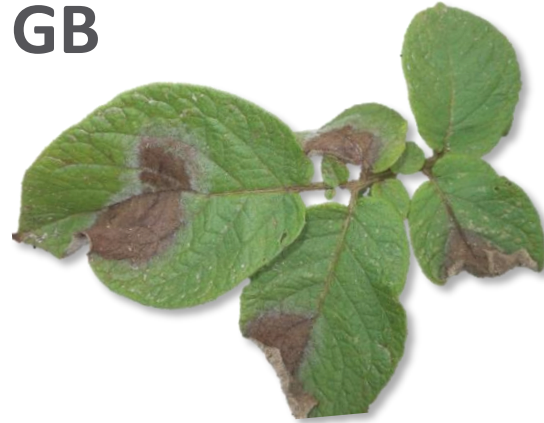




# Characterising *Phytophthora infestans* genotypes dominant in GB

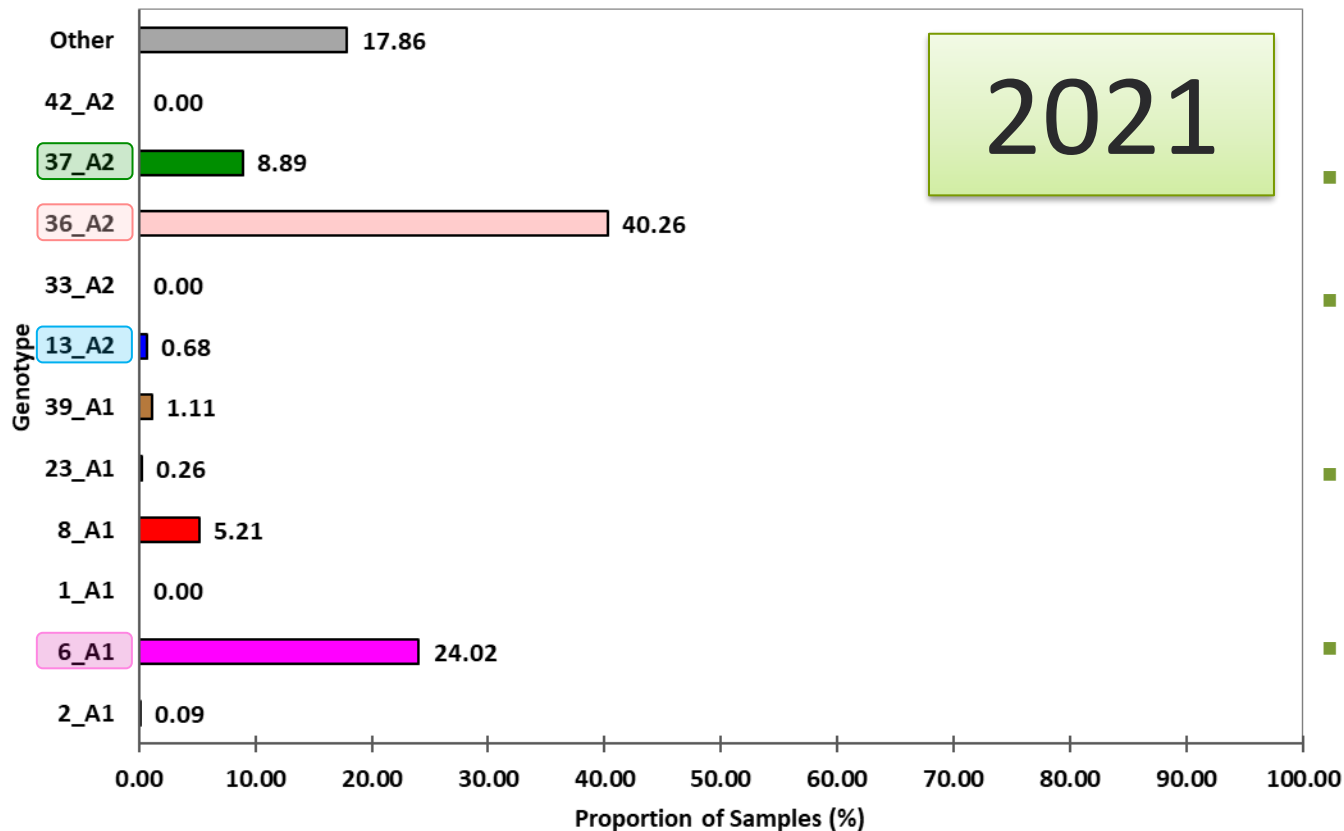


James Lynott, Alison Lees, David Cooke, Louise Sullivan



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# Changes in GB *P. infestans* population



