



## Late blight resistance management strategies: are we ready for the future?

Faye Ritchie, ADAS

Rebecca Joynt, ADAS

Ruairidh Bain, SRUC

Alison Lees, David Cooke, James Lynott, JHI



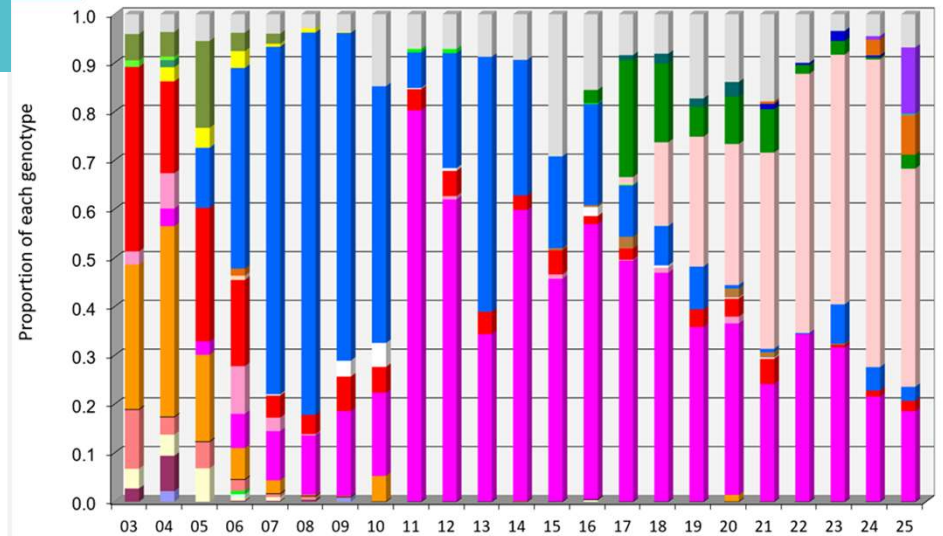
# Are we ready for the future? More to do.

Implementing resistance management strategies is becoming more challenging.

Novel strains with fungicide resistance established in populations.

What do we need to understand further to maintain effective control?

Create a new industry collaboration/initiative:  
Sustainable and effective late blight resistance management strategies.

