY WASH AFTER USE SINGLE-USE BAGS <p>REGULATED MOVEMENT – ONLY IF PROPERTY TESTED FREE OF PCN. SEGREGATE FROM HIGH RISK BINS/BAGS PLASTIC BINS</p>	VERY LOW
14. IRRIGATION WATER (RUNOFF, AND INTAKE FROM CHANNELS)	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<ul style="list-style-type: none"> DEVELOP AND APPLY WATER RUNOFF TRAPPING CODE OF PRACTICE AROUND INFESTED AREA. 	VERY LOW

15. WASTE WATER FROM FARM WASHING POTATOES/MACHINERY	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<ul style="list-style-type: none"> DEVELOP AND APPLY WATER RUNOFF TRAPPING CODE OF PRACTICE AROUND WASH-DOWN AREAS. 	VERY LOW
16. WASTE WATER FROM PACKING SHED/PROCESSORS	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<ul style="list-style-type: none"> DEVELOP AND APPLY WATER RUNOFF TRAPPING CODE OF PRACTICE AROUND WASH-DOWN AREAS. 	VERY LOW
17. CULTIVATION OF SOIL	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<ul style="list-style-type: none"> AVOID CULTIVATION FROM KNOWN INFESTED SITES TO UNINFESTED SITES. CLEAN EQUIPMENT BETWEEN SITES 	VERY LOW
18. SOIL/WASTE FROM ON-FARM AND PACKING SHED/PROCESSORS	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<ul style="list-style-type: none"> DISPOSE BY BURIAL 	VERY LOW
19. HUMANS (BOOTS AND SHOES), GROWERS, WORKERS, CONTRACTORS, VISITORS ETC.	MODERATE	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	<ul style="list-style-type: none"> APPLY FARM HYGIENE PRACTICES RESTRICT ENTRY OF VISITORS, MOVEMENT AROUND FARM, WASH FOOTWARE ON ENTRY AND EXIT OF INFESTED FIELDS 	VERY LOW
NON-POTATO PRODUCTION ON-FARM									
20. NURSERY STOCK	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH	LOW	YES	WASHED AND BARE ROOTED, OR PROPERTY TESTED FREE OF PCN	VERY LOW
21. BULBS	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	PRECEDE BULB PRODUCTION WITH AT LEAST ONE SEASON OF A RESISTANT POTATO CROP WASHED AND BARE ROOTED, AND PROPERTY TESTED FREE OF PCN	VERY LOW
22. TURF	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH	LOW	YES	PROPERTY TESTED PCN FREE	VERY LOW
23. OTHER ROOT CROPS	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH	LOW	YES	WASHED AND BARE ROOTED OR PROPERTY TESTED PCN FREE	VERY LOW
24. SOIL, COMPOST AND SILAGE FOR SALE	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH	LOW	YES	PROPERTY TESTED PCN FREE	VERY LOW

OFF-FARM									
25. LIVESTOCK (HOOVES) MOVEMENT ON FARM AND SOLD/AGISTED OFF FARM	LOW	HIGH	MODERATE	LOW	HIGH	MODERATE	YES	PROPERTY TESTED PCN FREE. LIVESTOCK GRAZED ON GOOD PASTURE TO CLEAN HOOVES BEFORE MOVEMENT OFF FARM.	VERY LOW

^AProbability of EES derived using matrix of rules for combining descriptive likelihoods (e.g. Table 13, Final IRA report, apples from NZ, 2006).

^BDerived from combination of EES and consequences using risk estimation matrix: estimation of the annual risk (eg. Table 11, Final IRA report, apples from NZ, 2006).

Table 5.4. Summary of conditions for prevention of PCN entry via nursery stock, root vegetables, potatoes and machinery into other Australian states from WA and Victoria

Nursery Stock

Vic	Nil
NSW	<20km: soil free
NT	Potato plants generally prohibited, from WA only
Qld	<20km: inspectors approval
SA	Bulbs, Potted: soil-less mix, or soil component treated; trees: bare rooted; or no potato growing with 10years; soil fumigated mature trees: no potatoes for 5 years; or soil sampled no PCN and treated with nematicide
Tas	Bulbs: cleaned and graded Potted: soil-less mix Trees: bare rooted Mature approval required
WA	Potted: soil-less mix, or soil component treated; Mature trees: bare rooted; or no potato growing with 10years; soil fumigated

