



Grower Summary

HNS 146

**Hebe: aspects of the biology
and control of Fusarium wilt**

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GROWER SUMMARY

Headline

Fusarium wilt of Hebe in the UK is caused by a host-specific strain of *Fusarium oxysporum*. Varieties differ in susceptibility to the disease so the disease can be managed by varietal choice and also by maintaining stock plants free of *F. oxysporum* and fungicide drenches to the growing medium. Incidental control may be afforded by the use of disinfectants for non-disease specific general hygiene purposes.

Background and expected deliverables

In 2005, *Fusarium oxysporum* was consistently isolated from stained vascular tissue of container-grown hebe plants affected by wilt and dieback. A vascular wilt disease of Hebe caused by *F. oxysporum* was first described in Europe in 2000 (in Italy) and it was considered that this might be the same problem. Hebe is a very popular garden plant and the occurrence of a new wilt disease could severely damage sales. By the start of this project, the problem had been recognised on one nursery, where it had been a continuing problem for several years. In 2005 it caused losses of over 15,000 plants.

The objectives of this project are:

1. To determine whether *F. oxysporum* is a cause of Hebe wilt in the UK;
2. To investigate aspects of the disease biology and spread;
3. To devise an effective control strategy.

Summary of the project and main conclusions (year 2)

Specificity of F. oxysporum in hebe

Young plug plants of Hebe cvs Pink Pixie and Purple Pixie and stock cv. Carmen were each inoculated with two strains of *F. oxysporum* obtained from Hebe plants affected by Fusarium wilt, and a strain obtained from stock (*Matthiola incana*) plants affected by Fusarium wilt. The plants were inoculated by dipping roots in a standardised spore concentration and then potted into new 9 cm plastic plant pots and grown in a heated glasshouse at around 25° C. Both strains of *F. oxysporum*

obtained from Hebe only caused Fusarium wilt symptoms in Hebe, and the *F. oxysporum* strain obtained from stock only caused Fusarium wilt symptoms in stock. These results suggest that the strain of *F. oxysporum* causing wilt in Hebe plants in the UK is a host-specific pathogen. It is unlikely that the fungus will readily cause a vascular wilt in herbaceous or nursery stock species unrelated to Hebe. It is also unlikely that *F. oxysporum* isolates causing vascular wilt diseases in other hosts, such as stock, will readily cause a vascular wilt in Hebe. In this experiment the latent period between inoculation and symptom development was 9 weeks.

Varietal susceptibility

All of six Hebe varieties inoculated with *F. oxysporum* from Hebe developed symptoms of Fusarium wilt. At 16 weeks after inoculation, the incidence of Fusarium wilt was significantly greater in Pink Pixie (35% of plants affected) than in Caledonia (5%), Rosie (8%) and Pascal (18%); levels were relatively high in Purple Pixie (25%) and Pink Paradise (30%).

Evaluation of fungicide and biological treatments

Four fungicides including 'Amistar' (asoxystrobin), 'Delsene 50 Flo' (carbendazim), 'Scotts Octave' (prochloraz) and an experimental material, as well as six biological treatments (composted pine bark incorporated into the growing medium, 'Trianum P' drench, two experimental biocontrol agents, 'Mycoplex' granules incorporated at potting and 'Turf Vigour Special' applied as a drench) were evaluated for control of Fusarium wilt in container-grown hebe in a replicated experiment in a heated glasshouse. Fusarium wilt was first observed 10 weeks after inoculation and at the end of the experiment 23% of untreated plants were wilted or dead. 'Scotts Octave' significantly increased the number of surviving plants (i.e. not wilted or dead) (See Fig. 1). None of the other treatments had a significant effect. 'Amistar' drench treatment resulted in stunted growth.

Disinfection of sand

Three disinfectants ('Jet 5' at 2%, 'Horticide' at 0.08% and 'Unifect G' at 4%) were tested for their ability to eliminate *F. oxysporum* from sand. Sand was infested by inoculation with a suspension of *F. oxysporum* spores two weeks before drench treatment with the disinfectants. After fumes had dissipated, sand was tested in the laboratory by plating onto agar to determine levels of *F. oxysporum* infestation. All

three disinfectants significantly reduced levels of *F. oxysporum*. 'Unifect G' at 4% was the most effective and no *F. oxysporum* was recovered from sand treated with this product. Treated sand was mixed with a peat-based growing medium and used to grow Hebe plants for 12 weeks. Only a very low incidence of Fusarium wilt occurred and there were no significant differences between treatments.