- Key Points
- Changes in dominant genotypes
- Detection of 36\_A2 and 37\_A2 in 2016, 2017
- 41\_A2 found in Scotland in 2021



# Phenotypic studies – Virulence profiles



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- Ability to overcome known R-genes varies between genotype
- Some differences are easily seen in varieties (R2 in M. Peer and P. Dell)
- Many other R-genes used in breeding for host resistance

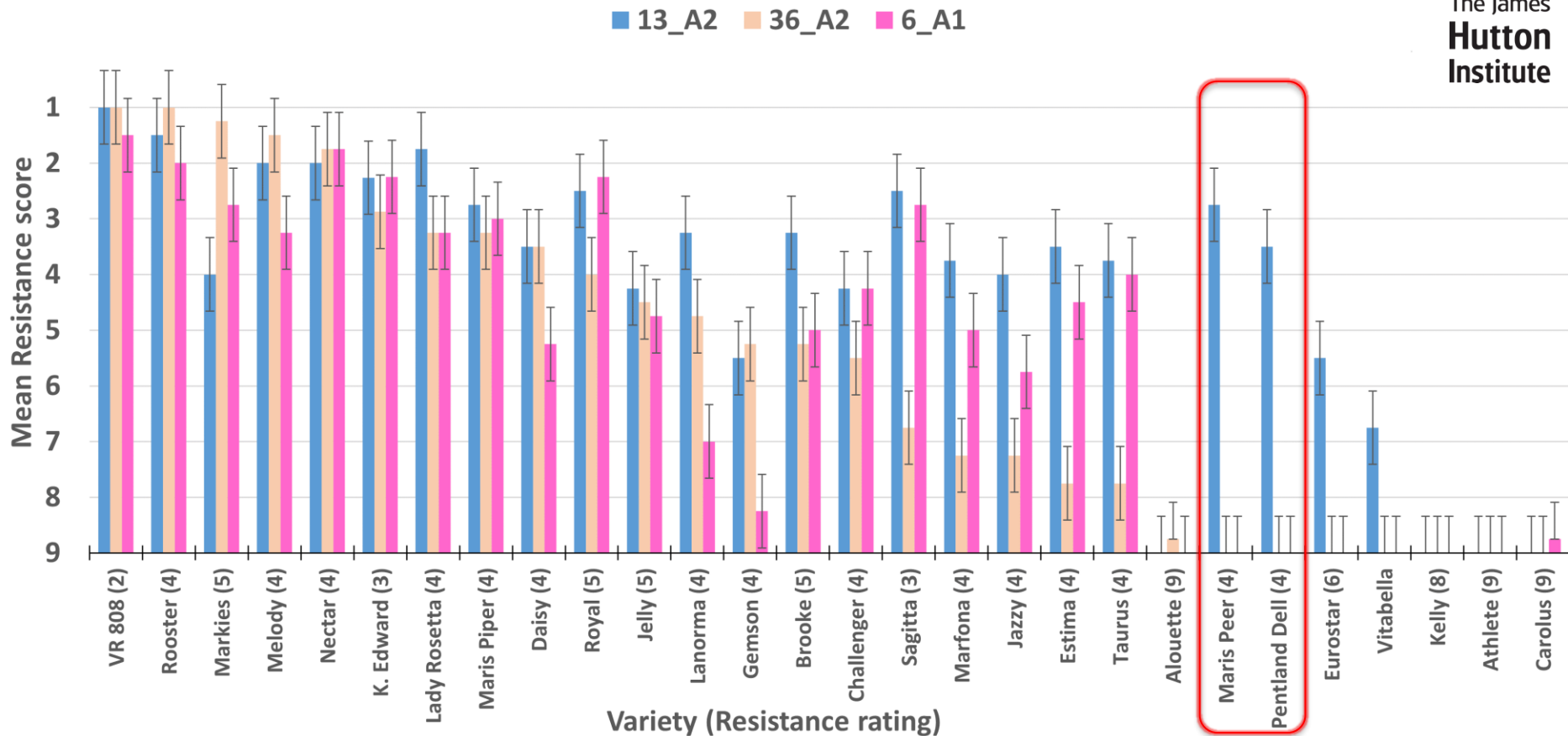
Genotype	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11
Common Profile	Orange	White	Orange	Orange	White	White	Orange	White	White	Orange	Orange
6_A1	Pink	White	Pink	Pink	White	White	Pink	White	White	Pink	Pink
37_A2	Green	White	Green	Green	White	White	Green	White	White	Green	Green
13_A2	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	White	Blue	Blue
36_A2	Light Pink	White	Light Pink	Light Pink	Light Pink	Light Pink	Light Pink	Light Pink	White	Light Pink	Light Pink