Root Vegetables

Vic	Nil
NSW	<20km: soil free
NT	Nil
Qld	<20km: inspectors approval
Tas	<20km: no potatoes with 10years or fumigated
WA	Nil

Seed Potatoes

Vic	Nil
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NSW	<20km: prohibited; or >20km: brushed & soil free
NT	Tubers (from WA only) - fork test, soil free
Qld	<20km: inspectors approval
SA	Certified seed
Tas	Certified minitubers or tissue culture
WA	Fork test, or soil sampled. And washed / brushed / found free of PCN or taken to WA approved premises, or sodium hypochlorite dip Specific arrangement for mini-tubers

Other Potatoes

Vic	Nil
NSW	<20km: prohibited
NT	Tubers (from WA only) - fork test, soil free
Qld	<20km: inspectors approval
SA	<20km: under permit >20km: fork / soil tested
Tas	Washed & free of soil; and survey of all crops in growing area, plus 20km buffer, over 3 years, and pre-plant or post harvest test of paddock
WA	Fork test, or soil sampled. And washed / brushed / found free of PCN or taken to WA approved premises, or sodium hypochlorite dip

Machinery

Vic	Nil
NSW	Nil
NT	Nil
Qld	<20km: inspectors approval
SA	<20km: written approval

Tas	nil
WA	Inspected on arrival that are clean of soil / plant material

State		Seed	Ware	Processing	
SA	Prohibition on potatoes grown within 20 km of PCN infested property unless under a compliance agreement	<p>Certified seed potatoes</p> <ul style="list-style-type: none"> • Brushed free of soil or washed and • Clean/new containers • From crops tested negative for PCN • Each container has National Certified Seed Label attached 	<ul style="list-style-type: none"> • washed and commercially packed with PHC stating where grown, packed and that washed visibly free of soil OR • brushed potatoes from a crop tested negative for PCN in current season 	Unwashed potatoes must be processed in registered premises if from untested crops	Fork or soil testing at 10 x 10 m or similar approved grid system
Tasmania		Only tissue cultured plantlets or minitubers and VicSPA accredited	<ul style="list-style-type: none"> • State PCN area freedom for current year and previous 3 years OR 20 km zone area freedom for 3 years plus current season test of crop • Produced from certified seed, on a property that doesn't 		All potato crops over 3 years, also a 20 km buffer around area with one third of crops tested annually, national protocol for soils sampling and testing must be followed. 200 samples on 10x10 every 2 ha, giving a 2 kg sample from which 500 gm tested. (Hinch 1991)

			share machinery, packed in clean containers		
Qld	Potatoes or machinery or soil from within 20km of a known PCN infested property are prohibited without a PHC or Inspector's Approval, or are soil free (machinery).		•		
NSW	Potatoes are restricted by legislation from entry into seed production districts.		•		

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Appendix II

Potato Cyst Nematode Management Committee

2nd May, 2008

Hilton Hotel, Melbourne Airport

Short Meeting Summary - Minutes

In attendance:

Keith Blackmore (chair), Laura Bowles, Anna Duthie, Michael Jess, Geoff Moar, Cameron Tree, David Beardsall, Gary D'Arcy, Ryan Wilson, Allan Smith, Des Jennings, Lucy Keatinge, Bruce Baker, Frank Rovers, Graeme Lukeis, Marcelle O'Brien, Peter Liehne, Satendra Kumar, Cameron Tree, Wendy Coombes, Stephen Page, Lois Ransom, Roberta Rossely, Pat Sharkey, Dean Metcalf,

Apologies; John Gallagher, Philip Beswick, David Cartwright, Iain Kirkwood, Andrew Bishop, Mike Ashton, John Slack, Sashi Sharma, Mike Robbins, Richard Walker

1. Welcome and goal setting for the day; in principle agreement to draft plan for managing PCN and maintaining market access

2. State Issues Since last meeting:

VIC: DPI support significant, tracking well on State basis, main concern is national access, European standards are to be completed in 2010. John Pickup will be consulted. Movement between states is an issue and product requires labelling. The ICA system needs to be examined

NSW: Processors issues are about handling susceptible varieties. Vic to NSW transport has been problematic. There has been work with supermarkets to resolve issues. Need to review PCN legislation in NSW. Existing protocols have been ignored by some operators. High level of interest and concern regarding PCN protocols and import regulations. Discussed under grader sampling process.

WA: PCN testing update test is very sensitive 1cyst per 25g organic matter. Funding future work is an issue.