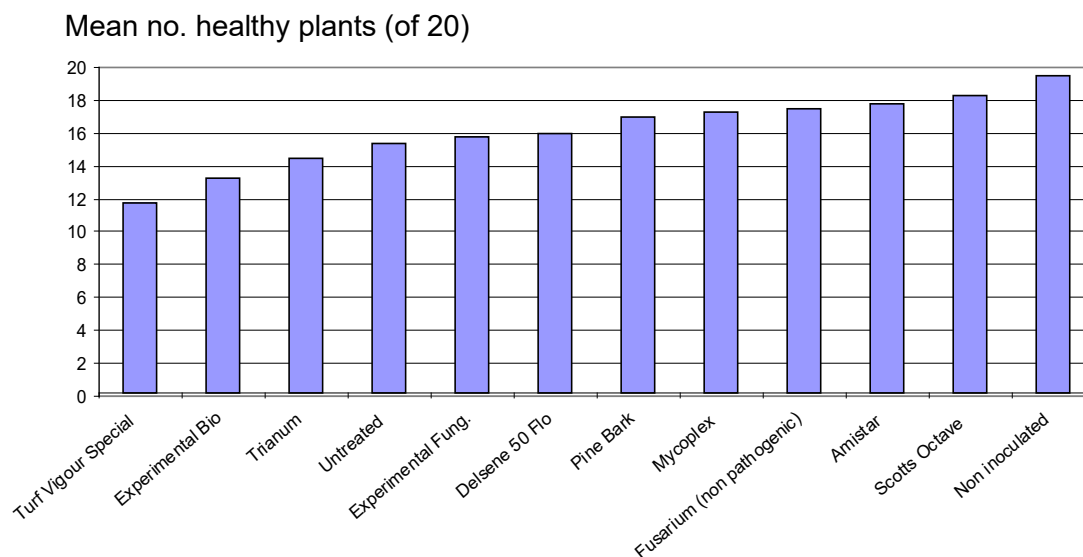


Fig. 1: The effect of fungicides and biological treatments on Fusarium wilt in Hebe - 2007

Financial benefits

Losses due to Fusarium wilt of Hebe on one nursery were at least £30,000 in 2005 and further substantial losses occurred in 2006. As the project progresses it is anticipated that an increased understanding of the disease will allow a reliable control strategy to be devised.

This disease is new to the UK and appears at present to be restricted in occurrence. If it can be controlled in the near future, the potential financial benefit is huge because widespread Fusarium wilt in garden centres or home gardens could severely damage the image of Hebe and subsequent sales.

Action points for growers

- Growers should familiarise themselves with the symptoms of Hebe Fusarium wilt.
- Note that Hebe Fusarium wilt could initially be confused with downy mildew. If in doubt, contact a plant pathologist or submit a sample to a Plant Clinic.
- When selecting a disinfectant for use as part of your general nursery hygiene/clean up programme, it makes sense to select a product which is also known to have activity against plant pathogens of concern.
- For effective hygiene it is important to disinfect standing areas thoroughly and not just wet the surface.
- With the transfer of responsibility of the Biocides Directive to the HSE, biocides for use in crop production must be registered as Plant Protection Products.
- Although the biocides 'Unifect G', 'Horticide' and 'Jet 5' are known to have activity against Fusarium, they are unfortunately not approved as Plant Protection Products and can therefore not be used for this purpose.
- Check the health of stock plants before taking cuttings; symptomless, systemic infection by *F. oxysporum* can occur within plants.
- Where feasible, maintain growing temperatures below 20°C; there is evidence that Fusarium wilt is favoured by temperatures around 25°C.
- Many varieties of both large leaf and dwarf forms of Hebe are susceptible to Fusarium wilt. The varieties Pink Paradise, Pink Pixie and Purple Pixie are more susceptible than Caledonia or Rosie.