

# **Grower Summary**

---

## **TF 190**

An investigation of any correlation in the sensitivity of scab isolates to different fungicides

Final 2011

## **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.*

*No part of this publication may be reproduced in any material form (including by photocopy or storage in any medium by electronic means) or any copy or adaptation stored, published or distributed (by physical, electronic or other means) without the 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 HDC is clearly acknowledged as the source, or in accordance with the provisions of the Copyright, Designs and Patents Act 1988. All rights reserved.*

*AHDB (logo) is a registered trademark of the Agriculture and Horticulture Development Board. HDC is a registered trademark of the Agriculture and Horticulture Development Board, for use by its HDC division. All other trademarks, logos and brand names contained in this publication are the trademarks of their respective holders. No rights are granted without the prior written permission of the relevant owners.*

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](mailto: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:** TF 190

**Project Title:** An investigation of any correlation in the sensitivity of scab isolates to different fungicides

**Project Leader:** Prof Xiangming Xu

**Contractor:** East Malling Research

**Industry Representative:** Nigel Kitney

**Report:** Final report (including year 2)

**Publication Date:** 4 August 2011

**Previous report/(s):** Annual 2010

**Start Date:** 1 April 2009

**End Date:** 31 March 2011

**Project Cost:** £ 21,446

## Headline

- Mixed (or alternate) use of captan, dodine (Radspor) and pyrimethanil (Scala) with other scab fungicides can be generally recommended to maintain scab control and minimise the risk of resistance development.

## Background and expected deliverables

One consequence of overusing fungicides is the selection of fungal strains less sensitive (a more accurate term than more resistant) to the fungicide active ingredients used. Disease management strategies have been developed to reduce the risk of emergence and spread of these insensitive fungal strains. Overusing DMI fungicides has led to emergence of scab strains less sensitive to DMI fungicides in USA and Canada. In the long-term, this may lead to loss of disease control. There is some anecdotal evidence that isolates from DMI-sprayed orchards in the UK appear to have an overall reduction in sensitivity to myclobutanil (Systhane), which is commonly observed in other regions. However, failure to control scab control is often due to poor spray timing and not reduced sensitivity.

Some recent studies have shown that cross-resistance of the scab fungus to fungicides may or may not exist depending on the particular fungal populations concerned. If reduced sensitivity to one fungicide exists, then care is needed to select alternative product(s) without jeopardising disease control and resistance management. However, the necessary knowledge on cross-resistance required to make such rational selection decisions is not available yet.

Recent Canadian research suggests independent resistance mechanisms to myclobutanil and kresoxim-methyl (Stroby) but a positive correlation in resistance to myclobutanil and flusilazole. This result does not agree with results obtained in New York State. More recent research on other pathogens also suggests that the presence and the extent of cross-resistance depends on particular fungal populations and fungicides concerned. It is, therefore, necessary to carry out research for each particular fungal population to understand the potential of cross-resistance to particular fungicides. In any anti-resistance strategy, information on cross-resistance is critical for devising control strategies in cases where reduced sensitivities to one fungicide have been observed. There has been no published information for the baseline sensitivity and the current status of sensitivity to common scab fungicides in the UK scab population.

## **Expected deliverables and benefits**

This project will generate information on the baseline sensitivity of the UK apple scab population to important scab fungicides registered in the UK. This information is essential for future research and development on scab insensitivity to fungicides.

The project will generate information on scab (in)sensitivities to common scab fungicides, which can be used to re-assess the extent of the shift towards insensitivities against each fungicide. The information on the rate of insensitivity shift is critically important to reappraise the long-term future of each fungicide; this is particularly important because of potential reductions in the number of fungicides in the EU. Information on the presence or absence of cross-resistance among these fungicides could potentially allow growers to develop more sustainable anti-resistance strategies to control scab. For example, if possible, fungicides that exhibit no or low cross-resistance should be used on a given site. This project will generate the range of concentration of each fungicide deposited on leaf surfaces following an application. This information is essential for interpreting *in vitro* sensitivity results in terms of field control efficacy.

## **Summary of the project and main conclusions**

The responses of many isolates to nine active ingredients of eight scab fungicides registered in the UK have been quantified and the level of fungicide *residues* on leaves has also been estimated following a standard application of these fungicides.

In this study scab isolates with reduced sensitivity to captan did not show a related reduced sensitivity to other scab fungicides i.e. there was no correlation. Similarly, scab sensitivity to boscalid (a component of Bellis) and dodine (Radspor) were not statistically significantly correlated with reduced sensitivity to the other scab fungicides trialled.

However, the sensitivities of scab isolates to some of the other fungicides in the trial were statistically significantly correlated, meaning that scab isolates that showed reduced sensitivity to one also showed reduced sensitivity to another and vice versa as shown in Table 1.

Table 1. Statistically significant correlation (at the level of 5%) between the reduced sensitivity of scab to different fungicide actives

	Cyprodi nil	Dithiano n	Fenbuconazo le	Myclobuta nil	Pyraclostrob in	Pyrimetha nil
Cyprodinil (Switch)	X	X		X	X	X
Dithianon (component of Maccani)	X	X	X	X	X	
Fenbuconazo le (Indar)		X	X	X		
Myclobutanil (Systhane)	X	X	X	X	X	
Pyraclostrobin (component of Bellis and Maccani)	X	X		X	X	
Pyrimethanil (Scala)	X					X

X means that a significant correlation in scab sensitivity was found between the fungicide in the column and the fungicide in the row and so they should not be used sequentially in the spray programme.

The findings shown in Table 1 mean that care should be taken when using fungicides in the programme where significant correlation in scab sensitivity has been found. To minimise the risk the programme should include captan, dodine (Radspor) and pyrimethanil (Scala). Where the other fungicides are used they should be alternated with either captan, dodine (Radspor) or pyrimethanil (Scala) as appropriate.

Initial fungicide deposition concentration on leaves, following application at the full recommended rate at 200 L/ha, was higher than the concentration at which reduced sensitivity was reported. Heavy rainfall resulted in a significant loss of all fungicides, except dithianon on leaf surfaces.

For best effect the spray interval, and possibly the rate, needs to be adjusted according to the past/predicted rainfall and the rate of host growth.

## **Financial benefits**

Scab can cause serious losses, particularly in some seasons when weather conditions favour it and limit opportunities to spray. Damaged fruit is unmarketable and so effective control of the disease is vital. The findings of this project will encourage growers to use the most suitable spray programmes that give effective control and minimise the establishment and subsequent spread of scab strains that are insensitive to fungicides.

## **Action points for growers**

- Growers should think carefully the selection of fungicides in the spray programme to avoid frequent and repeated use of those fungicides to which reduced sensitivities of scab is known to be highly positively correlated.
- Growers need to adjust the spray interval (and possibly the rate) according to the past/predicted rainfall and the rate of leaf and fruit growth.