University of Hertfordshire

Update of research on brassica pathogens

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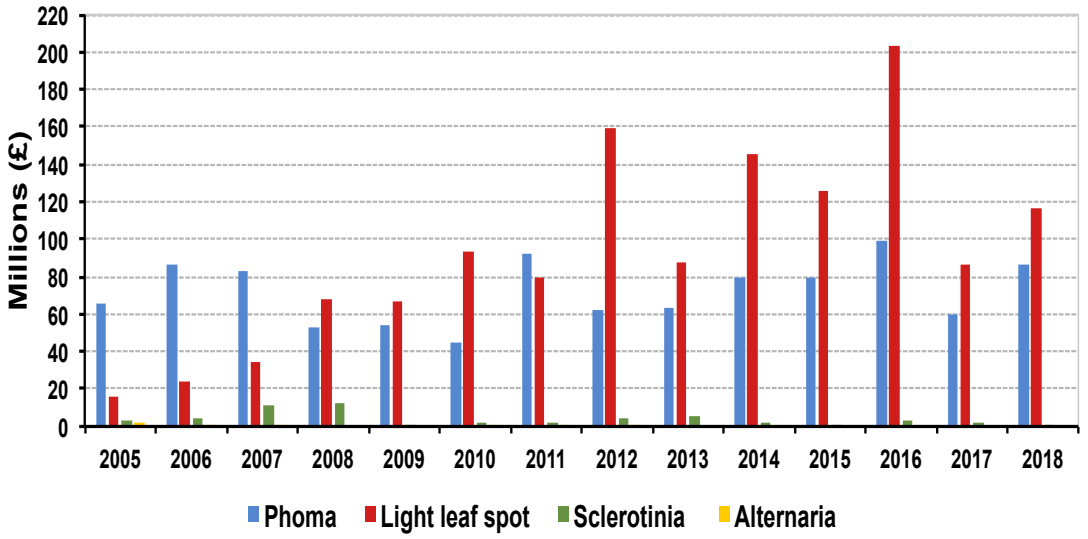
Cooperative Projects

1. BBSRC Newton-Bhabha project lead by University of York on *Brassica juncea* pathogens *Sclerotinia sclerotiorum* and *Alternaria brassicae*
2. Royal Society International Exchanges with Japan on resistance genes against *Fusarium oxysporum* f. sp. *conglutinans* that affect *Leptosphaeria maculans*
3. BBSRC/ERA-CAPS MAQBAT project with JIC on quantitative resistance against *Pyrenopeziza brassicae* in *B. napus*



PORI project

Alternaria

Sclerotinia

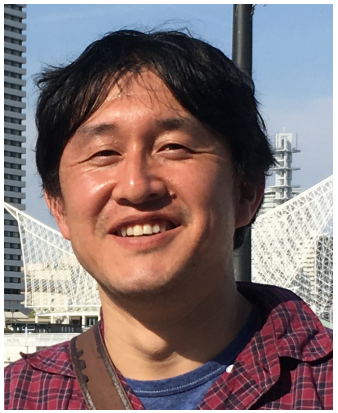
Understanding the genetic and molecular basis of black spot and stem rot tolerance

- ✓ *A. brassicae* genome being sequenced at RRes
- ✓ Inoculations of *B. juncea* accessions Sej-2 and Pusa Jaikisan with an *A. brassicae* and two *S. sclerotiorum* (different oxalic acid levels) isolates
- ✓ *A. brassicae* foliar infections sampled after 1, 2 and 4 days
- ✓ *S. sclerotiorum* stem infections sampled after 12 h, 1 and 2 days.
- ➢ RNA extractions being optimised at UoH (115 samples)
- ➢ RNAseq analysis (69 samples)

