



Understanding Potato Cyst Nematode decline rates to preserve Scottish potato-growing land



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Introduction

Potato cyst nematodes (PCN) are currently the greatest pathogenic threat to the Scottish potato sector.

Predictions suggest that PCN could collapse the Scottish seed industry by 2050.

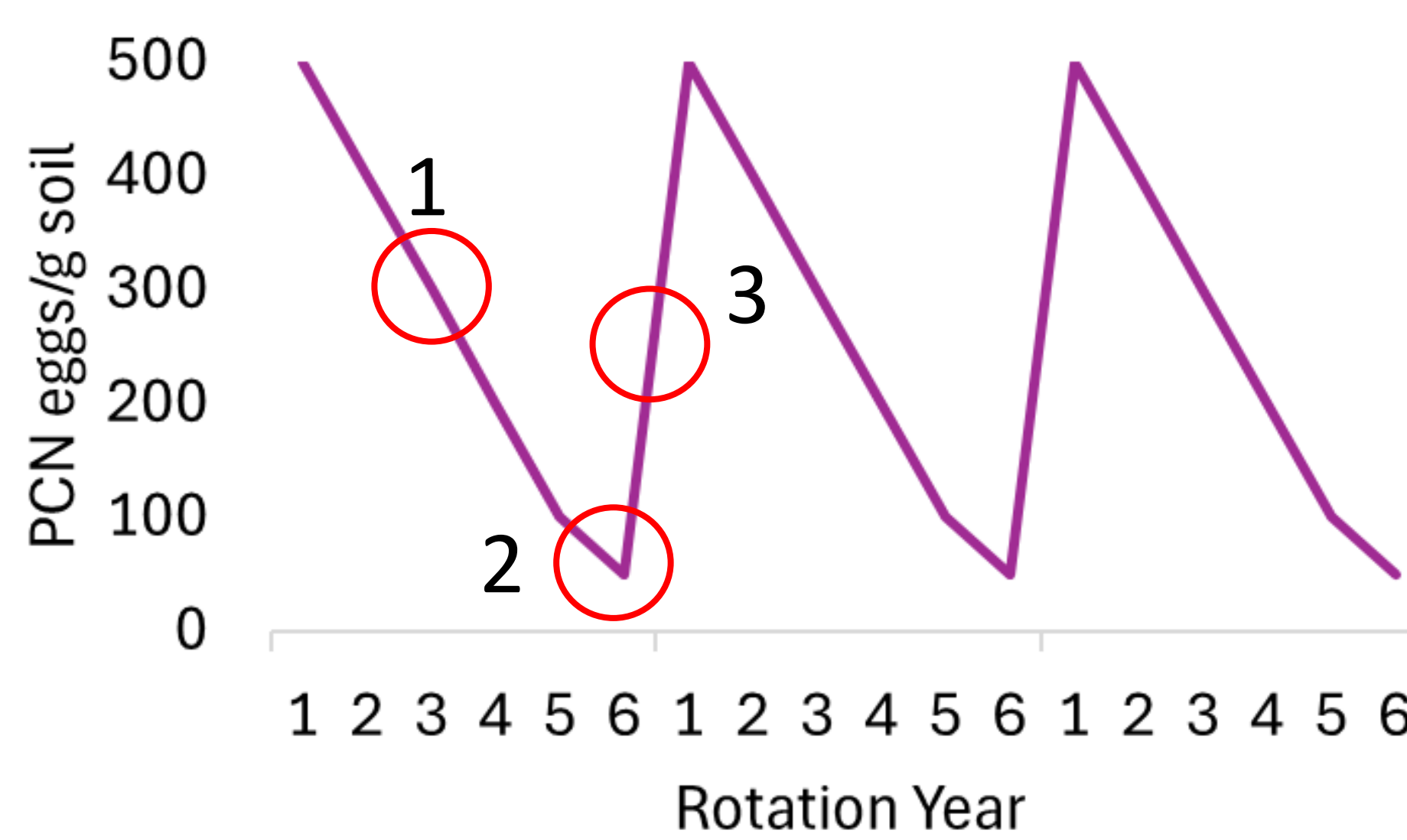
Knowledge of how PCN populations decline in the absence of a host is vital to support agronomic practices and management strategies.

