Grower Summary

TF 202

Monitoring scab population for fungicide insensitivities and races

Final 2014

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Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

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

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Contractor/(s):	East Malling Research
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Further information

If you would like a copy of this report, please email the HDC office (hdc@hdc.ahdb.org.uk), alternatively contact the HDC at the address below.

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GROWER SUMMARY

Headline

- It would be advisable not to continuously use myclobutanil or fenbuconazole and dithianon together over many seasons for scab control.

Background and expected deliverables

One consequence of overusing fungicides is the selection of fungal strains less sensitive to the fungicides. Disease management strategies have been developed in order to reduce the risk of emergence and spread of these insensitive fungal strains. Overusing demethylation inhibitor (DMI) fungicides has led to emergence of scab strains less sensitive to DMI fungicides in the 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 reduced sensitivity to myclobutanil (Systhane), which is commonly observed in other regions. However, failure in scab control is often due to poor spray timing.

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

Recent Canadian research points to 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 depend on the 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 to devising control strategies in cases where reduced sensitivities to one fungicide have been observed. There has been no published information on the baseline sensitivity and the current status of sensitivity to common scab fungicides in the UK scab population.

Recently, HDC funded East Malling Research (Project TF 190) to conduct a preliminary investigation on the cross-resistance of apple scab (with a limited number of isolates) to all scab fungicides registered in the UK. Most of the observed cross-resistance to fungicides is expected on the basis of the chemistry. However, the strong correlation in the sensitivity to dithianon (a multi-site action fungicide) with DMI fungicides (e.g. myclobutanil and fenbuconazole) was unexpected, and is also worrying since dithianon and DMI fungicides are often used in the same spray programmes.

Understanding scab population structure with particular reference to its virulence (race) is critically important for a breeding programme and effective deployment of current cultivars with different resistance genes. Recently, the nomenclature of scab races and the corresponding resistance genes has undergone extensive revisions, culminating in the proposition of a new nomenclature system in 2011. Consequently, a new set of indicator genotypes is proposed to differentiate scab races.

Scientists at EMR propose to establish a plot with all 16 proposed indicator genotypes for future monitoring of scab race structure, joining a world-wide monitoring programme. This monitoring will generate valuable information not only for growers in terms of cultivar deployment, but also for breeders in terms of breeding for resistance and for pathologists in terms of predicting the spread of new virulence.

- This project will generate information to confirm whether there is significant correlation in the scab response (sensitivity) to dithianon and myclobutanil.
- This correlation, if confirmed, will have a significant impact on our current scab control programmes.

Summary of the project and main conclusions

EMR has obtained grafting wood of all indicator genotypes for differentiating scab races from a Swiss researcher and successfully grafted them to rootstocks and maintained them as potted plants. These will be planted out in an orchard at East Malling Research in 2014.

Thirty single spore isolates were collected from several orchards where scab control was problematic in recent years, and initiated *in vitro* testing for their sensitivities to myclobutanil, fenbuconazole and dithianon. The following conclusions were drawn:

- Dithianon is more effective against apple scab as a protectant then as a curative fungicide.
- Using QoI (quinone outside inhibitors) fungicides alone to control scab is not advisable.
- There is a weak (though overall significant) correlation between the sensitivity to dithianon and DMIs (fenbuconazole and myclobutanil) in reducing germ tube elongation, suggesting that it might be better not to continuously use these three fungicides together over many seasons.

Financial benefits

New information on the sensitivity of scab isolates to different fungicides can inform growers and advisors in drawing up fungicide spray programmes. Improving spray programmes to maintain good control of apple scab will reduce the level of crop losses to this disease.

Action points for growers

- Use correct products as alternatives to control scab and minimise the establishment and subsequent spread of scab strains that are insensitive to fungicides.
- Maintain a good range of effective fungicides against scab to achieve effective control.
- Plant apple cultivars with an appropriate resistance background, selected partially on the basis of scab monitoring results on the indicator genotypes in the future.
- Dithianon is a good protectant fungicide against scab. It would be advisable not to continuously use myclobutanil or fenbuconazole and dithianon together over many seasons.