

Grower Summary

CP 106

Pre-colonisation of
strawberry runners and tray
plants with arbuscular
mycorrhizal fungi to manage
Verticillium wilt

Annual 2014

Disclaimer

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

©Agriculture and Horticulture Development Board 2015. No part of this publication may be reproduced in any material form (including by photocopy or storage in any medium by electronic mean) or any copy or adaptation stored, published or distributed (by physical, electronic or other means) without prior permission in writing of the Agriculture and Horticulture Development Board, other than by reproduction in an unmodified form for the sole purpose of use as an information resource when the Agriculture and Horticulture Development Board or AHDB Horticulture is clearly acknowledged as the source, or in accordance with the provisions of the Copyright, Designs and Patents Act 1988. All rights reserved.

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 AHDB Horticulture office (hort.info.ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

AHDB Horticulture,
AHDB
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

Project Number: CP 106

Project Title: **Pre-colonisation of strawberry runners and tray plants with arbuscular mycorrhizal fungi to manage Verticillium wilt**

Project Leader: Prof Xu
East Malling Research

Contractor:

Industry Representative: **Marion Regan**

Report: Annual Report 2014

Publication Date: September 2015

Previous report/(s): None

Start Date: October 2013

End Date: September 2016

Project Cost: £67,650

Headline

- There is some evidence of reduced wilt development in AMF-colonised plants.

Background and expected deliverables

Strawberry wilt, caused by *Verticillium dahliae* Kleb., can reduce yield by up to 75%. For ca. 40 years, strawberry growers routinely fumigated their soils with methyl bromide to reduce levels of soil inhabiting *V. dahliae* before planting. The use of methyl bromide in the UK was banned in 2006. Other soil fumigants have also been used for this purpose, most notably chloropicrin, but its use has also been limited by legislation in recent years. Extensive effort has gone into finding alternative ways of reducing levels of soil inhabiting *V. dahliae*, including the incorporation of green manures that release volatile fungitoxic compounds (so-called biofumigation), which has shown promise as a component of a disease management strategy.

In a recent Defra Horticulture LINK project (HL0177, HDC project SF 77), a group of scientists led by EMR demonstrated that the incorporation of lavender waste in soils prior to planting, can effectively reduce verticillium wilt severity on strawberry. Three key terpenoids were identified as being responsible for the observed suppressive effect. In a follow-on TSB funded project, EMR is leading a consortium to investigate whether pelletised lavender waste and microencapsulated terpenoids can effectively control *V. dahliae* in soils. Results so far, however, indicate limited efficacy of these products. Therefore, other control measures in addition to the biofumigation-based approach are needed.

Arbuscular mycorrhizal fungi (AMF) are ubiquitous in terrestrial ecosystems where they are major components of the soil microbial biomass. Mycorrhizal associations are multi-functional, assisting the plants in nutrient acquisition, water uptake and protecting roots from pathogens. AMF have been shown to increase plant tolerance to *V. dahliae* in several crops, including pepper, strawberry and cotton. However, the beneficial effects offered by AMF can vary considerably.

A recent publication showed that one particular AMF strain significantly reduced strawberry wilt when plants were inoculated at planting. The extent of AMF root colonisation and their beneficial effects to plants are however also dependent on particular AMF strains and strawberry cultivars. Ensuring sufficient colonisation of strawberry planting materials (runners or tray plants) before trans-planting, may further increase the benefit of AMF-symbiosis through physical exclusion of potential colonisation sites for soil pathogens.

Arbuscular mycorrhizal fungi (AMF) have been shown to confer a number of benefits to their host plant including enhanced pathogen resistance. This project is investigating if pre-colonising strawberry plants with AMF leads to reduced incidence or severity of verticillium wilt.

Summary of the project and main conclusions

To date, we have demonstrated that AMF can colonise in-vitro produced plantlets in vermiculite and runner tip produced plants in a peat/perlite based substrate. The high moisture conditions during weaning/tipping did not prevent AMF from colonising roots. The effects of the symbiosis on plant growth were variable. All AMF species tested on the tissue culture produced plant of the cultivar EM1996 increased the crown diameter of the plantlets, but this increase was only significant with *R. irregularis*. For the runner tip produced plants, the effects of AMF inoculation on crown diameter varied greatly with specific combinations of AMF and cultivars. There is some evidence of reduced wilt incidence for AMF-colonised plants, which needs to be confirmed in 2015.

Financial benefits

It is too early to identify the potential financial benefits from this project.

Action points for growers

- This is only the first year of the project so it is too early to recommend specific action points for growers.