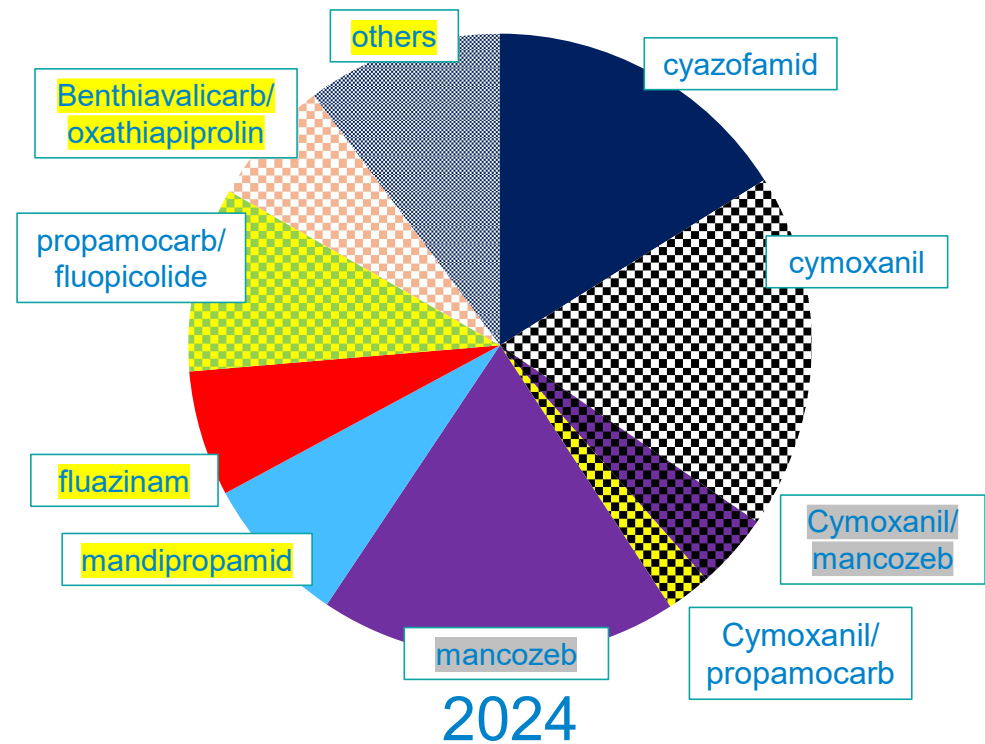
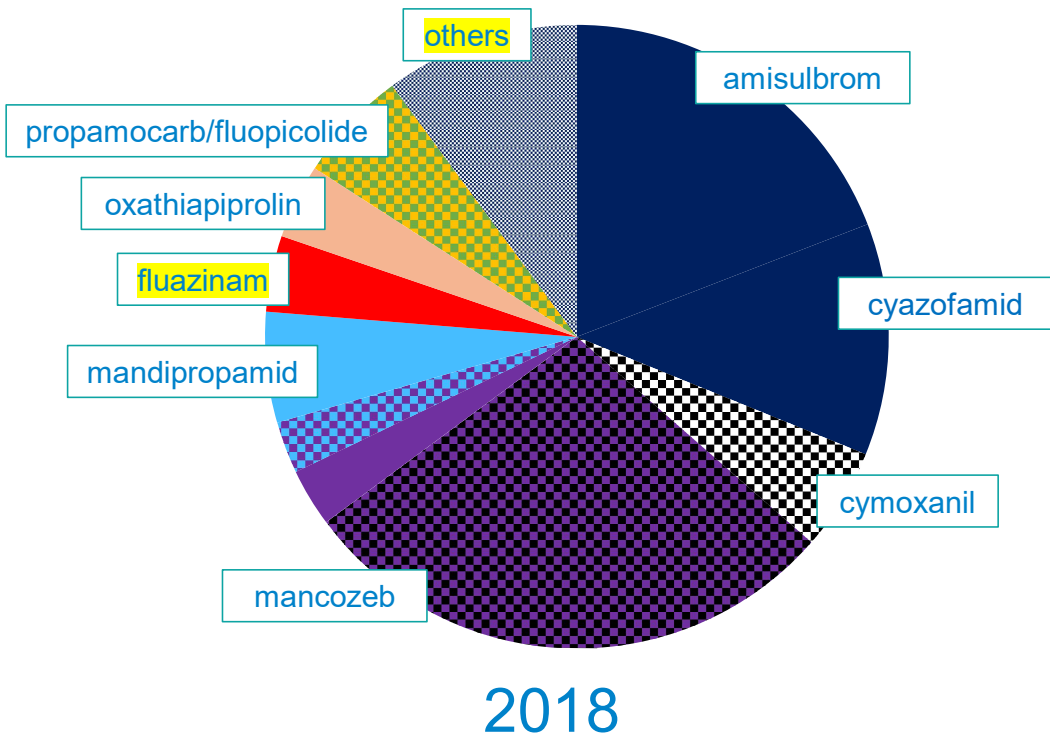


## Clone

Other EU46 EU43 EU41 EU37 EU36 EU13 EU8 EU6

Fight Against Blight: James Hutton Institute + industry

# We have 10 modes of action available in the UK



Data from the DEFRA Pesticide Usage Surveys

2024: other fungicides include ametoctradin, ametoctradin/dimethomorph, amisulbrom, amisulbrom/mandipropamid, amisulbrom/oxathiapiprolin, azoxystrobin/fluazinam, bentiavalicarb, cymoxanil/mandipropamid, cymoxanil/zoxamide, difenoconazole/mandipropamid, dimethomorph, dimethomorph/propamocarb hydrochloride, dimethomorph/zoxamide, fluazinam/valifenalate and unspecified fungicides

