



A Guide for Managing PCN in Great Britain – Essential Facts



THE PEST

1. The potato cyst nematode (PCN) species inhabiting UK soils are *Globodera rostochiensis* and *Globodera pallida* and are just a small proportion of the numerous nematode species found in UK soils.
2. Since the 1960's there has been a shift in soil populations of PCN from mainly *G. rostochiensis* to *G. pallida* thanks to the introduction of the 'H1 resistance' gene in many of the potato varieties e.g., Maris Piper now being grown in the UK.
3. There are a number of pathotypes within both species of PCN and the H1 gene confers resistance only to *G. rostochiensis* pathotype 1 (Ro1).
4. PCN co-evolved as root parasites of wild potato and other Solanaceae plant species and have adapted to survive, as eggs within hard robust cysts, for long periods (20+ years) in the absence of a host plant.
5. Each cyst can contain up to 600 eggs which are actively stimulated to hatch by the presence of potato root exudates.
6. The juvenile nematodes migrate along the root exudate gradient towards the root tips, enter the roots and grow into either adult males, which exit the roots to mate, or adult females, which remain attached and develop within the roots.
7. Fertilised females ultimately evolve into the egg containing cysts and can be seen attached to roots and tubers in PCN affected crops.
8. PCN infected soils can impact upon crop yield by up to 80% depending upon:
 - a) The initial PCN population.
 - b) The tolerance of the variety grown to PCN feeding.
 - c) Any other stress that the crop is suffering (Eg: drought, excess water, soil compaction, etc).
 - d) Secondary infection of potato plants, weakened by PCN feeding, by opportunist pathogens E.g., *Rhizoctonia solani*.
9. PCN is classified as a quarantine pest in the UK and, as such, is referred to in a number of UK regulations which are listed within the following Defra Plant Health Portal link: [Plant pest factsheet PCN](#)



Spread and Multiplication of PCN

1. PCN is mainly spread through the transfer of soil and/or the use of potatoes as farm saved seed from contaminated fields.
2. PCN cysts can also be spread as a result of soil wind erosion or surface water run-off from contaminated fields.
3. Growing a susceptible variety can result in up to a 30+-fold multiplication of the PCN population in 1 year with an equal further multiplication the next year if groundkeeper potato plants are inadequately controlled.
4. The soil PCN population will naturally decline over time but, in the absence of any control measures, it can take 10+ years for a high population (100 g-1 soil) to decline enough (3-11 eggs g-1 soil) to economically grow an intolerant variety.
5. Seed potatoes produced within the Seed Potato Classification Scheme must be produced on land sampled and found free of PCN.



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Resistance vs Tolerance

1. A resistant variety is one that minimises the reproduction of PCN and may, if the resistance is high, reduce the PCN population.
2. Resistance in varieties is measured on a scale of 1 to 9 with 9 being the most resistant.
3. A tolerant variety is one that can tolerate any feeding damage by PCN without severely impacting upon the yield but, depending upon the level of resistance can multiply the PCN population.
4. Tolerance within varieties is usually described as degrees of tolerance/susceptibility E.g., *very tolerant*, *moderately tolerant*, *some tolerance*, *moderately susceptible* or *intolerant*.
5. Resistance and tolerance to PCN are two totally separate varietal characteristics. A variety can be resistant and intolerant (E.g., Innovator to *G. pallida*) or can exhibit no or little resistance but be extremely tolerant to feeding damage (E.g., Cara to *G. pallida*).
6. An ideal variety is one that exhibits both good resistance and tolerance to PCN.



Control Options

1. **Variety Choice and Genetic Resistance:** Increasingly varietal resistance is being used as and when suitable varieties are available to minimise the PCN population increase whilst growing a potato crop.
2. **Seed:** Only plant certified seed potatoes or, if farm saved seed, from land tested and known to be free of PCN.
3. **Land Selection:** Only grow potatoes on land tested and found to have a low or zero count for PCN. (ideally less than 15 eggs g⁻¹ soil). Extend the rotation if required. A short rotation will exacerbate the population density.
4. **Chemical:** Historically PCN populations could be controlled or managed using nematicides or a soil sterilant, but many of these have now been withdrawn from use. Those that remain, if correctly applied, can suppress PCN root invasion and therefore the impact to a potato crop.
5. **Trap Crops:** There are some Solanaceae species that will stimulate PCN eggs to hatch but because the nematodes are unable to complete their lifecycle on these species the PCN population is reduced more quickly than growing alternative crops.
6. **Hygiene:** Control volunteer potatoes within PCN contaminated fields. Machinery can spread cysts so clean all machinery to minimise soil transfer from contaminated fields into 'clean' fields. Do not spread waste soil from land known to be contaminated with PCN onto land on which potatoes will be grown.
7. **Biocontrol/Biofumigation:** The use of various plants e.g., Indian mustard and biological based products that are either antagonistic or created an antagonistic environment to PCN have been and continue to be trialled.

The full management guide can be accessed by members of GB Potatoes and CUPGRA at www.gb-potatoes.co.uk and www.cupgra.com where digital copies of this factsheet can also be downloaded by all.

CUPGRA, with over 40 years of supporting research and knowledge exchange in potatoes, and GB Potatoes, a unifying voice for the GB potato sector, are committed to ensuring the industry has access to the tools and knowledge it needs to thrive

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