# Phenotypic studies – Host resistance

- SSCR funded project in 2020
- Assess host resistance using the dominant and emerging genotypes present in the GB *P. infestans* population (13\_A2, 6\_A1, 36\_A2)
- Important to know varietal resistance to contemporary pathogen population



# Phenotypic studies – Host resistance



# Phenotypic studies – Fungicide sensitivity



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- Due to the changing nature of the *Phytophthora infestans* population, fungicide resistance problems have occurred in the past
- Given the recent emergence of new genotypes of *P. infestans*, AHDB commissioned work (2019-2021) to monitor the efficacy of fungicides belonging to a range of FRAC groups in controlling common genotypes over time

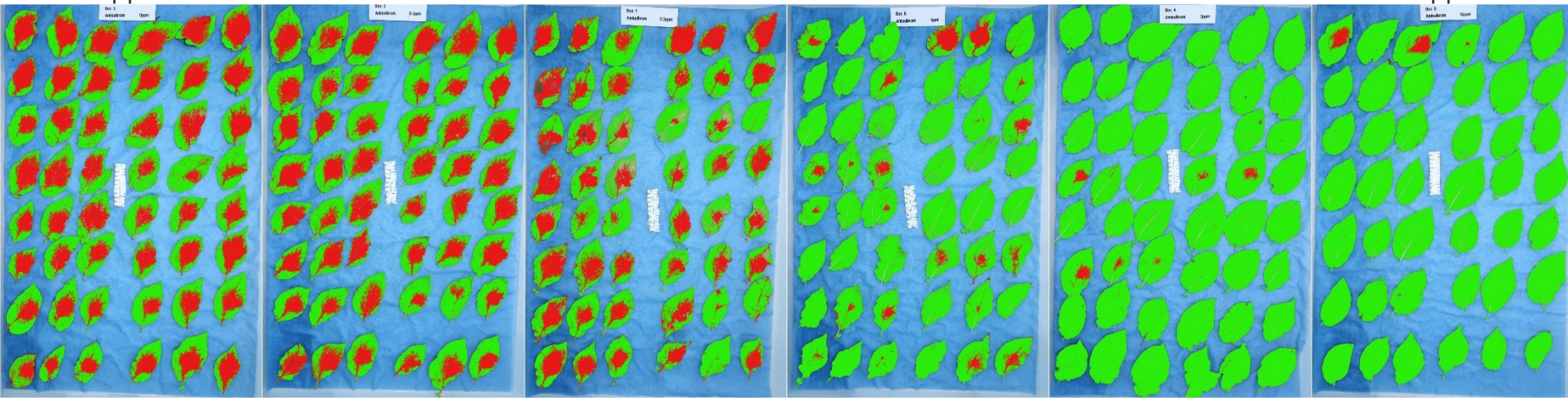
Fungicide Group (FRAC Code)	Active Ingredient	Product	Max dose (l/Ha)	Volume (l/Ha)	Max Tank Mix (ppm)
Qil (21)	Cyazofamid 160g/l	Ranman	0.5	200-400	400
Qil (21)	Amisulbrom 200g/l	Shinkon	0.5	200-500	500
CAA (40)	Mandipropamid 250g/l	Revus	0.6	>200	750
Carbamates (28)	Propamocarb 722g/l (625g/l as Infinito)	Promess	1.6	200-400	5000
Benzamides (43)	Fluopicolide 5mg/ml (62.5g/l as Infinito)	Pure active (Sigma Aldrich)	1.6	200-400	500
OSBPI (49)	Oxathiapiprolin 100g/l	Zorvec	0.15	200	75
Dithiocarbamates (M03)	Mancozeb 750g/Kg	Penncozeb	1.7(kg/Ha)	200	6375

# Phenotypic studies – Fungicide sensitivity

- Detached leaf tests = 7 fungicide actives at 6 concentrations, 5 contemporary isolates of each genotype, 6 leaves inoculated for each isolates/concentration
- Fungicide dose response curves were produced from lesion area data collected, this allowed EC50 values to be calculated for each genotype
- EC50 is the concentration of the fungicide that reduces growth by 50% relative to a non-fungicide treated control