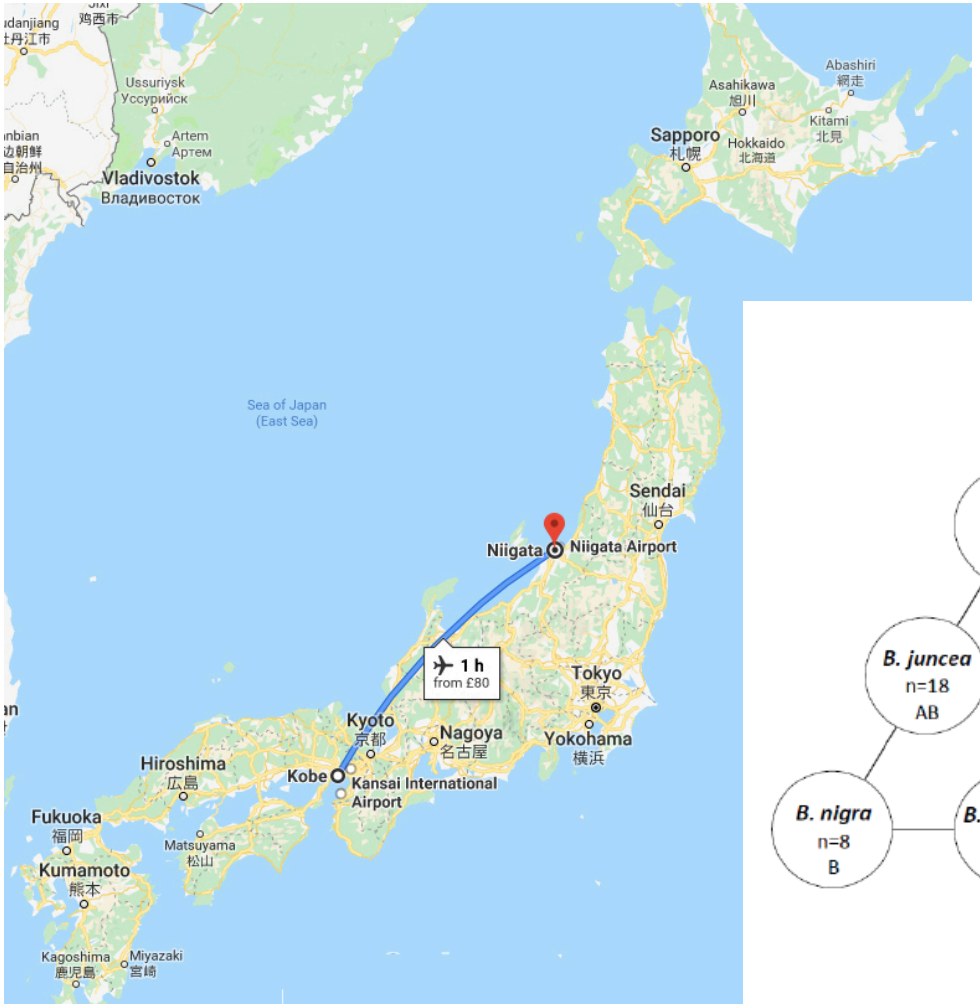
THE ROYAL SOCIETY

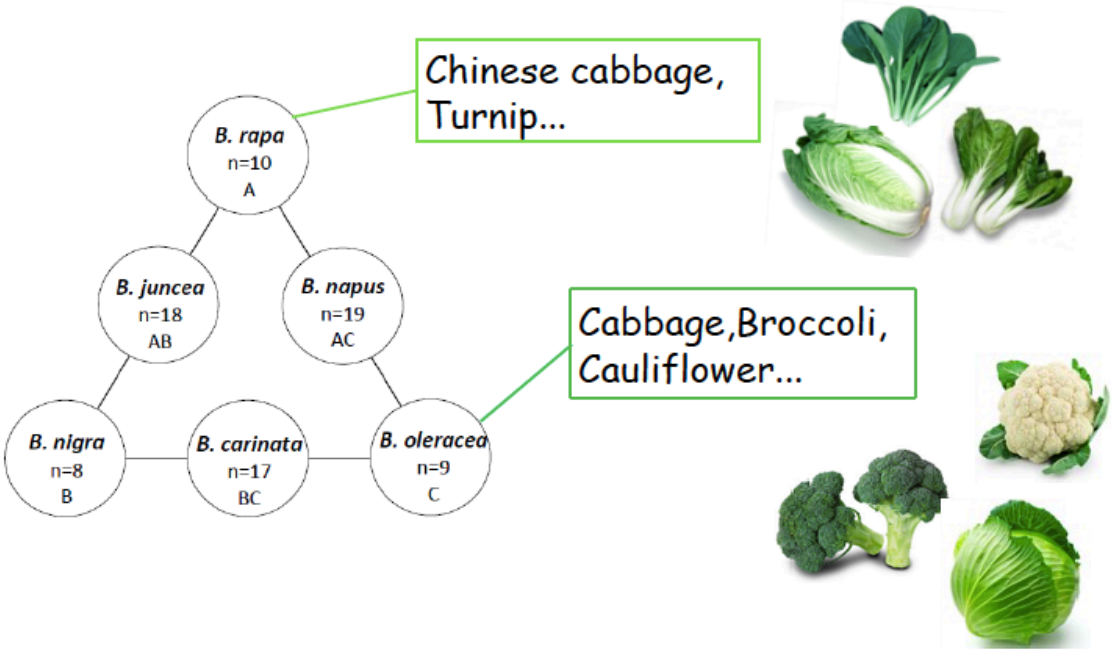