However, little is known about population decline under Scottish conditions and how this might be affected by climate change.

This project supports novel zero-waste management techniques and informs large grower-directed initiatives such as the Scottish Plant Health Centre's 'PCN Action Scotland'



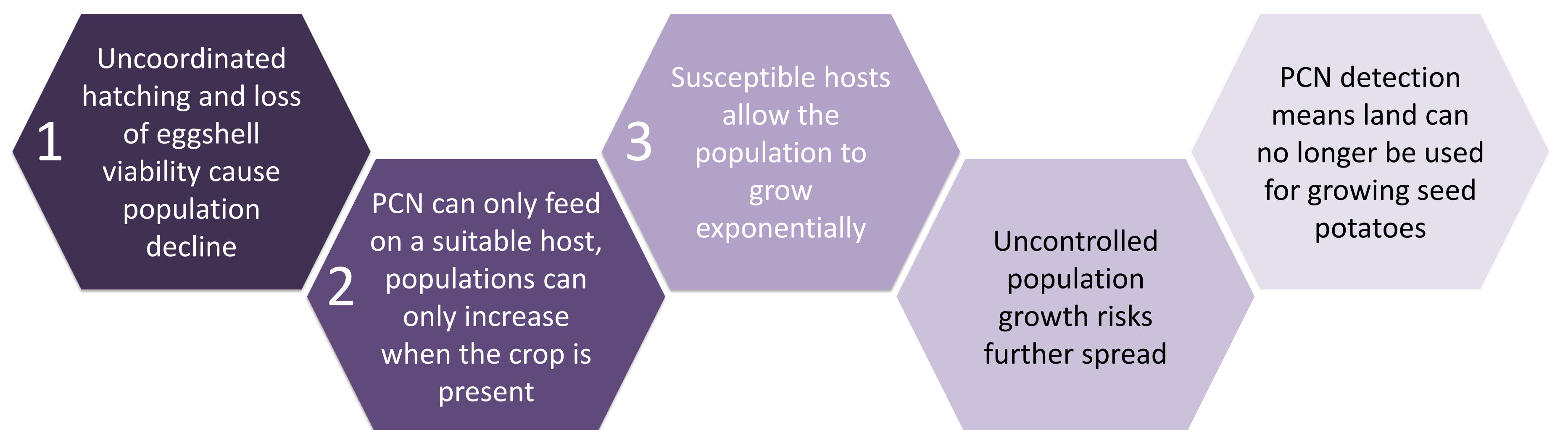
What is a decline rate?



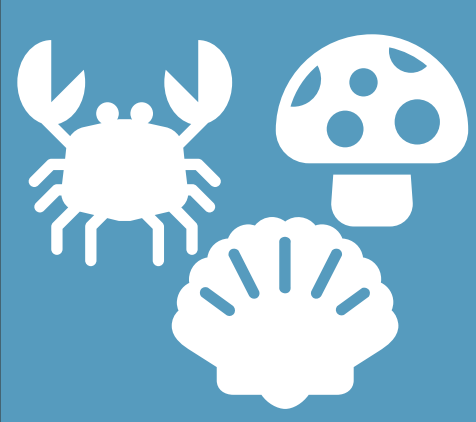
Natural decline of PCN populations varies with factors including **temperature, soil type, and moisture.**

Understanding this is crucial for modelling PCN spread and establishment.

However, **there is limited data on PCN decline under Scottish conditions** and the potential effects of **climate change.**



Soil amendments and sustainable soils



Shellfish and mushroom waste can be composted into a **chitin-rich soil amendment** that returns nutrients and introduces chitin degrading microorganisms to the soil.