SA: Vic to SA transport, needs to get feedback on documents. Not a lot of development and needs to understand requirements. Who will fund surveillance plans and how to connect to Area of freedom? Clarify international requirements for Area of Freedom. Costs for tests are significant, \$4K per pivot.

QLD: examining PCN documentation, potatoes from the PCN area into Pepisco under agreed pathway. Reviewing disposal and waste issues. Need to engage with Nursery trade: stock and bulbs in particular, via internet sales. PCN is regarded as significant disease and education is required in effect and management.

TAS: two key issues; how to work on under grader sampling? If detection is made from a mixed crop who is to be identified. Two kilometre barrier intrastate is satisfactory. For interstate movement, this may not be sufficient.

CCOPO: interested in PCN activity, recognition of importance of PCN and support of national approach. Management plan is good, but has some gaps.

4. Confirmation of Agreement for National Under-Grader Sampling (UGS)

UGS – detection sensitivity is based on amount of soil taken, can be problematic. ECO is changing their recommendations. UGS comes from the

rhizosphere and Brodie has correlated data; increase likelihood of detection. Problem is trace-back from UGS to particular paddock/pivot. Area of Freedom is difficult to standardize as based on individual applications. This method would require further work. Within the 2km radius UGS and other methods would have to be combined. 70 graders in Australia, \$250K or annual testing. Most packing sheds have QA procedures in place. Can this be incorporated? Possibility of under truck sampling? Possibility of R&D funding for UGS? Is the tool effective? Survey across Australia to determine/confirm extent of problem. PCN does not recognize any boundaries, exposed to PCN from other sources (imported bulbs). Seed industry is highest risk of PCN. Eventually exporters are going to ask for PCN Area of Freedom. History of testing gives confidence in process. No data to defend the position if PCN is detected.

Practical outcomes need to be incorporated into management plan, so growers know what actions are required and ability to trade is maintained.

Decisions to be made:

- UGS: is this an indicative method? Should this be adopted nationally?
- Action plan if detected: what are the restrictions? Options
- Should other crops be involved?

Is the UGS study to be taken as an indicative test? For international trading this will not be acceptable.

Management plan needs to be easily understood, details can sit in reference materials. Risk assessment plan needs to be determined to inform the management plan.

Action:

Draft risk management plan needs to be presented to PHC 4 June 2008 meeting

Risk analysis group: Anna Duthie, David Beardsall, Bill Washington, Cindy Hanson, meet before 20 May and draft to be presented to PHC secretariat at 20 May

Recommendation:

No seed to be grown and sold unless a negative test for PCN provided for certified seed (Australia wide). KB to take to SPAG, by June 2008

Action:

DM to provide e-copy of management plan to DB and cross references to 2002 PCN plan

Action

National Surveillance document to be updated as per discussions from meeting. Include a section on national surveillance. Requires pest risk analysis (PRA) to be completed. Both draft document to be circulated by July 2008

Action

Roberta to help DB with definitions by June 2008

Action

Washing trial to be completed by DPIVic as a matter of priority. Depends on availability of infested potatoes. Recommend Gembrook potatoes, as model potato. Trials suggests 1. brushed, 2. washed and 3. brushed/washed and 4. soak time. Scope to be discussed by all states.

Recommendation to working group PRA

Certified seed is not a risk mitigation pathway.

Recommendation

nationally PCN affected material can be treated as intrastate ware potatoes, brushed/washed clean and when sold, labelled as "not for planting"

Action

LB to coordinate communication of meeting outcomes, via Potatoes Australia, and other publications.

Input required from committee, plan this for after PHC meeting.

Action

Nursery industry to be engaged with regard to seed potatoes and bulbs, as these are risks to the potato industry and PCN infestation. LK to action within HAL.

Action

National engagement with retailers is required. Ausveg to instigate. LB and LK to discuss.

Action

LB to act as coordinator for questions to Jon Pickup all welcome to submit questions.

UGS: is this an indicative method: yes as a detection survey and include seed potatoes. Should be excluded for area of freedom verification, clearly stated upfront.

Should UGS be adopted - yes

Action plan if and when PCN detected

restrictions

options

testing: methodology for regular PCN testing; where how and when is testing to be carried out. Is this to be included in QA procedure, DB to provide some figures for current testing regimes. HAL levy, PHA levy for biosecurity,

These need to be clearly described in plain english

Methodology for UGS or under truck sampling needs to be determined.

How large/encompassing should PCN test area be? Only potatoes at the moment

Other crops eg bulbs: yes