PHC2020/08 – Modelling the spread of PCN in Scotland to identify the key factors responsible and the most appropriate management options for future mitigation.

Background: Two species of PCN are present in Scotland: *Globodera rostochiensis* - the golden cyst nematode and *Globodera pallida* - the white cyst nematode. In the 1970s, *G. pallida* represented 2–3% of PCN findings with *G. rostochiensis* representing the rest. In recent years, however, the incidence of *G. pallida* has increased markedly. While there are currently commercial varieties with resistance to *G. rostochiensis* suitable for the Scottish fresh market (e.g. those carrying the H1 resistance gene), this is not the case for *G. pallida*. To add to the difficulties with *G. pallida*, it has a slower decline rate than *G. rostochiensis* in soil in the absence of a host crop and its prolonged hatching period renders nematicide control less efficient.

Statutory testing data collected by SASA shows that the area of land recorded as infested with *G. pallida*, is doubling every 7–8 years and now accounts for nearly 70% of findings. SASA estimates that over 13% of the area regularly planted with potatoes in Scotland is now infested with PCN, with an estimated increase in spread of 5% per year. The widespread presence of *G. pallida*, and its spread into land historically used for seed production, is a particularly acute problem since land infested with PCN, by statute for sound biological reasons, cannot be used to grow seed. This spread, therefore, is currently impacting on potato seed and flower bulb production businesses and, if allowed to continue under current regulations, PCN spread could end future production across the whole of Scotland in as little as 30 years. This would have a major impact on both the important potato seed export sector and the downstream sustainability of the ware sector throughout GB. Moreover, if PCN infestation was to reach a level that impacted significantly on high grade seed growing areas in Scotland, which are managed by only 22 remaining high grade seed growers in Scotland, this would have a major knock-on effect to the rest of the industry and accelerate its demise.

While seed and bulb producers are directly impacted by PCN regulation, ware yields can be affected when non-tolerant varieties are used, and their cultivation can spread the pest to non-infested areas. There is therefore much to learn about the presence of PCN across the whole of the potato and bulb production systems from wide geographical areas down to field scale.

Recently, following a working group on PCN, a report entitled 'Potato cyst nematode (PCN) and the future of potato production in Scotland' was submitted to Scottish Government highlighting the PCN problem in detail and outlining practical recommendations for its reduction. However, in order to maximise and target resources for such a reduction, we wish to better understand i) the main areas of infestation in Scotland and how this is changing over time, ii) what key factors are responsible for that spread (be it geographic, climatic, agronomic etc) and, iii) which management options would allow us to make the biggest impact on reducing spread.

Impact: We will use the outcomes of this project to provide guidance to both policy and industry on the most effective ways to reduce spread of PCN. This project should link with key potato and policy stakeholders and to members of the PCN working group.

Objectives and research required for the call:

- Identify and assess available data and information sources for ware/seed potato and flower bulb crops
- Use this to determine the main areas of infestation in Scotland for both species of PCN.
- Identify (for each area) how this has changed / is changing over time.
- Identify the key factors linked to high PCN incidences / severity (geographic, climatic, agronomic etc).
- Identify any areas where change over years differs from the average and identify any factors that are associated with rapid spread.
- Model the impact of management options on reducing spread and/or reducing incidence and severity and identify those that singly or in combination have most impact.
- Where possible, model the impact of different sampling and testing regimes (in seed, ware and other affected crops).

Outputs required:

- A report summarising the findings against the objectives outlined above, suitable for distribution to stakeholders in the plant health sector (following the PHC reporting guidelines).
- A stand-alone 1-2 page policy summary that outlines control options that can be managed by industry and those where policy intervention would have impact and, in the context of current relevant policy, identifies the impact that alternative policies could have.
- Participation at a relevant plant health / policy / industry meeting or event.

Indicative Key Dates:

- Deadline for submission of application form: 12pm on Friday 26th February 2021
- Project start: March 2021
- Overview of plans and project start-up meeting with PHC Directorate: March 2021
- Discussion with PHC and policy stakeholders when available data has been collated to discuss the level of granularity possible and further review plans: April 2021

Date all work needs to be completed by: 30th October 2021

Project type: Collaborative

Maximum funding available (including overheads and VAT where applicable): £50, 000