

Free living Nematode Molecular Diagnostic Service

At James Hutton Limited, as part of a wider industry collaboration which included 13 key players in the potato breeding, growing and processing industries*, Dr Roy Neilson has developed a molecular diagnostic test, capable of identifying the species of Free Living Nematodes (FLN) in soils.

The project, which began in 2010, was co-funded by Innovate UK and AHDB Potatoes. It was designed to add value in the potato supply chain by reducing yield and quality losses caused by the direct feeding of FLN and their role in the transmission of Tobacco Rattle Virus (TRV). It brought together a consortium of companies with a base of over 500 growers involved in ware potato production seed both for use in the UK and export.

Free-Living Nematodes are considered a significant constraint to profitable crop production. In particular, FLN are emerging as a major problem for example in the UK potato, root vegetable and horticultural industries.

The need to improve and develop testing for FLN has grown with the major problems they cause for UK potato growers. This is exacerbated in the short term by removal of approved nematicides and in the long-term by climate change, which is expected to increase FLN populations.

FLN cause damage directly by feeding on potato roots, reducing yields and quality, and indirectly by infecting roots and transmitting TRV leading to spraing symptoms in potato. Relatively low levels of TRV infections can render entire crops unsaleable, both for the fresh and the processing industries. The problem is further compounded by beneficial and pathogenic FLN species co-existing making accurate discrimination between the two essential.

Identification of FLN to species is time consuming and requires a highly skilled taxonomist. For potato, typically a FLN count does not separate vector and non-vector *Paratrichodorus* and *Trichodorus* species due to minute morphological differences which are not visible using low-powered microscopy. Thus, an inherent assumption has been that any *Paratrichodorus* and *Trichodorus* present in soil have the potential to lead to spraing symptoms in potatoes. Arguably this conservative approach has led to the unnecessary application of nematicides at a cost to both the farmer and the environment.

New DNA based diagnostic recently launched through James Hutton Limited, provides a rapid and cost effective identification of the four most common *Paratrichodorus* and *Trichodorus* species in the UK that are known to vector TRV. Combined with an appropriate sampling strategy, the diagnostic offers growers an opportunity to generate a robust field map of the distribution of FLN species capable of transmitting TRV. This means that agronomists will know specifically where problems exist and where to treat.

The diagnostic has undergone three years of validation and been tested against c.5000 soil samples from potato growing areas of the UK. In parallel, this has enabled scientists at James Hutton Institute to potentially identify molecular markers which will facilitate future breeding of new potato varieties with resistance to Tobacco Rattle Virus (TRV) and to develop strategies for controlling FLN.

The new service is now being marketed through James Hutton Limited and will be available at the organisation's Dundee site and while ideally placed to meet the needs of UK customers, it is also expected to have international appeal. For further information and pricing, please contact Dr Jonathan Snape jonathan.snape@huttonltd.com +44 (0)1382 568568.

* The collaboration which supported the development of the project consists of Cygnet potato breeders (Lead), ADHB Potatoes, Pepsi Co, Farmcare, Du Pont, Plant Health Care, TSB, Tozer Seeds, Eden Research, McCain, SRUC, James Hutton Institute, James Hutton Limited and Harper Adams University.