## Experimental evidence: Tactics to decrease selection for fungicide resistant strains


	Increase selection	No effect	Decrease selection
Increase dose	16	1	2
Increase spray number	6	0	0
Add mixture partner	1	6	46
Alternate (replace sprays)	1	2	9
Adjust timing	3	1	2

van den Bosch et al. 2014 Governing principles can guide resistance management tactics

*Annual Review Phytopathology*

\*analysis included *P. infestans*, *P. viticola*, *P. cubensis* and *P. aphanidermatum* (oomycetes)



 Curtin University

**GRDC**  
Grains  
Research &  
Development  
Corporation

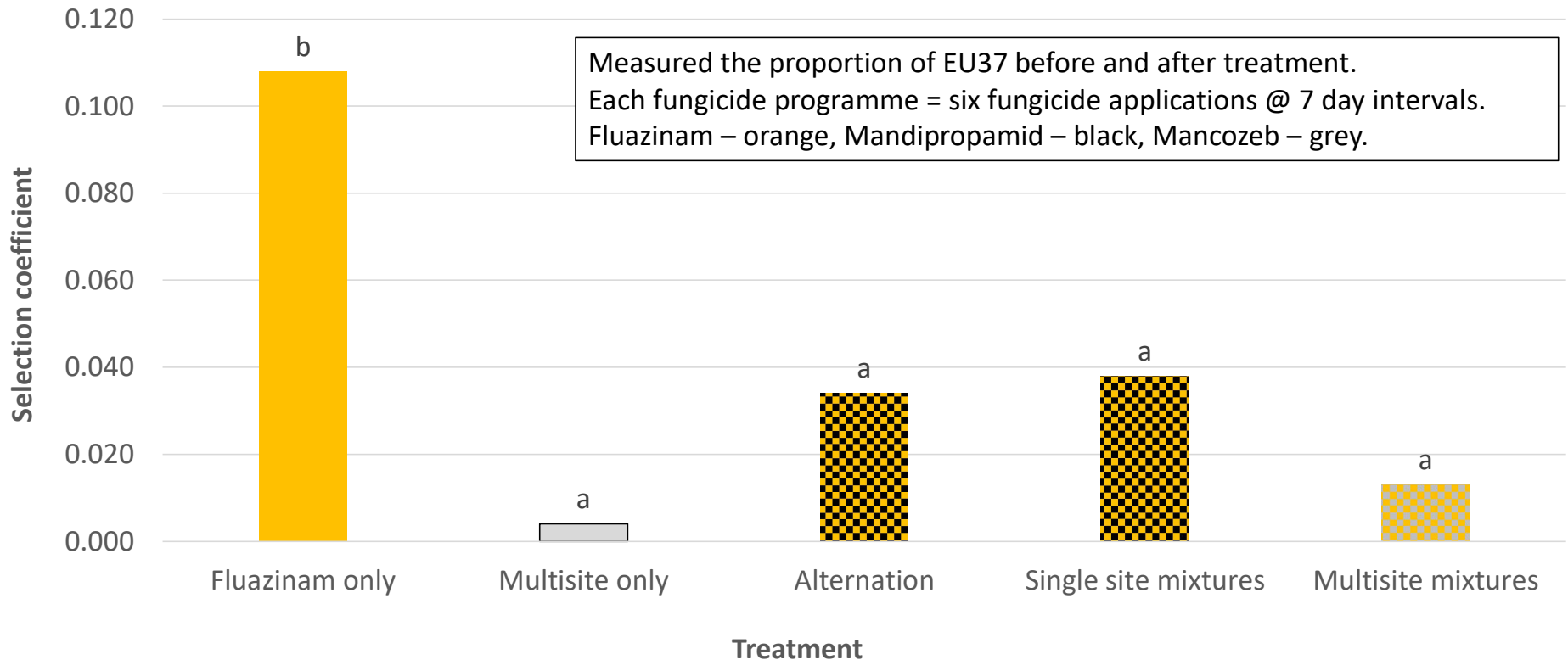
  
**HSE**

  
**defra**  
Department for Environment  
Food and Rural Affairs

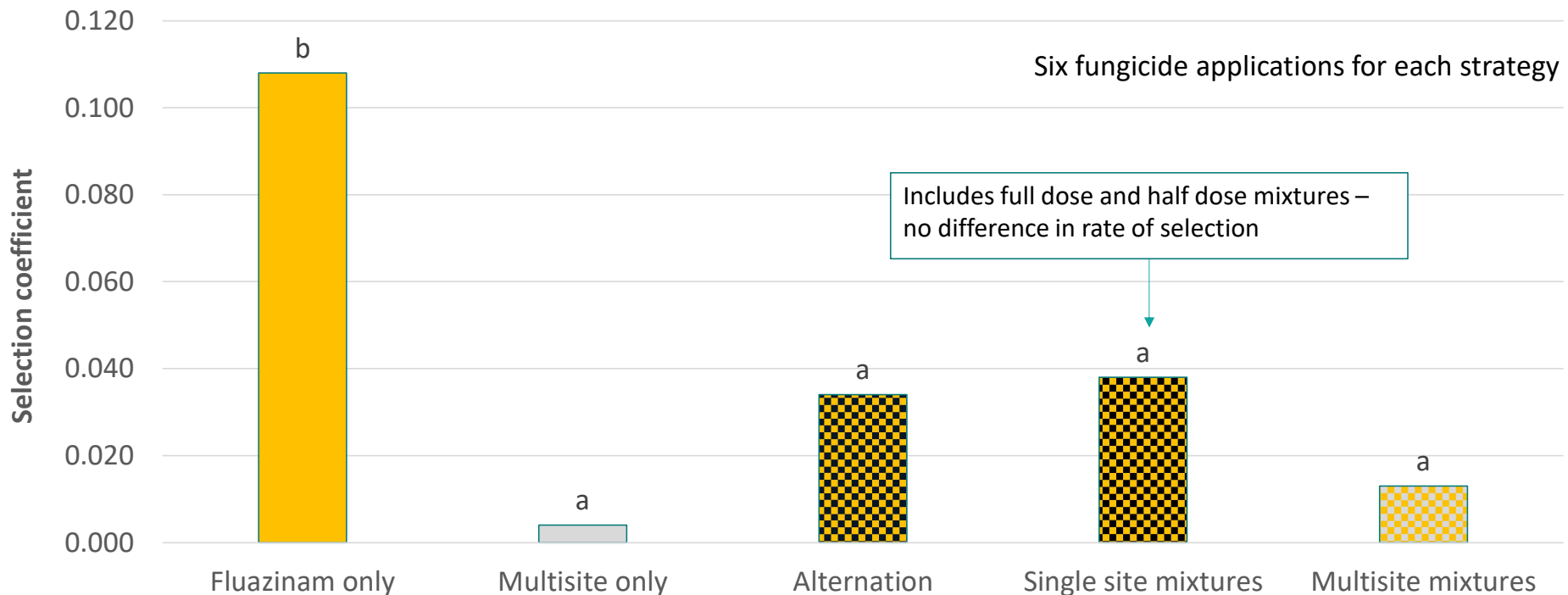
  
**BBSRC**  
bioscience for the future

  
**ADAS**

# Experimental evidence: recommended resistance management strategies are effective



# Experimental evidence: recommended resistance management strategies are effective

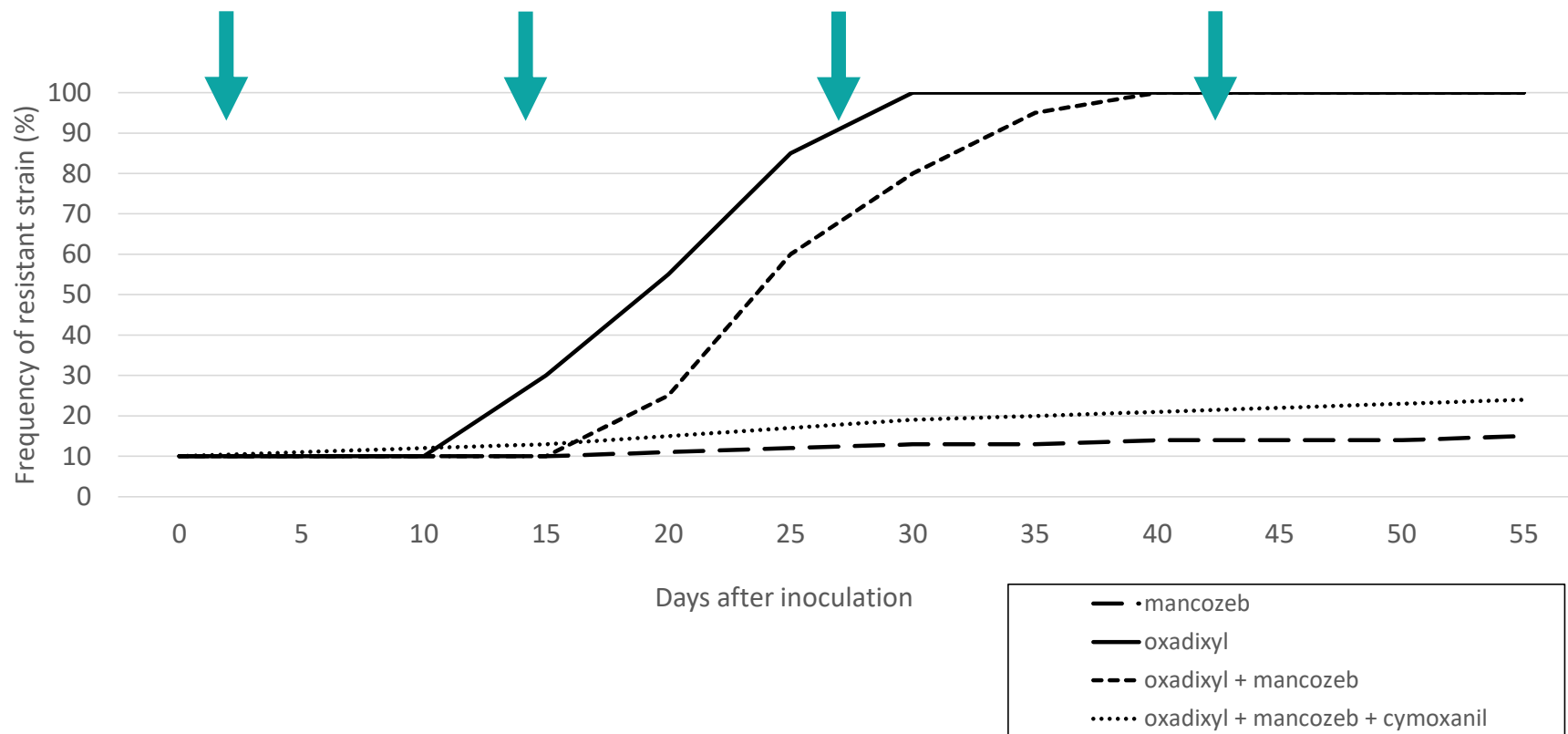


Six fungicide applications for each strategy