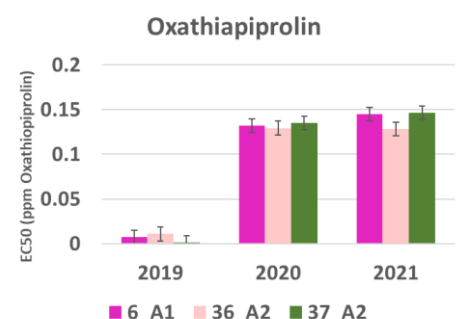
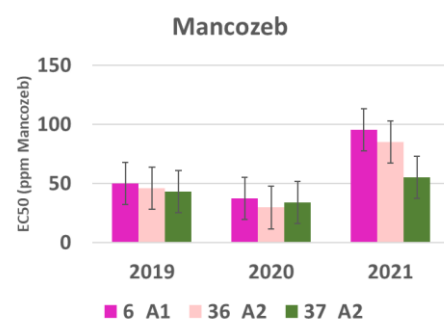
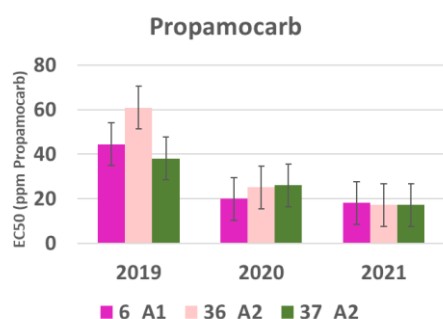
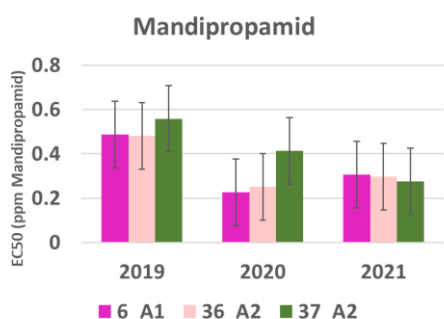
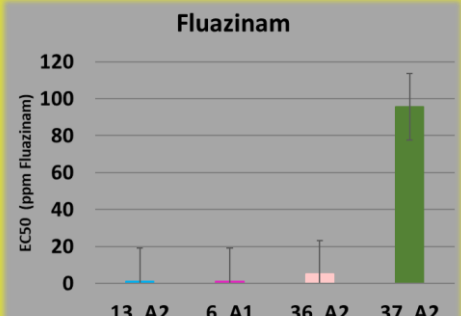
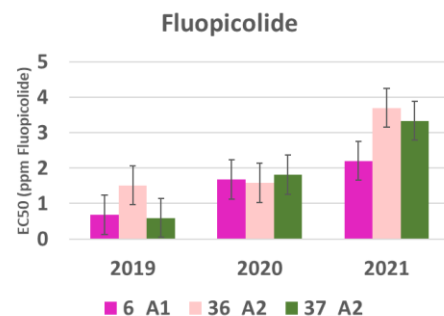
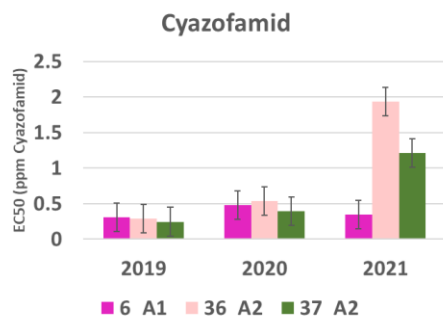
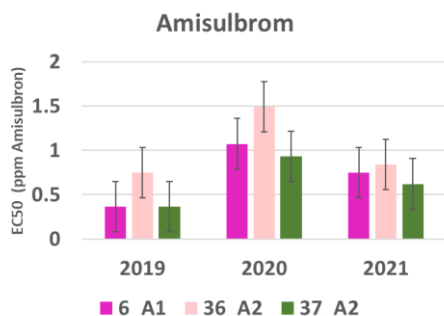
0ppm

10ppm



# Phenotypic studies – Fungicide sensitivity

- No evidence to suggest that genotypes 37\_A2, 36\_A2, 6\_A1 displayed insensitivity to any of the actives tested in detached leaf tests, or the need for changes to recommended practices



# Phenotypic studies – Aggressiveness



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- Aggressiveness of 6\_A1, 36\_A2, and 37\_A2 tested by inoculating leaves of Cara (7), Maris Piper (4), King Edward (3), Lady Balfour (4), and Estima (4)
- Data collected on set parameters

Measurement	Description
IP – Incubation Period	Time from inoculation to symptoms visible.
LP – Latent Period	Time from inoculation to sporulation.
IF – Infection Frequency	Proportion of inoculations that result in infection.
LA – Lesion Area	Measured at a set period post-inoculation when the largest lesions are almost covering the leaves.