Brassica genetics

Ryo Fujimoto (Kobe)

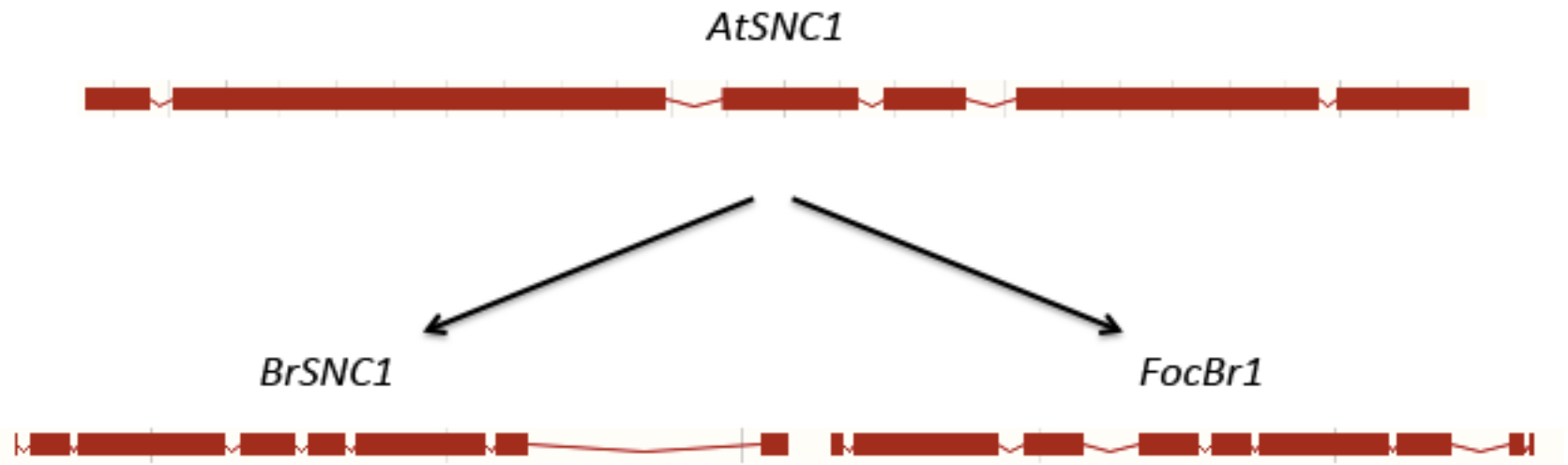


Keiichi Okazaki (Niigata)