Includes full dose and half dose mixtures – no difference in rate of selection

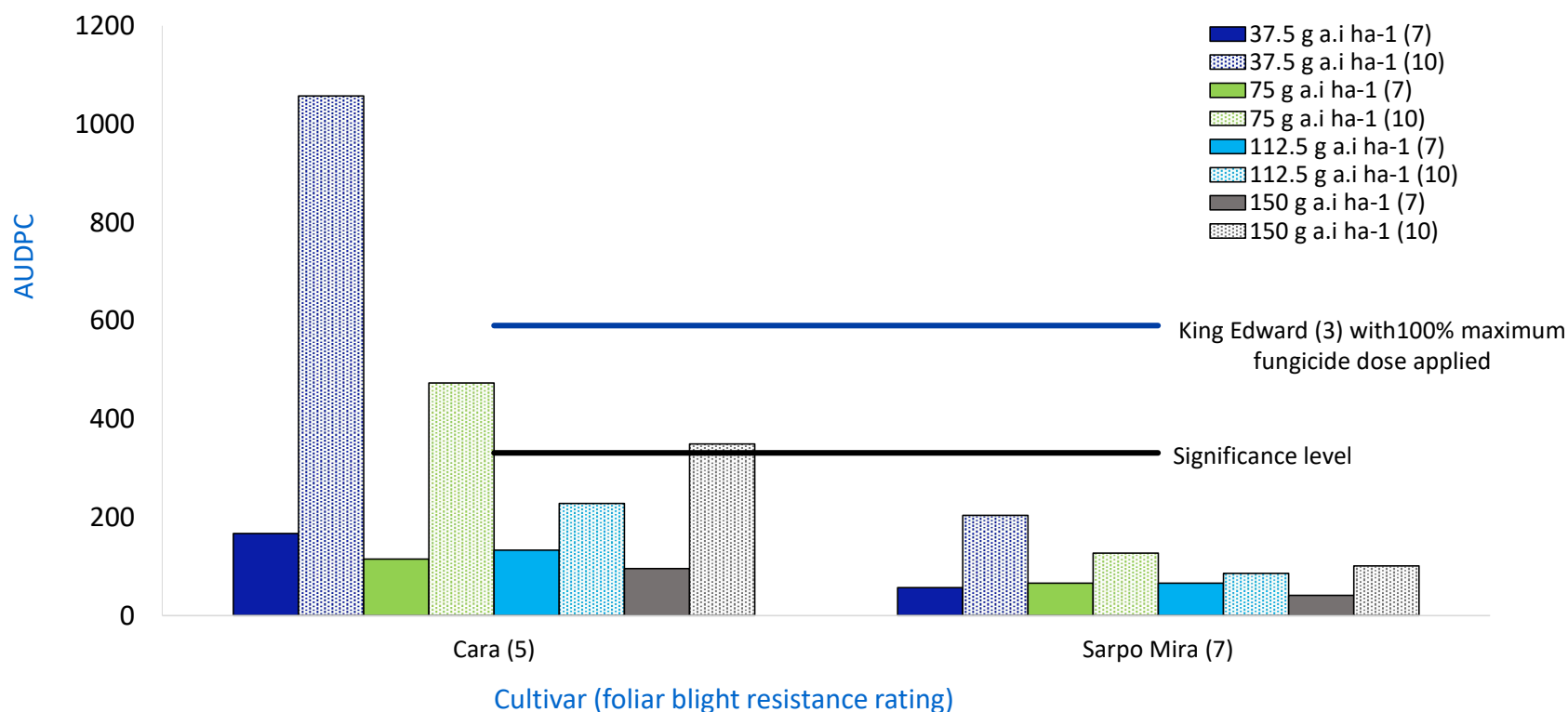


# Should we adapt our fungicide programmes to support resistance management?



Cohen and Samoucha, 1990

# Integrated control works during both rapid and stable canopy growth



Project: 2009 to 2012



# Can cultivar resistance support fungicide resistance management strategies?

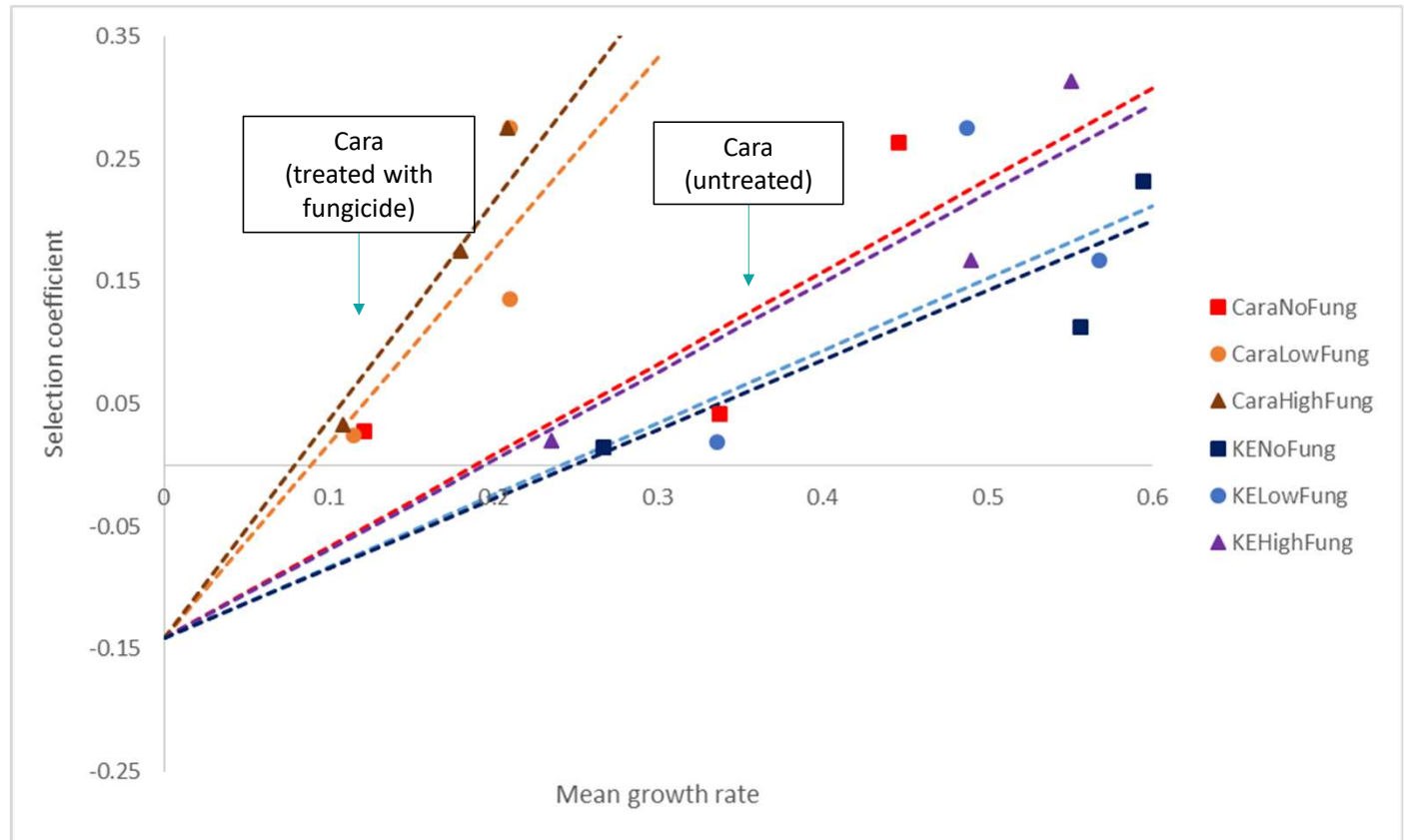
Does cultivar resistance influence fungicide resistance management strategies?

Does dose affect the selection for fungicide insensitive strains?

Experiments were designed to select for EU13 using phenylamide chemistry.

Trials run from 2014 to 2016

Selection was higher relative to the mean epidemic growth rate when fungicides were applied to Cara, compared to the untreated control.



## Are we ready for the future? More to do.

Both alternation and mixtures are the foundation for effective resistance management strategies.

We need up to date information on cultivar resistance and to understand fitness/aggressiveness/general characteristics of strains.

**UK industry initiative:** Sustainable and effective late blight resistance management strategies:

Modelling and field trial approaches to fine tune resistance management strategies.

1. What is the minimum number of modes of action (MoA) required to maintain effective resistance management?
2. What is the likely long-term effectiveness of resistance management strategies, when resistance to one or more MoA is present in the population?
3. Can cultivar resistance support resistance management strategies?