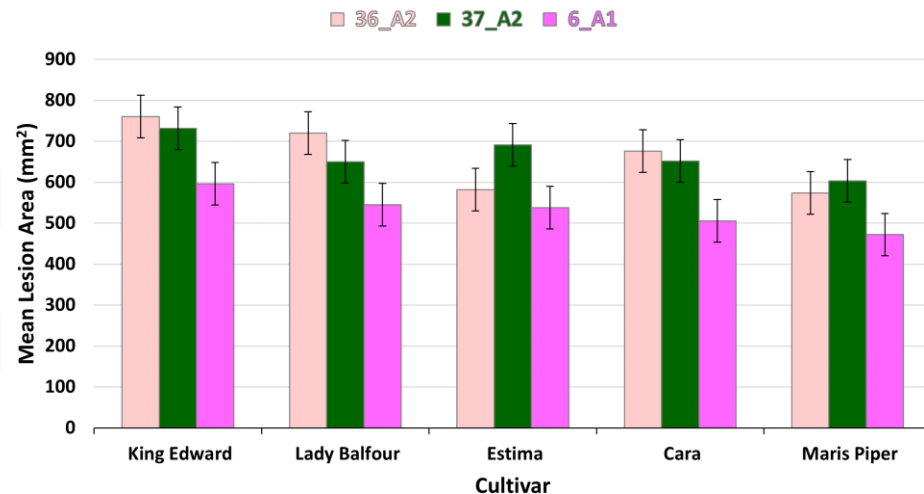
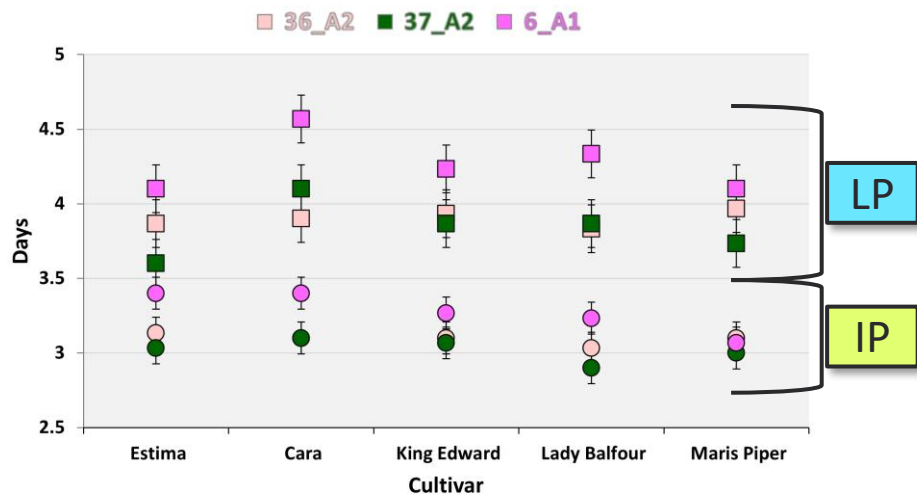


# Phenotypic studies – Aggressiveness



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- Genotypes 36\_A2 and 37\_A2:
  - Shorter Incubation Period **IP**
  - Shorter Latent Period **LP**
  - Consistently larger lesion size
- Indication that 36\_A2 and 37\_A2 can develop larger, sporulating lesions more quickly than 6\_A1 (n.s.)



# Summary & Conclusions



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- Major shifts in proportions of genotypes identified in GB population 2003-2021.

2\_A1



13\_A2



6\_A1



37\_A2



36\_A2

- No evidence to suggest that 36\_A2 can overcome host resistance in the 15 most widely grown commercial varieties that was not already overcome by genotypes 13\_A2 and 6\_A1
- No evidence to suggest insensitivity to any of the fungicide actives tested, or the need for changes to recommended practices



# Conclusions

- Genotype 36\_A2 can overcome known R-genes that are less commonly overcome by 37\_A2 and 6\_A1.
- 36\_A2 and 37\_A2 developed larger sporulating lesions more quickly than 6\_A1
- This evidence suggests that the characteristics of genotype 36\_A2 may provide a slight advantage over other local genotypes.
- Fungicide sensitivity and host resistance data inform effective disease management



# Acknowledgements

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