Duplicated genes in the brassicas corresponding to *AtSNC1*



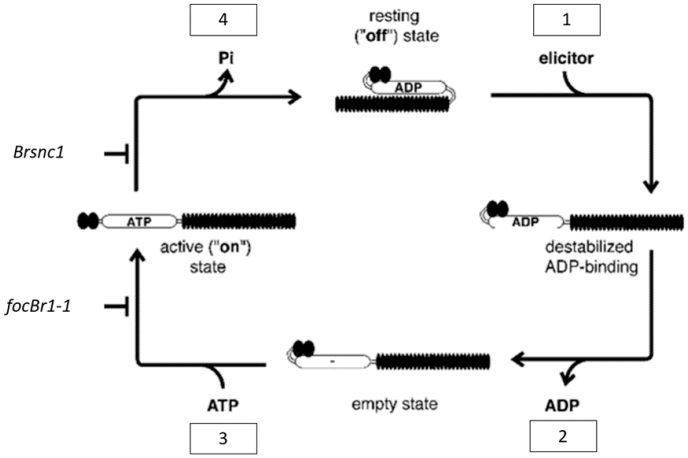
Hypotheses:

- *FocBr1* confers resistance to *Fusarium oxysporum* f. sp. *conglutinans*.
- *BrSNC1*, a central regulator of temperature-dependent defence responses

