

Potato Cyst Nematode Management Policy

CONTENTS

1. Authorisation	3
2. Introduction	3
3. Policy Statement.....	3
4. Scope.....	3
5. Requirements	3
6. Potato cyst nematode biology	4
7. PCN risks.....	4
8. PCN containment.....	4
9. Detection management	5
10. Risk Mitigation	5
11. Procedures	6
12. Permits.....	6
13. Glossary/Definitions.....	6
14. References	8

ACCESSIBILITY

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1. AUTHORISATION

Title	Potato Cyst Nematode Management Policy
Issuing Division/ Branch	Chief Plant Health Officer (CPHO), Biosecurity and Agricultural Services
Date Effective	6 December 2021
Enquiries	Market.Access@agriculture.vic.gov.au
Approved by	Chief Plant Health Officer
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2. INTRODUCTION

This document outlines the policy principles underpinning the management of potato cyst nematode (PCN), *Globodera rostochiensis* (Wollenweber) in Victoria.

3. POLICY STATEMENT

Agriculture Victoria will, at state and national levels, support the establishment of collaborative risk-based management arrangements with affected parties (including state and Commonwealth jurisdictions, and industry groups). This support will minimise the potential impacts of potato cyst nematode (PCN) by encouraging solutions to sustain, restore or enhance productivity and market access.

Agriculture Victoria is the lead agency responsible for the delivery of plant biosecurity programs for PCN, including provision of response, containment, and certification standards to support the trade of host material and equipment used in the cultivation of potatoes. These activities are authorised through powers provided by the *Plant Biosecurity Act 2010* and *Plant Biosecurity Regulations 2016*.

Reaching national consensus on the management of PCN is complex, and as such, Victoria's affected producers face unique challenges in establishing and maintaining access to sensitive domestic and international markets. There have been several attempts to establish an agreed national approach to PCN management since it was first detected in the late 1980's.

Agriculture Victoria, with support from Plant Health Committee (PHC), has commenced a review of the fundamental scientific principles underpinning PCN management in 2021. This work will include the preparation of a literature review, pest risk analysis and an updated management plan, and is due for completion in 2022.

4. SCOPE

This policy has been developed to assist affected industries and government agencies with understanding the roles of government and industry in PCN management.

5. REQUIREMENTS

This policy statement identifies:

1. The risks and associated strategies used to manage PCN.
2. The relevant legislation and technical standards that underpin PCN management.

6. POTATO CYST NEMATODE BIOLOGY

PCN are highly specialised parasites of potatoes (Marks and Brodie 1998). The two most important of these, *Globodera rostochiensis* and *G. pallida*, are cosmopolitan pests in both temperate countries and temperate (highland) regions of tropical countries (Moens et al. 2018). In many countries, PCN are plant quarantine pests that present significant challenges in terms of the management of existing populations and containment to prevent further spread.

Management of PCN in the State of Victoria is focused on the containment of existing infestations through quarantine controls and a regime of PCN soil testing for certified seed potato crops and for commercial potato crops grown for interstate trade. Victoria has only one species and one pathotype of PCN, the “golden” cyst nematode, *G. rostochiensis* pathotype Ro1 (Blackett et al. 2019; Faggian et al. 2012; Hinch et al. 1998; Marshall 1998; Quader et al. 2008).

PCN are soil-borne parasites, and they survive in the soil as dormant cysts in the absence of a suitable host. The cysts are formed by the dead body of the mature female, which is filled with 200-500 eggs which each contain dormant juvenile nematode (Moens et al. 2018; Turner and Evans 1998). Cysts with viable eggs can persist in the soil for 20-30 years (Turner 1996).

The active part of the life cycle starts when the juvenile hatches from the egg in the presence of host plants. Hatching is stimulated by chemical (diffusates) leaking from the roots (Rawsthorne and Brodie 1986) and are specific to plants within the *Solanaceae* family (Clarke and Hennessy 1984; Perry 1989). The hatched juveniles move between soil particles to locate and invade host plant roots. Once inside the root, the nematode punctures the plant cell wall and feeds with a needle-like stylet (Ebrahimini et al. 2014). Feeding induces changes in the plant root cells which leads to disease symptoms such as stunted growth, chlorosis or yellowing of leaves, dieback, and reduced root systems and tuber sizes.

Eventually, female nematodes at the feeding sites on the roots become sedentary and continually enlarge before rupturing the outer root tissue. Slender, male nematodes leave the roots and mate with the females. When the female dies, her body forms the cyst which can drop off host roots and into the soil. In general, only one life cycle occurs on each growing crop and takes approximately 38-48 days to complete (Price et al. 2021). As PCN are obligate sedentary endoparasites, they cannot complete their life cycle without a host present (Han et al. 2018; Lambert and Bekal 2009).

7. PCN RISKS

PCN is a soil borne pest that may spread via:

- host materials (e.g., potato tubers or soil) which is moved from an infested property to linked land or an un-infested property
- used machinery which is moved from an infested property to linked land or an un-infested property without appropriate cleaning.
- absence of appropriate on-farm biosecurity protocols to restrict the entry of host material entering the production facility.