These organisms consequently target chitin in PCN eggshells, **disrupting hatching and increasing natural PCN decline.**

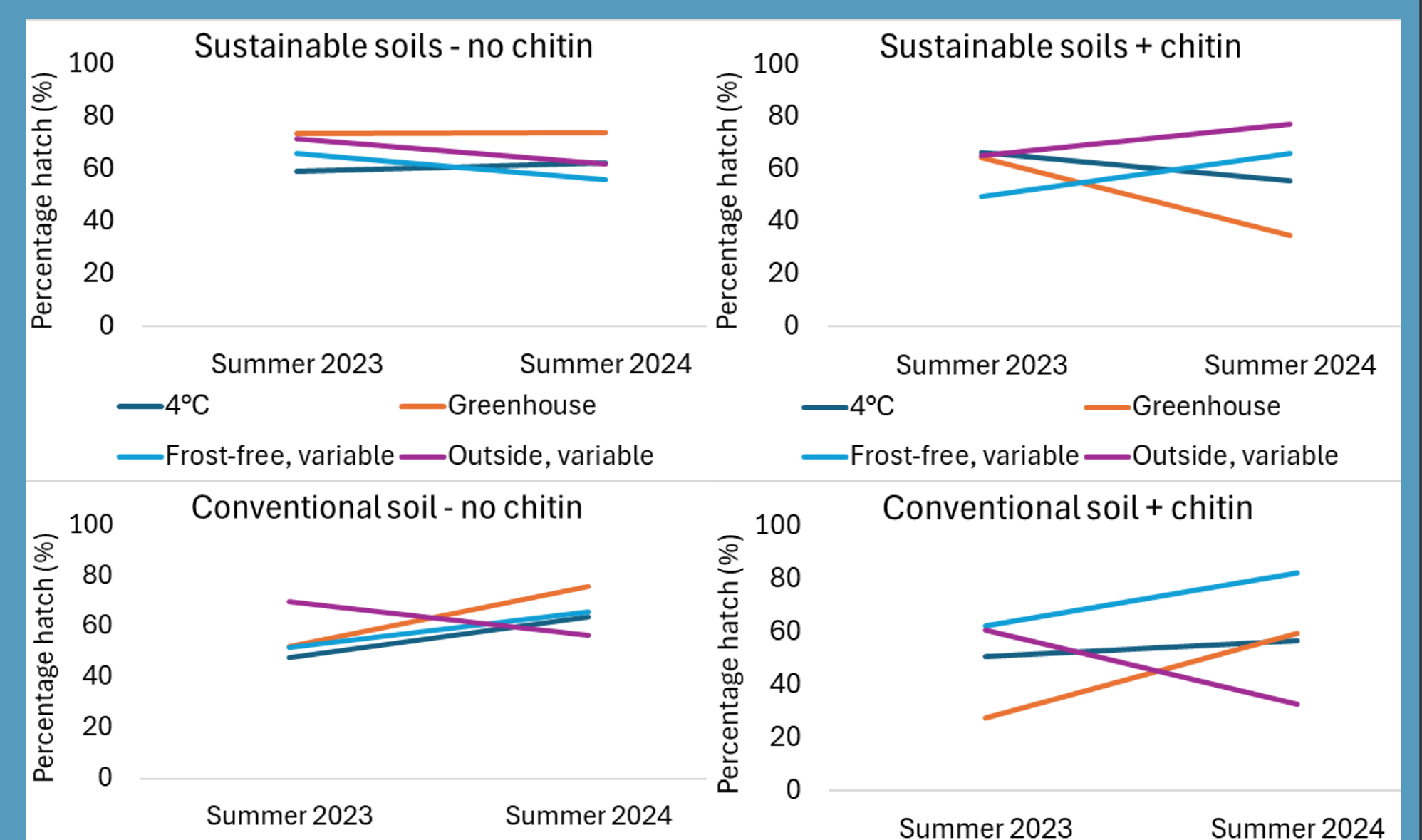


Additionally, plants can recognise chitin, priming their defence against pathogens.



Sustainably managed soils have been developed at **Balruddery Farm (Hutton)** using integrated crop systems. This includes practices such as reduced tillage, use of organic matter amendments, reduced fertiliser use and biodiversity management.

The Research



Experiments were carried out under controlled and varying environmental conditions to assess the effect of chitin amendment and sustainably managed soils on hatching of PCN. Microcosms are being sampled every 6 months for PCN viability. The first year of this project has demonstrated that combinations of both soil management strategy and chitin-rich amendments can increase PCN decline.

Conclusions

- Under constant temperature conditions chitin-rich soil amendments increase PCN population decline in sustainable soils.
- The benefit of chitin-rich soil amendments is currently seen in conventionally managed soils.
- The data does not currently suggest that warmer soils resulting from climate change will have a noticeable impact on PCN decline.