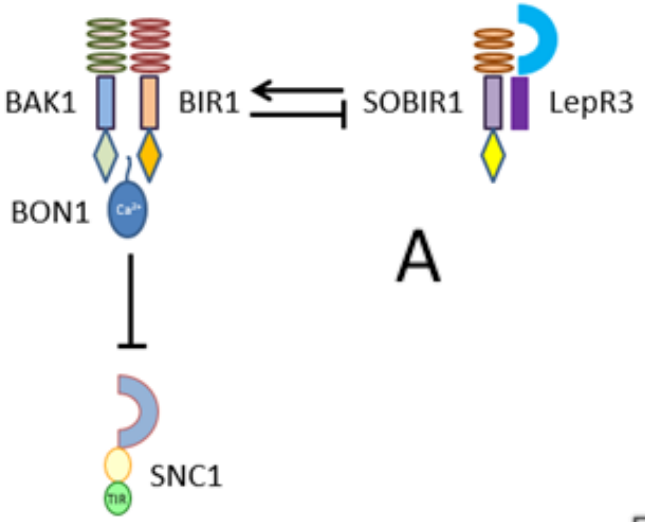
Analysis of *B. rapa* TILLING mutants

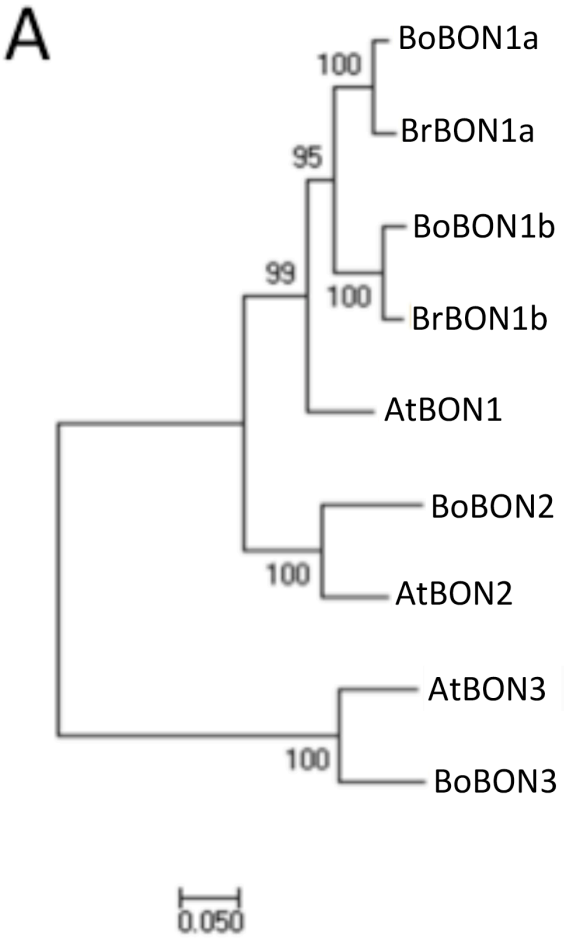
Katherine Noel

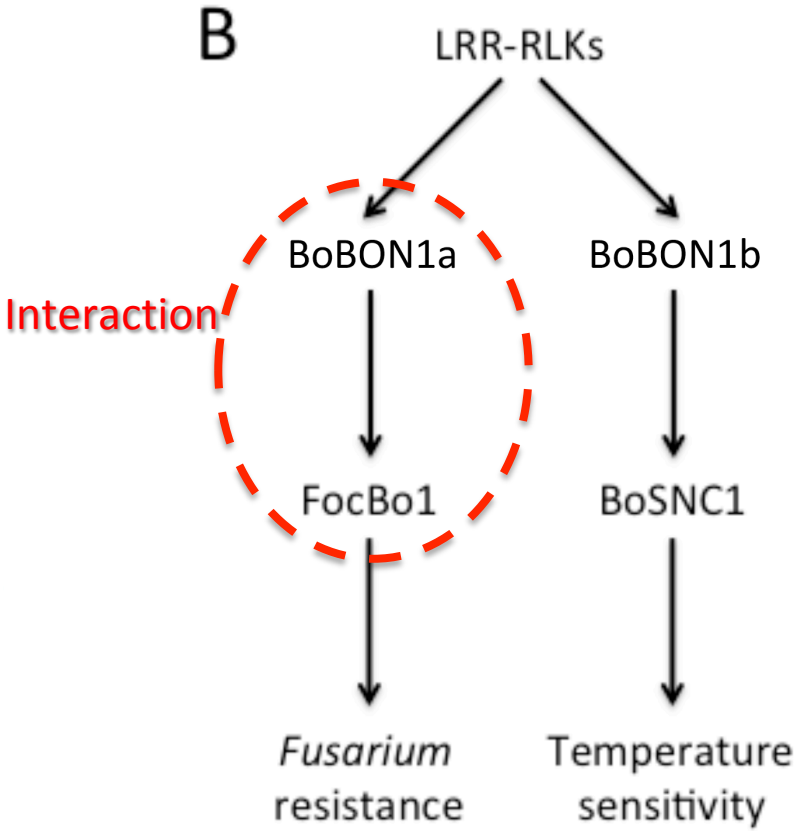
Mutations in the P-loop (G -> R) of these TIR-NB-LRR genes alter resistance and temperature-sensitivity of resistance against *L. maculans*.



