



Pre-breeding for commercial development of sustainable traits – quantitative resistance against *Pyrenopeziza brassicae*

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BBSRC-FoF project objectives

1. Compare novel resistances against *P. brassicae* (*Pb*) using a high-throughput screen
2. Evaluate novel resistance obtained through modification of a susceptibility gene against the light leaf spot (LLS) pathogen *Pb*
3. User engagement and business development plan



No sporulation

< 10%

10-25%

LLS phenotyping

25-50%

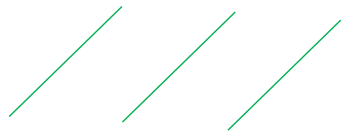
50-75%

57-100%

- ✓ As part of BBSRC ERA-CAPS project, 195 accessions assessed for LLS susceptibility
- ✓ Area of asexual sporulation (acervuli) assessed
- ✓ Adjusted means of the population response nearly normal
- ✓ Associative transcriptomics pipeline

Glasshouse LLS scores

- Aurelia (hybrid) and Barbados (recommended for North) have an RL-score of 8.
- Nikita and Ambassador (high yielder) have an RL-score of 7.
- Three of these performed well under glasshouse conditions.



Glasshouse *Pb* spore counts

- Spores were washed off leaf surfaces and counted.
- Good correlation between disease scores and spore counts
- Ambassador was the only RL-cultivar that produces lots of spores in the glasshouse.

Field trial site in Thriplow

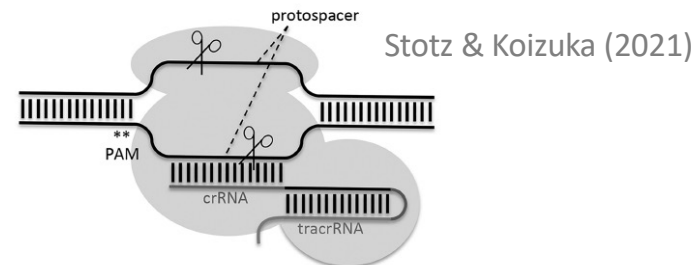


POSH	RV31	Zenith
Nikita	Sansibar	Yudal
Moana	SWU Chiinese 1	Temple
Lipid	Tapidor	Tapidor
Leopard	Temple	SWU Chiinese 1
Laser	Yudal	Sansibar
Imola	Zenith	RV31
Dwarf Essex	Ambassador	POSH
Cubs Root	Aurelia	Nikita
Campus	Barbados	Moana
Cabriolet	Cabriolet	Lipid
Barbados	Campus	Leopard
Aurelia	Cubs Root	Laser
Ambassador	Dwarf Essex	Imola



Analysis of a putative susceptibility gene

- One of eight genes: Expression positively correlated with disease score
- HxxxD acyl transferase
- Nine TILLING lines (Cabriolet), one with a mutation in HxxxD motif
- CRISPR/Cas9 in RV31 background



Summary & discussion

1. Benchmarking of resistant and susceptible pre-breeding lines with elite cultivars
2. Evaluate novel resistance obtained through TILLING and CRISPR modification of a susceptibility gene against *Pb*
3. User engagement and business development plan (Diego Durantini)

Acknowledgements

UH colleagues

- Heather Fell
- Laura Gimenez-Molina
- Ajisa Ali
- Rehmat Kang

KWS

- Jessica Blagbrough
- Paul Vincent
- Frank Breuer
- Susann Volkmann

John Innes Centre

- Catherine Chinoy
- Rachel Wells
- Saleha Bakht (TILLING)
- Penny Hundleby (CRISPR)
- Mark Smedley (CRISPER)
- Diego Durantini
- Chris Ridout

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