Grower Summary

BOF 074

In vitro screening of fungicides with potential to control basal rot of narcissus caused by *Fusarium oxysporum* f.sp. *narcissi*

Final 2012

Disclaimer

AHDB, operating through its HDC division 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.

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.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

HDC
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

HDC is a division of the Agriculture and Horticulture Development Board.

Project Number:	BOF 074
Project Title:	In vitro screening of fungicides with potential to control basal rot of narcissus caused by Fusarium oxysporum f.sp. narcissi
Project Leader:	John Clarkson & Gordon Hanks
Contractor:	Warwick University & Gordon Hanks
Industry Representative:	Claire Taylor, O A Taylor & Sons Ltd, Lincolnshire Mark Clark, Grampian Growers Ltd, Scotland
Report:	Final Report 2012
Publication Date:	28/09/2012
Previous report/(s):	None
Start Date:	01 December 2011
End Date:	30 June 2012
Project Cost:	£15,136

Headline

Fungicide products containing prochloraz, tebuconazole or both active ingredients were the most effective in suppressing growth of the pathogen *in vitro*. Follow up work will be required to test for crop safety and, ideally to seek approval in HWT.

Background

Basal rot of *Narcissus* bulbs caused by the fungal plant pathogen *Fusarium oxysporum* f.sp. *narcissi* (FON) is the major problem for the UK industry. Currently, control is dependent on the use of Storite Clear Liquid or Tezate 220 SL (a.i. thiabendazole) and Bravo variants (a.i. chlorothalonil) available through Extensions of Authorisation for minor use in the UK (EAMUs). To avoid over-dependence on these products, the HDC Bulbs and Outdoor Flowers Panel commissioned a project to identify new fungicides with activity against FON.

Summary

Fusarium was isolated from *Narcissus* bulb samples showing typical basal rot symptoms which were obtained from different growers, locations and cultivars. A large collection of over 150 isolates was assembled and stored. The identity of thirty representative isolates was confirmed as FON through DNA sequencing and pathogenicity tests. FON isolates varied in morphology on agar and in aggressiveness on *Narcissus* bulbs.

Fourteen fungicides including Storite Clear Liquid and Bravo 500 were tested against eight of the most pathogenic FON isolates selected from different morphology groups. Storite suppressed growth of six of the eight FON isolates with a minimum inhibitory concentration for 95% growth reduction (MIC95) of 5 ppm a.i. The remaining two FON isolates had decreased sensitivity to thiabendazole with a MIC95 of 182 ppm a.i. Bravo was less effective with a MIC95 of >1000 ppm.

Agate (tebuconazole + prochloraz), Mirage (prochloraz) and Orius (tebuconazole) as well as the coded products HDCF46 and HDCF48 were extremely effective in suppressing the growth of FON, with MIC95 concentrations between <1 and 15 ppm a.i. They were therefore more effective than Bravo and equally or more effective than Storite. Products containing prochloraz and (or) tebuconazole should therefore be investigated further as a replacement or alternative to the currently recommended fungicides. Many conazoles are available as fungicides and their activity compared with tebuconazole could also be investigated. Future availability of the coded products for *Narcissus* will also be monitored.

Cuprokylt, based on copper oxychloride, was also effective against FON, albeit at a relatively high concentration. This identifies fungicides from four mode-of-action groups with potential for integrating in an improved basal rot management strategy.

Financial Benefits

The loss of control of basal rot would be devastating to UK daffodil bulb and cut-flower production, an industry with an estimated annual output value of around £45million. As no alternative to HWT with fungicide can be identified as a method of control in the short-term, and attempts to breed disease resistance into improved commercial daffodil cultivars have not progressed, the industry's reliance on just two active substances as fungicides is cause for concern. The identification of thiabendazole-tolerant strains of FON in this project reinforces this view, as does the finding that the activity of chlorothalonil may be less than formerly thought.

Another project (Hanks, 2011, BOF 61b) showed that optimising biocide and fungicide use in HWT could boost bulb output by 12%, together with a similar figure likely for cut-flower output. This would represent an increase in production worth in excess of £5million annually (or in excess of £1k/ha). The findings of the current project suggest that using alternative fungicides, which are considerably cheaper than thiabendazole-base products and more effective than chlorothalonil-based products, could be practical after further testing and subject to the necessary approvals.

Action Points

- Alternate the use of thiabendazole- and chlorothalonil-based fungicides to prevent further development of thiabendazole-tolerant FON isolates, either by alternating their use in successive HWT, or by using thiabendazole as an on-line bulb spray followed by chlorothalonil in the HWT tank.
- When using Storite or Tezate, ensure dip tank concentrations are maintained as close to the currently recommended concentration of 275 ppm a.i. (1.25L of product per 1000L of dip) as possible, for example with the aid of a sodium bisulphate acidifier.
- When using Bravo products, also ensure that the full rate of 1L product per 1000L of dip is used and maintained.
- Consider commissioning further research to develop the practical use of products containing prochloraz and (or) tebuconazole (or other conazoles) and of copper oxychloride for use in HWT, taking account of chemical stability and crop safety.