Globodera rostochiensis (Wollenweber) Behrens

Fig. 1. (a) Second-stage juveniles and eggs of *Globodera rostochiensis*; (b) Symptoms of severe infestation in a potato crop; (c) Crushed cyst with numerous eggs; and (d) Potato roots infested with cysts. Photo credits: (a) and (c) Ulrich Zunke, University of Hamburg, www.forestryimages.org; (b) John Marshall, JM Advisory NZ Ltd; and (d) Andrew Taylor, DAFWA.

Classification: K: Animalia, P: Nematoda, C: Secernentea, O: Tylenchida, F: Heteroderidae
Common Name: Potato Cyst Nematode, PCN, Potato Root Eelworm, or Golden Nematode.

Distribution, Host Range & Pathology:

Globodera rostochiensis and *Globodera pallida* are the nematode species known as Potato Cyst Nematodes (PCN). PCN originated in the Andean Highlands of South America and has been spread by the transport of potatoes and soil to many potato growing areas of the world and now occurs in more than 60 countries. PCN are specialist parasites with an intimate association and co-evolution with their specific host plants, potatoes. As such, major hosts are restricted to the Solanaceae family including crop (e.g. potato, tomato, eggplant) and weed species (e.g. blackberry nightshade, hairy nightshade).

In Australia, only *G. rostochiensis* (Fig 1a) has been detected. It occurs in quarantined areas of Victoria and was in the past detected in the Perth Metropolitan Area. Western Australia is currently undertaking research to claim 'Area Freedom' from the pest. PCN was eradicated from infested sites in Western Australia, and there have been no further detections in the State after 20 years of routine sampling.

Symptoms & Impact:

Unfortunately, PCN does not produce visual symptoms in a potato crop until infestation is high. It may be many years from the initial introduction before crop damage is detected, particularly where potato crops are grown over long rotations.

Symptoms of PCN attack on potatoes reflect those typical of many soil borne pathogens, nutrient deficiencies or water stress. Plants may show wilting, yellowing of the leaves, poor growth, delayed flowering and early senescence. The affected plants are usually patchy within the field due to uneven distribution of the nematodes (Fig 1b). Severe infestations can reduce yield by up to 90%.

Key Distinguishing Features:

Within two weeks from flowering the presence of the nematodes can be confirmed visually on potato roots by the appearance of round pinhead sized pale to golden yellow cysts (Figs 1c, 1d). The cysts, which contain up to 400 eggs, are formed from the hardened dead cuticle of the female. Although spontaneous hatch occurs annually, hatching is primarily stimulated by the presence of potato root exudates. Even under optimal conditions, only a proportion of eggs hatch annually. Although most eggs hatch after 7-10 years, cysts can remain viable for up to 30 years.

Management & Control:

Chemical control of cyst nematodes is expensive and only effective during narrow periods of the nematode lifecycle. Management in infested areas through crop rotation and the use of resistant potato cultivars is very effective. As cysts are easily spread by infested soil adhering to tubers, machinery, boots, bulbs, etc, minimising soil movement is essential. To protect against establishment and spread of this nematode in Australia, the use of certified seed, tested for PCN and produced under a strict code of practice, is important for growers.

Quarantine:

Due to the difficulty of early detection and ease of its spread, combined with high economic impact, PCN are of high biosecurity and quarantine concern. PCN poses significant market access restrictions, with their movement regulated by over 100 countries.

Further Reading:

• Eyres, N., Vanstone, V. and Taylor, A. (2005). *Potato cyst nematodes Globodera rostochiensis and G. pallida. Exotic threats to Western Australia*. Factsheet 10/2005, Department of Agriculture and Food Western Australia. http://www.agric.wa.gov.au/content/pw/ph/par/potato_csyt_fs.pdf
• *Potato Cyst Nematodes. Biology, Distribution and Control*. (Eds. Marks, R.J. & Brodie, B.B.). CAB International, Cambridge.
• OEPP/EPPO (2004). Diagnostic protocols for regulated pests - *Globodera rostochiensis* and *Globodera pallida*. *OEPP/EPPO Bulletin 34*: 309-314.

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