PCN is a notifiable pest under the *Plant Biosecurity Act 2010*, and it mandatory to report a suspect detection to Agriculture Victoria at Market.Access@agriculture.vic.gov.au.

8. PCN CONTAINMENT

PCN containment efforts are focussed on the management of land based on its pest status, defined as:

- **PCN infested land**: any area which has had a positive PCN detection or untested linked land.
- **PCN linked land**: means an area that –

- has been tested and found negative for PCN during the current growing season in accordance with the National Potato Cyst Nematode Testing Standards, and
 - has been farmed with equipment used on known PCN infested land, or
 - borders PCN infested land, or
 - receives direct drainage from PCN infested land, or
 - is currently or has previously been planted with seed sourced from PCN infested land or land exposed to PCN because of a regulatory violation.
- **PCN un-infested land:** any clearly defined area which is not infested or linked land.

In Victoria, the level of PCN regulatory (movement and treatment) controls applied to a parcel of land will vary depending on the PCN pest status of that land. Refer section 11. Procedures for further information.

9. DETECTION MANAGEMENT

The following is Agriculture Victoria's response to a new PCN detection:

1. collection of a confirmatory sample from the affected area.
2. laboratory diagnosis through Crop Health Services, which is an approved laboratory, including confirmation of genetic strain and egg viability.
3. where the detection is confirmed positive for PCN:
 - a. Enact legislation to reflect the changed land status of infested site and any identified linked properties.
 - b. Inform landholder on the best-practice PCN risk management procedures and relevant regulations.
 - c. Explore plant health accreditations to facilitate the business activities whilst complying with market access requirements.

10. RISK MITIGATION

Industry Responsibilities

PCN risk mitigation measures can include:

- planting resistant potato cultivars in infested and linked land.
- sourcing only certified seed potatoes known to be PCN tested free.
- ensuring machinery and used bins are cleaned free of soil prior to leaving or entering a property.
- ensuring host crops are planted on long rotations (i.e., longer than 5 years) on linked land.
 - Alternatively, planting resistant crops on shorter rotations in infested land may help to reduce PCN populations.
- managing *Solanaceous* weed and volunteer plants in the cropping area, headlands and fallow ground.
- management of irrigation and run off water from infested land.

Government Responsibilities

Agriculture Victoria is responsible for implementing a rapid departmental response to new detections of PCN and consistent, transparent application of quarantine controls on infested, suspect infested and/or linked lands.

11. PROCEDURES

To provide industry groups with a cost-effective option for complying with PCN requirements, Agriculture Victoria provides Interstate Certification Assurance (ICA) accreditations and procedures to facilitate intrastate (within state) and interstate (out of state) movement of PCN host material. Such programs are quality assurance-based programs, which acknowledge and formalise industry's role in achieving biosecurity outcomes.

The table below indicates protocols and procedures relevant to potato production.

Name of Protocol	Protocol application
ICA-44	Movement of potatoes (Processing and Ware) from PCN linked land
PS-14	Sourcing potatoes from a PCN control area
PS-27	Nursery property accreditation

12. PERMITS

Landowners who operate land within the PCN control area are required to apply for permits to move host material off this land. Permit conditions have been developed for processing and ware potatoes, waste potatoes, ornamental nursery stock, used equipment, used packages and diagnostic samples. The movement conditions may not cover all circumstances, and for these situations a special permit issued by Agriculture Victoria may be granted where the risk of spreading PCN can be adequately reduced.

Under the *Plant Biosecurity Act 2010*, it is an offence to remove host material from a PCN control area unless in accordance with the conditions of a permit issued by Agriculture Victoria. The maximum penalty for this offence is currently \$10,900 for an individual and \$54,500 for a body corporate.


13. GLOSSARY/DEFINITIONS

Infested Land means any area which has had a positive PCN detection or untested linked land.

Linked land means an area that –

- has been tested and found negative for PCN during the current growing season in accordance with the National Potato Cyst Nematode Testing Standards, and
- has been farmed with equipment used on known PCN infested land, or
- borders PCN infested land, or
- receives direct drainage from PCN infested land, or
- is currently or has previously been planted with seed sourced from PCN infested land or land exposed to PCN because of a regulatory violation.

PCN means the pest potato cyst nematode, *Globodera rostochiensis*.




PCN control area means an area declared by Order under the *Plant Biosecurity Act 2010* to be a control area for the purpose of preventing the spread of PCN.

PCN un-infested land means any clearly defined area which is not infested or linked land

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Summary of amendments to latest version:

July 2019 - introduction of section 11 relating to permits, minor edits.

August 2019 – minor general review, inclusion of seed potatoes in linked land definition, change of wording from business/farmer to person in the linked land definition.

December 2021 – general review, alignment of definitions to RBRRM, removal of reclassification of PCN affected land, change of PCN biology section. Inclusion of reference to the 2021 PCN program review.