

Investigations into the control of *Fusarium oxysporum* in protected cut flower column stocks



Background

Fusarium oxysporum is a major problem in protected cut flower crops, especially column stocks (*Mattiola incana*) and lisianthus (*Eustoma grandiflorum*), the disease often gives rise to considerable economic losses.

Since the withdrawal of methyl bromide as a soil sterilant in 2008, the only practical control option left for use in commercial production is steam sterilisation of the soil. However, this is expensive (in terms of both labour and fuel), is not sustainable in the long term and produces very variable levels of disease control. This leaves the industry with a need for viable alternatives.

Over the past five years, AHDB Horticulture has therefore funded a number of projects commencing with a detailed survey of the issue within the industry, followed by trials examining a number of potential chemical and biological control options, a further project assessing the *Fusarium* susceptibility of commercially grown column stocks varieties and most recently an investigation into the feasibility of producing column stocks in a deep pool hydroponic system.

Treatment	Active ingredient	Percentage seedling emergence	Percentage <i>Fusarium</i> infection
Control (untreated)	N/A	81.5	5.1
Inoculated control	N/A	80.8	89.9
Amistar	Azoxystrobin	61.5	95.6
Serenade	<i>Bacillus subtilis</i>	55.3	89.9
Systhane 20EW	Myclobutanil	60.3	62.5
Trianum	<i>Trichoderma</i>	57.0	95.2

Method

In project PO 005(a), a number of chemical and biological control options were assessed in a commercial glasshouse (with a known history of *Fusarium*) and in 'pot trials' located at Stockbridge Technology Centre. A number of additives were also incorporated into the soil to aid the efficacy of some of the biological agents as demonstrated in previous trials. These included mushroom compost (as a source of chitin), paper waste and bark (as sources of carbon).

As part of project PO/BOF 002a (The Cut Flower Centre), all available commercial varieties of cut flower column stocks (85 varieties in total) were planted in the same glasshouse as the above mentioned trial and their susceptibility to *Fusarium* assessed as the crop matured.

PO 020 investigated the possibility of eradicating the *Fusarium* problem altogether by growing the crop in both deep and shallow pool hydroponic systems, removing the need for soil-based culture.

Results

None of the chemical or biological control options examined achieved an acceptable level of disease control in either the glasshouse or the 'pot trials' (see table opposite for the performance of some of the products used in the 'pot trial').

The variety trial showed significant differences in plant susceptibility to *Fusarium* and has been summarised in leaflet CFC/AHDB Horticulture Information Sheet 4, published in 2013.

The deep and shallow pool hydroponic system trials identified several key parameters (especially the oxygen concentration of the water) which need to be optimised to produce a marketable column stock crop.

Action points for growers

- Maintain good levels of nursery hygiene including sterilisation of footpaths and removal of infected plant material/debris.
- Maximise the impact of steaming by ensuring that the soil texture is suitable and the soil moisture status is appropriate at the time of sterilisation.
- Consult CFC/HDC Information Sheet 4 for assistance in determining varietal *Fusarium* susceptibility.
- Select column stock varieties which are appropriate to the cultural situation e.g. for production in steamed or unsteamed soil, taking account of the history of *Fusarium* on site etc.
- Keep up to date with the 2016 trials that will further develop deep and shallow pool hydroponic systems.
- Keep up to date with all future cut flower trials via the Cut Flower Centre blog at www.thecutflowercentre.co.uk