

Project title: Development and delivery of knowledge transfer activities on current best practice for Oomycete root rot detection and control

Project number: CP 128

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Previous report: None

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AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

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Headline

- Four cross-sector grower workshops were delivered in February and March 2015.
- Three factsheets which will form the basis of a larger body of practical hints for growers have been developed.
- A group of video clips demonstrating hints and tips for identifying and reducing the impact of oomycete pathogens will be available on the AHDB Horticulture website.

Aim of CP 128

To provide and disseminate to the UK Horticultural Industry, using factsheets, grower workshops and other media, a comprehensive update on the techniques and materials currently available for monitoring, management and control of Oomycete root-and stem-rot pathogens, to help inform and guide current best practice and indicate possibilities for future development. This project was complementary to the AHDB Horticulture desk study CP 126 and other AHDB Horticulture outputs and focus on:

- i) Understanding the organisms – Oomycetes, what are they? What makes them different? How is this important?
- ii) Symptoms and diseases – what to look for and early signs of disease problems, potential losses and the risks of disease.
- iii) Diagnostics and Detection – what is available and from where? What is appropriate? The most useful questions to ask and what the answers might mean.
- iv) Management and Control – what practical steps can be taken to reduce inoculum presence and spread? What chemical and cultural tools are available for growers?

Background

This KT (Knowledge Transfer) project complements the AHDB Horticulture desk-based global knowledge review (CP 126) and has arisen from the need to consolidate Oomycete R&D to reduce the considerable risk of duplication and dilution of research and KT effort across the wide diversity of horticultural sectors in the UK. To this end, an Oomycete seminar/workshop was organised by AHDB Horticulture in October 2012 and this provided a broad overview of Oomycete pathogens and reviewed some of the more recent work on a range of economically important diseases in horticultural crops. More importantly, there was consensus with the

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AHDB Horticulture over the need to provide a clearer focus for future R&D on Oomycete root and stem rot disease problems. The logical first step in this process was to commission an in-depth desk study to capture existing worldwide knowledge (CP 126) but also to deliver Knowledge Transfer output on the current state of identification, diagnostics and management strategies (CP 128).

Summary

Workshops

A series of four grower workshops were organised and run at Stockbridge Technology Centre, Yorkshire (17th February 2015), The James Hutton Institute, Dundee (19th February 2015), University of Warwick, Wellesbourne, Warwickshire (4th March 2015) and East Malling Research, Kent (5th March 2015). The workshops at Stockbridge, Wellesbourne and East Malling were one-day stand-alone events whilst at the James Hutton Institute the AHDB Horticulture Oomycetes workshop was adjusted to a half-day and presented as part of the Scottish Society for Crop Research Winter Soft Fruit Meeting, extending this into a full-day event. These workshops and project CP 128 in general were also presented/promoted to the AHDB Horticulture Herbaceous Perennials Technical Discussion Group meeting '*Root diseases of ornamental plants*' (London, 11 February, 2015).

All three members of the project consortium gave presentations at the workshops:

- Alison Wakeham: '*Deployment of diagnostics in disease management systems for horticulture, with emphasis on oomycete stem and root pathogens*'
- Martin McPherson: '*Update on the options for chemical and biological control of oomycete stem and root pathogens*'
- Tim Pettitt: '*Strengths and weaknesses of our current knowledge of root, stem and crown rot oomycetes*' & '*Current gaps in our knowledge of root and stem rot oomycetes: what do we need to know to improve and maintain disease management?*'

In addition, visiting speaker Professor Walter Wohanka gave a very well received presentation on '*Control of oomycete pathogens in irrigation water*'. Walter is an international expert in this field and has more than 30 years' experience in practical consultancy and clinic work as well as pathology research. The workshops provided a great opportunity to meet him and see him speak and he made many potentially useful and hopefully fruitful contacts with UK growers and consultants during his visits for the AHDB Horticulture workshops.

Excellent trade stands gave commercial knowledge of water hygiene and biosecurity measures plus specialist areas of expertise. These were provided and manned by:

- Priva UK Ltd – primarily presenting their UV disinfection equipment
- Quill Productions – primarily presenting a stabilised hydrogen peroxide disinfectant/cleaner/oxidiser
- Ximax Environmental Solutions PLC – primarily presenting their chlorine dioxide water treatment systems
- Flowering Plants Ltd – primarily presenting their specialised approach to biological filtration.

Each workshop finished with a discussion and questions section for the panel of speakers chaired/facilitated by Cathryn Lambourne of AHDB Horticulture.

Factsheets

A set of three factsheets have been prepared and submitted to AHDB Horticulture:

- 1) *Oomycete stem and root rot pathogens in UK horticulture* – The stem and root rot oomycetes are a large and apparently very diverse group of plant pathogens with representatives causing significant economic damage in the majority of horticultural crops. This factsheet outlines the basic biology of this important group of plant pathogens, highlighting that they share many aspects of their behaviour and life cycles in common, indicating that there may be possibilities for more generic cross-sector approaches towards their management and control.
- 2) *Testing water for plant pathogens* - Water for irrigation can easily become contaminated with potential plant pathogens, and whether a new source of water is being considered or there are concerns with the current supply such as possibly contaminated storage tanks or the occurrence of suspicious disease outbreaks, water testing is essential for guiding management decisions. However, the approach to testing can strongly influence the value of the results. This factsheet explains the appropriate testing that is currently available to properly assess the disease risks and outlines interpretation of results, and the questions to ask a prospective test provider.
- 3) *Methods of water treatment for the elimination of plant pathogens* - Many plant diseases can be introduced to, and spread within cropping systems by contaminated irrigation water, especially those caused by species of *Pythium*, *Phytophthora* and *Fusarium*. Fortunately, it is possible to eliminate or significantly reduce this disease

threat by treating water before irrigation use. There is a wide range of effective water treatment methods available and selection of an appropriate method or system for a particular horticultural concern is very much a case of 'horses for courses'. In this factsheet the currently most readily-available water treatment methods are outlined together with some emerging technologies together with some considerations to assist individual nurseries in the selection of an appropriate technology.

Video clips

Four initial ideas have been submitted to AHDB Horticulture:

- 1) *Awareness of the potency of puddles as oomycete inoculum sources* – using fluorescent dye to demonstrate how easily, rapidly and widely inoculum can be spread from a fairly 'innocent-looking' puddle.
- 2) *How to take a water sample for plant pathogen analysis* – this would follow a similar format to an already existing AHDB Horticulture soft fruit video for *E. coli* etc. (human pathogen contamination) analysis, but with the differences needed for plant pathogen (especially oomycetes) analysis.
- 3) *Oomycete inoculum sources* – With a similar aim to video 1 this video would show 'swab tests' on shoes, Danish trolleys, machinery etc. – showing results ('Blue Peter here's one we prepared earlier' style?). Also plate tests will be used to show the hazards of leaving opened containers of growing media exposed in comparison with clean and fresh (contained/protected) media.
- 4) *Sources of water and their microbial content* – using membrane filter tests, close-up shots, plates and possibly microscope images to demonstrate that often 'nice and sparkly' water from roofs and from compromised storage tanks (i.e. faulty or completely absent lid) can be seriously contaminated. Also look at river water, reservoir water and good clean water from mains, boreholes and clean storage tanks.

The videos will be produced in conjunction with AHDB Horticulture and will then be launched on the AHDB Horticulture website. They, along with the factsheets developed here, and in future work on Oomycetes will form the basis of a 'Practical Knowledge Hub' resource for UK horticultural growers.