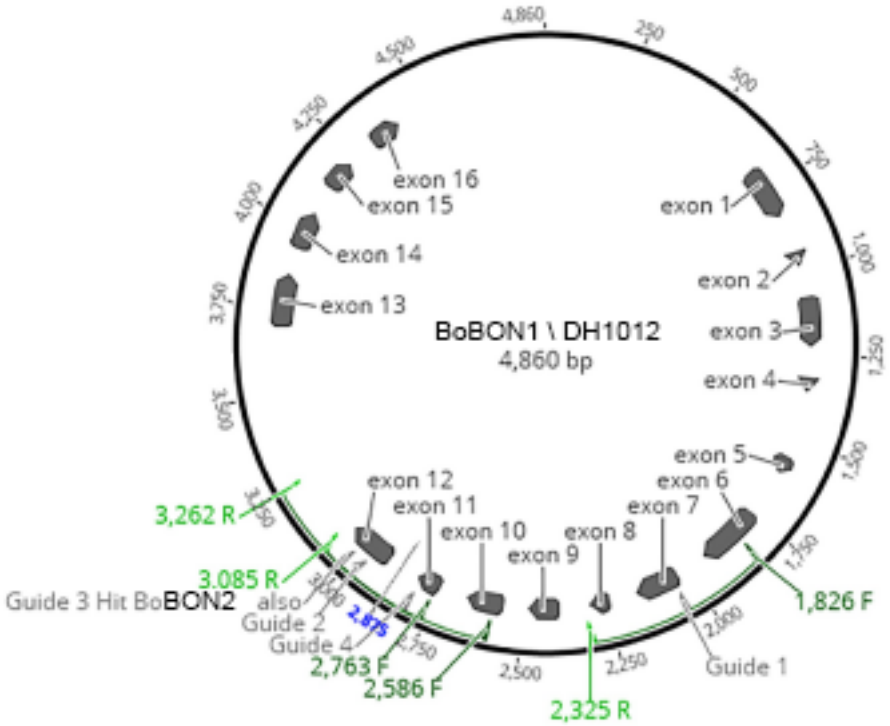
Two *BON1* homologs in brassicas



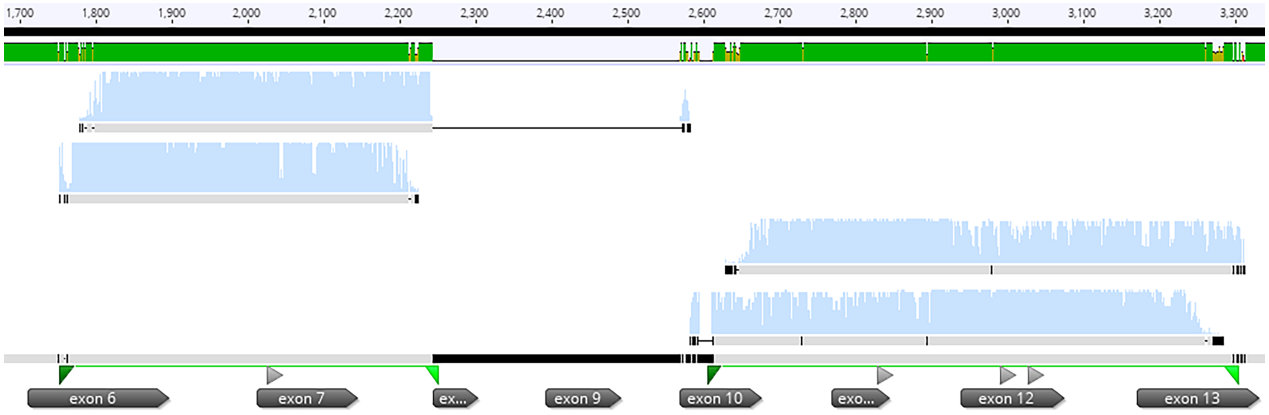




CRISPR/Cas9 for *BONZAI* mutants



- BRACT2463: 28 plants (17 independent transgenics)
- BRACT2464: 37 plants (all independent transgenics)
- 7/54 transgenics with dwarf phenotype; 5 currently grown to generate T_2 seeds



Partial resistance against *Pyrenopeziza brassicae* in oilseed rape

- ✧ Glasshouse trial of 195 accessions
- ✧ Ten trials with 24 entries each (with 4 repeated controls)
- ✧ Each entry with 5 replicates as a randomised α-design
- ✧ Total of 1190 assessments

- ➢ Linear mixed-effects model
- ➢ Adjusted mean scores
- ➢ Histogram with 10 bins
- ➢ Slightly skewed distribution

Mapping of partial resistance against *P. brassicae*

- ✓ Associative transcriptomics (MAQB**AT**)
- ✓ Eight GEMs and GWAS peaks on eight chromosomes

- ➢ Relevance of glasshouse trials to field performance?
- ➢ Connection to OREGIN projects (Scottish field trials)?

Acknowledgements

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University of York

Prof Ian Bancroft

John Innes Centre

Dr Rachel Wells
Dr Chris Ridout

Niigata University, Japan

Prof Keiichi Okazaki