



Agriculture & Horticulture  
DEVELOPMENT BOARD



# Grower Summary

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## TF 195

Sensitivity of apple powdery  
mildew  
(*Podosphaera leucotricha*)  
populations to triazole, QoI and  
SDHI fungicides

Final report, 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.

**Project Number:** TF 195

**Project Title:** Sensitivity of apple powdery mildew  
(*Podosphaera leucotricha*) populations to triazole,  
QoI and SDHI fungicides

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**Contractor/(s):** East Malling Research

**Industry Representative:** Nigel Kitney

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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](mailto:hdc@hdc.ahdb.org.uk)), alternatively contact the HDC at the address below.

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## **GROWER SUMMARY**

### **Headline**

- There are some indications that there is more variability in the mildew response to Systhane (myclobutanil - triazole fungicide) among the orchards tested than to Luna (fluopyram – a succinate dehydrogenase inhibitor (SDHI) fungicide) and Vivid (pyraclostrobin - a quinone outside inhibitor (QoI) fungicide).

### **Background and expected deliverables**

Apple powdery mildew can reduce yield and fruit quality, with levels as low as 8% mildewed leaves reducing yield and quality on sensitive varieties such as Cox. On other varieties, high levels of powdery mildew have been recorded in many commercial orchards but the effect on yield and quality is not as well understood as on Cox.

All those growers and advisors consulted on powdery mildew agree that control is becoming increasingly difficult. On average, some badly affected farms in East Kent have orchards with 50-100% mildew-infected shoots. There are many possible reasons for the poor mildew control including: limited range of effective fungicides, reduced efficacy of triazole or QoI (strobilurin) fungicides due to changes in the sensitivity of the mildew population, change in shoot growth pattern due to climate change, poor spray cover or insufficient monitoring of mildew development.

Good control of powdery mildew during the growing season is the top priority. Triazoles are currently the most effective fungicides against apple powdery mildew and consequently are used intensively in apple orchards as there are few alternative products. This leads to repeated use of fungicides from the same chemical group resulting in a high risk of mildew isolates being selected with reduced sensitivity.

Alternative products for mildew control, including potassium bicarbonate, potassium phosphite, Milsana (knotweed extract) and a biocontrol agent *Ampelomyces quisqualis*, were evaluated as part of a Defra project (HH2502STF). Most had limited efficacy. The Defra funded Horticulture LINK project (HL01109) on chemical control in horticultural crops (SCEPTRE) started in 2011. One of its objectives is to find new fungicides and/or alternative products for controlling powdery mildew on apple. Information on whether triazole (myclobutanil, penconazole) or QoI (kresoxim-methyl, pyraclostrobin) fungicides are less effective due to reduced sensitivity of mildew populations in orchards is important for selecting appropriate fungicides to achieve good control and minimise the risk of insensitivity development. SDHI fungicides have a different mode of action to triazoles and QoI

fungicides. New fungicides likely to be approved for use in apples in the future are SDHI fungicides and therefore it is relevant to include this group in this study.

Any new information from this project on the sensitivity of apple powdery mildew to triazole and QoI fungicides and its possible contribution to the current poor mildew control will benefit the industry in the following aspects:

- (1) The information generated will complement that generated in the Defra Horticulture LINK project (CP 77, SCEPTRE) in which new fungicides and/or alternative products for controlling powdery mildew will be investigated.
- (2) It should provide the industry with a clearer understanding on fungicide control of apple powdery mildew.
- (3) It will enable growers to select appropriate products in order to improve control as well as to reduce the risk of development of fungal resistance/insensitivity to fungicides.

## Summary of the project and main conclusions

Potted MM106 rootstocks and Malus cv. Bittenfelder seedlings were raised in a mildew-free glasshouse. They were then treated with a range of doses of the test fungicides – Systhane (myclobutanil), Tucana (pyraclostrobin) and Luna Privilege (fluopyram). They were then placed in apple orchards at East Malling Research and various parts of Kent where control of powdery mildew was known to be a problem. Untreated controls were also included. The apple rootstocks / seedlings were exposed to mildew for 48 hours and then collected and returned to the glasshouse to allow any mildew infection to develop. After one week the plants were assessed for mildew. A total of 60 such exposure studies (Plants [rootstock or seedlings] x time x orchards) have been conducted in three years. For some unknown reasons, only 16 out of these 60 exposure studies resulted in sufficient numbers of lesions for statistical analysis. Therefore further studies are necessary to validate conclusions from this project.

The following conclusions have been drawn from the data recorded:

- (1) Of the three fungicides, the differences in the dose-response of mildew among sites tested were greatest for Systhane, confirming anecdotal evidence.
- (2) Furthermore, the largest within-site variability in the dose-response of mildew at a given site was also greatest for Systhane.
- (3) These *limited* data suggest possible existence of reduced sensitivities to Systhane and to a lesser extent to Luna and Vivid. There are several orchards that can be used for further studies to confirm this preliminary conclusion.

## **Financial benefits**

Growers can benefit from the project results through selecting the correct fungicide products in spray programmes to control mildew and minimise the establishment and subsequent spread of mildew strains that are insensitive to fungicides.

## **Action points for growers**

- Maintain the use of a good range of fungicides against powdery mildew to achieve effective control.