

# Potato Cyst Nematodes – An Introduction

## What is PCN and why should we be worried?

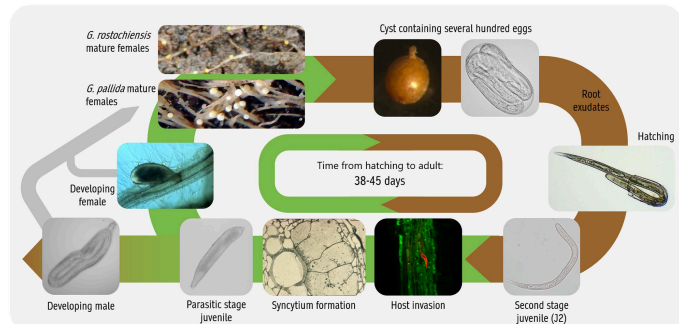
- Potato Cyst Nematodes (PCN) are an important pest of potatoes and across Europe, PCN reduces potato yields and quality.
- Nematodes are small, parasitic roundworms that feed and reproduce on the potato roots.
- Seed potatoes and bulbs can only be grown in land certified as free from PCN.
- In Scotland, the PCN infested land area is doubling every 7 years.
- Scotland's potato industry employs over 2000 people and is worth £250 million to the economy.
- Without action, PCN could end future seed potato and bulb production across the whole of Scotland within 5 crop rotations (30 years)<sup>1</sup>.



Figure 1: Nematode cysts present on potato roots.

## Lifecycle

(from J. A. Price, D. Coyne, V. Blok, J. Jones <https://bsppjournals.onlinelibrary.wiley.com/doi/full/10.1111/mpp.13047>)



### Two species of PCN are present in Scotland:

- *Globodera pallida* (quickly becoming the most dominant)
- *Globodera rostochiensis* (traditionally more dominant but less so now)

Cysts spread via contaminated soil, water movement, tubers, people (boots) and farm machinery.

### How do you know if you have PCN?

- Soil testing is the only way to determine what levels and species of PCN you have on your land.
- If the pest population in the soil is low, there are no obvious above-ground symptoms.
- Each time a susceptible potato crop is grown, the amount of PCN cysts increases.
- At a critical PCN population level, potato haulm growth can show stunting, wilting, yellowing or even death.
- In infected plants, cysts can be seen attached to roots, stolons, and even tubers.









## Current Control Methods

- **Resistant varieties** limit the multiplication of PCN. Eggs hatch, but the nematodes are unable to form a feeding site, and this leads to a reduction in population.
- **Nematicides** can protect yield when incorporated at planting.
- **Control groundkeepers** (volunteer potatoes) as they act a host and allow PCN to persist through crop rotations.
- **Cleaning equipment** of contaminated soil reduces PCN movement to non-infested sites.
- A **long rotation** will help reduce the PCN population. In the absence of a host, viable eggs in the soil will naturally decline.
- **Trap or biofumigant crops**

## PCN Project: PCN Action Scotland

A fully integrated 5-year package of scientific research and knowledge exchange funded by the Scottish Government aims to deliver a sustainable potato industry for Scotland through management of Potato Cyst Nematode (PCN).

The James Hutton Institute, SRUC, SoilEssentials, Scottish Agronomy and SASA are all working together to deliver 8 packages of work.

Work Package	
 <p>1. Economics</p>	Determine the cost of PCN to Scotland's farmers, businesses and consumers and understand the economic risks if PCN is not managed.
 <p>2. Decision Support (DSS)</p>	A digital platform that will help growers make informed choices on PCN management which are specific to their situation.
 <p>3. Resistance Markers</p>	Identifying molecular markers for resistance to PCN within potato varieties and wild relatives to potato to aid the development of new varieties.
 <p>4. Accelerated Breeding</p>	Potato genetics are complex. Techniques such as dihaploid induction will be used to combine different traits to breed plants with resistance against PCN.
 <p>5. Tolerance to PCN</p>	Some potato varieties can tolerate PCN. This project will explore how tolerance works at a genetic level which will help breeders produce more tolerant varieties.
 <p>6. Groundkeeper Control</p>	Better methods for locating and controlling groundkeepers (volunteer potato plants) will be developed.
 <p>7. Integrated Pest Management (IPM)</p>	An integrated approach is the best way to manage pests like PCN. This work package will assess the contribution options such as trap crops and chitin compost can make to PCN control.
 <p>8. Knowledge Exchange</p>	The outputs of the project will be brought together and delivered to stakeholders through a national communication programme.

More information and factsheets about each work package can be found on [pcnhub.ac.uk](http://pcnhub.ac.uk)



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