

# Diagnostic testing for seed- and soil-borne diseases

## Improving decision-making for the management of potato diseases using real-time predictive diagnostics

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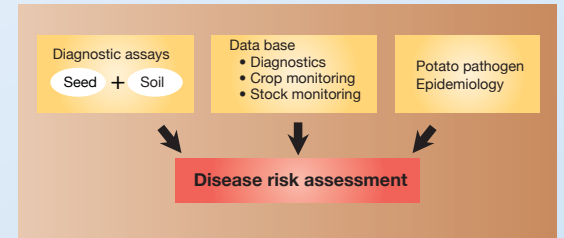
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In collaboration with Greenvale AP, MBM Produce & The Higgins Group

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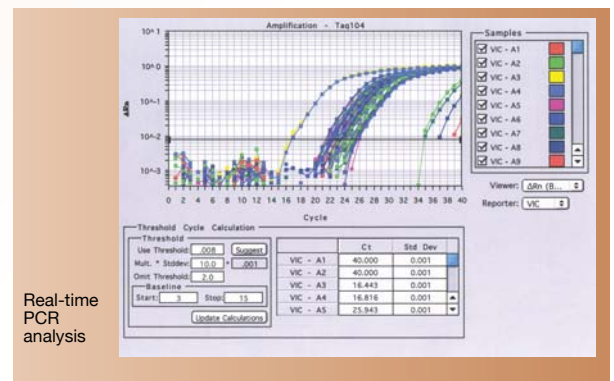


As part of a collaborative and industry led BPC funded project, real-time PCR diagnostic assays for a range of potato diseases have been refined for the testing of both tubers and soil, and robust seed and soil sampling strategies have been formulated. At the end of this project (Dec 2007) we aim to be able to translate diagnostic results based on the quantitative detection of a pathogen into disease risk assessments. We will do this through the deployment of standardised quantitative assays in conjunction with relevant sampling techniques, crop monitoring and knowledge of the epidemiology of potato pathogens.

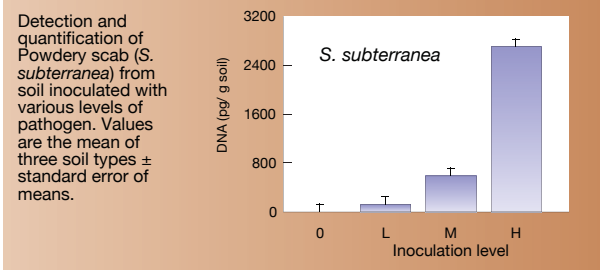


## What we have done

- Formulated robust seed and soil sampling strategies, enabling individual soil and tuber samples to be tested for a range of pests and pathogens. A literature review on pathogen distributions in soil and tuber stocks revealed that very little is known about pathogen distribution patterns on which sound sampling strategies can be based. In contrast, there is an extensive literature on sampling for nematodes in potatoes and other crops and many of the same general principles apply. On the basis of the above review, optimal sampling strategies for soil and tubers have been devised.
- The development of a complete set of standardised quantitative real-time PCR assays and detailed protocols that can be used to test soil and tubers for a wide range of pathogens is near completion:-
  - The detection and quantification of Black dot, Powdery scab and *Rhizoctonia* in seed tubers using real-time PCR assays works well in a standard format, suitable for multiplexing.
  - Combined real-time PCR assays for *Erwinia* spp. simultaneously detected, quantified and identified *Erwinia* spp. present on seed potato stocks, and are suitable for high-throughput testing.
  - The development of an assay capable of detecting latent PMTV infection in tubers is underway.
  - We have demonstrated that the direct extraction of pathogen DNA from soils employing a fine milling technique is sensitive and quantitative and therefore appears suitable as a standard soil test for Black dot, Powdery scab and *Rhizoctonia*.
  - A bait plant test for the detection of PMTV in soils is complete, but further refinement is necessary to enable quantification of PMTV contamination.



Real-time PCR analysis



## What we are doing

- Validating diagnostic assays by building up a large data set that will enable the results from extensive sampling, testing and monitoring to be compared.
- Translating results of diagnostic assays, based on the quantitative detection of a pathogen, into a risk assessment of disease.
- Transferring all technology to industry.

