Horticultural Development Company

Grower summary

M 48

Trichoderma green mould – diagnostic assays for improved disease management

Final Report 2010

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The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Headline

- A rapid molecular diagnostic test for *Trichoderma aggressivum* identification is now available that can permit early diagnosis of the disease and help mitigate financial losses.

Background and expected deliverables

The fungus *Trichoderma* is comprised of numerous species of which only some cause economic losses to the Mushroom Industry. At the onset of the problem in the mid 1980s, *Trichoderma* (green) compost mould and cap spotting was attributed primarily to *T. harzianum* leading to between 30-100% losses. However, several studies that investigated *Trichoderma* outbreaks in Europe and North America (Fletcher, 1986; Seaby, 1996; Muthumeenashi *et al*. 1998) showed the situation to be much more complex. There are four biotypes, some of which are present in the UK and some of which are economically damaging as summarised below:

Biotype	**Current Name**	**Present in UK**	**Economically damaging**
Th1	*Trichoderma harzianum*	yes	no
Th2	*Trichoderma aggressivum f. europaeum*	yes	yes
Th3	*Trichoderma atroviride*	yes	no
Th4	*Trichoderma aggressivum f. aggressivum*	no	yes

Rapid diagnosis of *T.aggressivum* cannot currently be achieved quickly so this prevents effective disease management. Recent advances in our understanding of *T.aggressivum* molecular biology (Project M 46) may permit the development of species - specific diagnostic tools.

Summary of the project and main conclusions

The project successfully developed extraction methods for *Trichoderma* DNA directly from Phase III compost. Real-time PCR primers and probe for *T.aggressivum* were developed using the translocation elongation factor gene. It was not possible to develop an assay for *T.harzianum* due to the complexity of this species taxonomy. The *T.aggressivum* assay was found to be as sensitive as plating out coupled with a standard PCR assay, but importantly,

could be achieved within one working day as opposed to the existing two stage method taking at least 8 days. The real-time PCR test can be semi-automated to help reduce time and costs and is also semi-quantitative. Levels of *Trichoderma* can be determined to at least 4500 propagules per gram of fresh weight and potentially 10 times more dilute (450 propagules/gfw; equivalent to only a few conidial heads of *Trichoderma*). The new assay has been used to successfully test several compost samples from commercial premises for *T.aggressivum,* This will be invaluable to aid the understanding of the pathogen's epidemiology in project M 50.

Financial benefits

A rapid molecular diagnostic test for *Trichoderma aggressivum* identification is now available that can permit early diagnosis of the disease and help mitigate financial losses.

Action points for growers

- Aggressive forms of *Trichoderma* compost mould (*Trichoderma aggressivum*) can cause significant yield losses (in excess of 50%) due primarily to bare areas and cap spotting.

- Early detection and rigorous hygiene measures are key to successful *Trichoderma* management.

- A semi-automated DNA extraction for Phase III compost has been developed permitting rapid diagnoses (<48h) from compost.

- The project has led to the development of the first rapid, cost effective commercial service for compost producers and growers, to screen Phase III compost directly for *T.aggressivum.*