The future threat of PCN in Scotland

Kim Davie, Jon Pickup (SASA) David Ewing, Helen Kettle, Adrian Roberts (BioSS; Adam Kleczkowski, Beth McDougall (Strathclyde University); Laure Kuhfuss, Vivian Blok (Hutton)

Introduction

Potato cyst nematodes (PCN) can cause 70% yield losses. Two species of PCN, *Globodera rostochiensis* and *Globodera pallida,* are present in Scotland. Around 13% of the area regularly planted with potatoes in Scotland is infested with PCN. Seed potatoes cannot be grown on land recorded as infested and ware potatoes can only be produced under a control programme.

In recent years the incidence of *G. pallida* has increased markedly, with Angus the most affected county. The area of land recorded with *G. pallida*, currently 6,200 ha, is doubling every 7–8 years, whilst the area of land infested with *G. rostochiensis* is relatively static at c. 14,500 ha. In the 1970s, *G. pallida* represented 2–3% of the all PCN findings, whereas now they account for nearly 70%.

At the current rate of increase, *G. pallida* may prohibit the production of seed potatoes on PCN-free land in as little as 30 years.

Acknowledgements

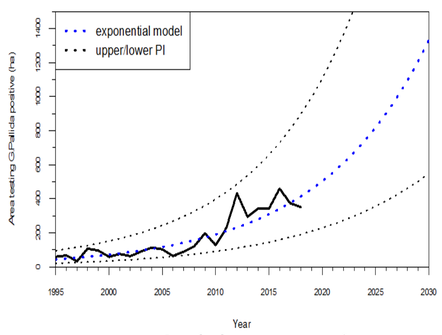
This work was funded by the Scottish Government's Rural and Environment Science and Analytical Services (RESAS) Division through the Centre of Expertise for Plant Health.

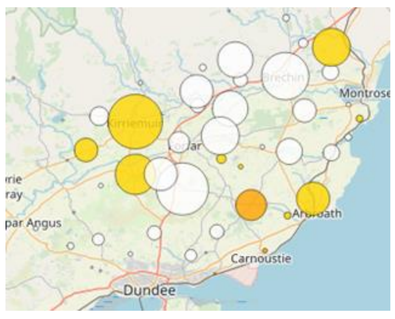
Objectives

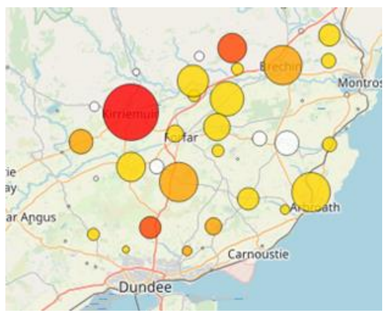
- Model future outcomes for both *G. rostochiensis* and *G. pallida*
- Review control options in Scotland and other countries
- Understand grower behaviours and attitudes to interventions
- Determine measures to be taken to improve PCN management in Scotland

Project outcomes

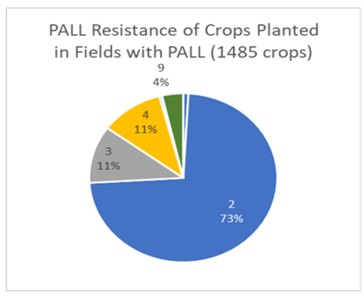
- Animations were produced showing that *G. pallida* infestations have spread quickly from initially low levels, whilst the proportion of fields infested with *G. rostochiensis* has increased more slowly over this time period
- The increase in *G.pallida* in Angus is in line with an exponential model, models, animations showing the spread of pallida by parishes were created. below shows 2010 on the left and 2018 on the right (white – no infestation, red – high infestation levels)

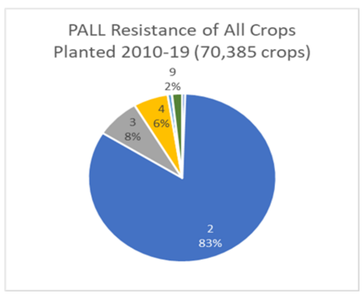


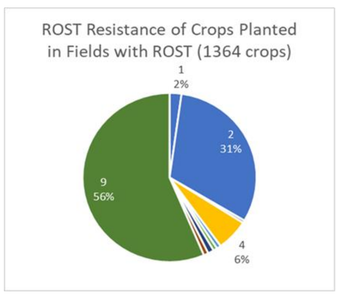


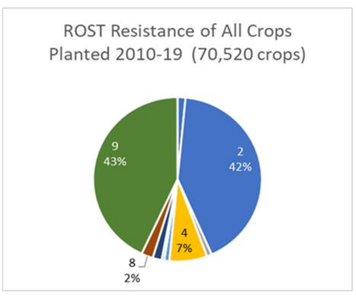


- Potential loses due PCN could rise to £125m per year by 2040 due to loss of land for the production of potatoes.
- Increased temperatures are predicted to increase multiplication rates in G. pallida.
- Several control options exist to manage PCN, but some are not suitable for the Scottish climate, using resistant varieties has the greatest impact.
- Resistance is measured on a scale of 1-9, a score of 2 is susceptible, while a score of 9 is the most resistant. The Scottish seed crop has an average score of 2.5 and ware 2.2 to *G. pallida*. For *G.rostochiensis* seed has an average score of 5.6 the ware crop 6.3. However, when an infestation is identified there is only a 10% swing towards resistant varieties for both species.









- Most growers were concerned about PCN, but growers have limited say in variety choice. Increased market demand for resistant varieties is required.

Key messages

- *G.pallida* infestations are increasing in line with an exponential model
- If no action is taken, there may be no land available for seed production in as little as 30 years
- There are several options to manage PCN, some are not suitable for the Scottish climate and novel solutions should be considered
- Resistant varieties are the most effective tool to manage infestations
- Resistant varieties are not currently being used to full effect
- Current restrictions on seed land to be re-examined
- Changes should be made to encourage greater use of resistant varieties