Exploring Canola TILLING populations and RNAi as potential new sources for disease control options

Jonathan Anderson
6th February 2019

CSIRO AGRICULTURE AND FOOD
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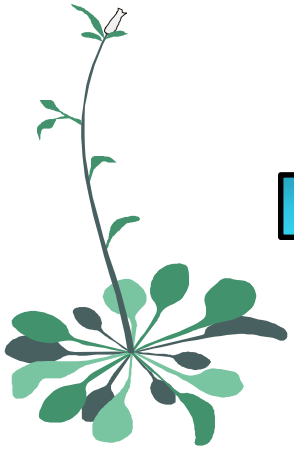
Genetic knowledge from Arabidopsis can deliver new traits to the Canola industry



Arabidopsis thaliana

Oil yield

Oil quality

Adaptation to environment

Disease resistance

Architecture

Establishment

Weed control

Gene mutations

- CRISPR/Cas9
- TILLING

A Canola TILLING population to deliver traits in Australian germplasm

Australian cultivar
"Zircon" (NuSeed)

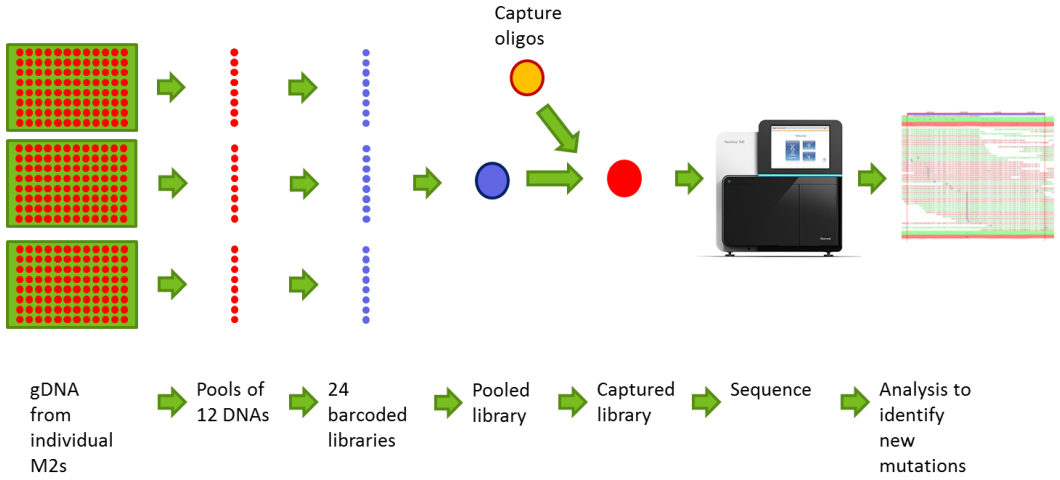
Mutagenesis

3000 EMS M1 (0.4-0.8%)

Single M2 seed

TILLING population
DNA + Seed library

Bulk M3 seed –
forward screens

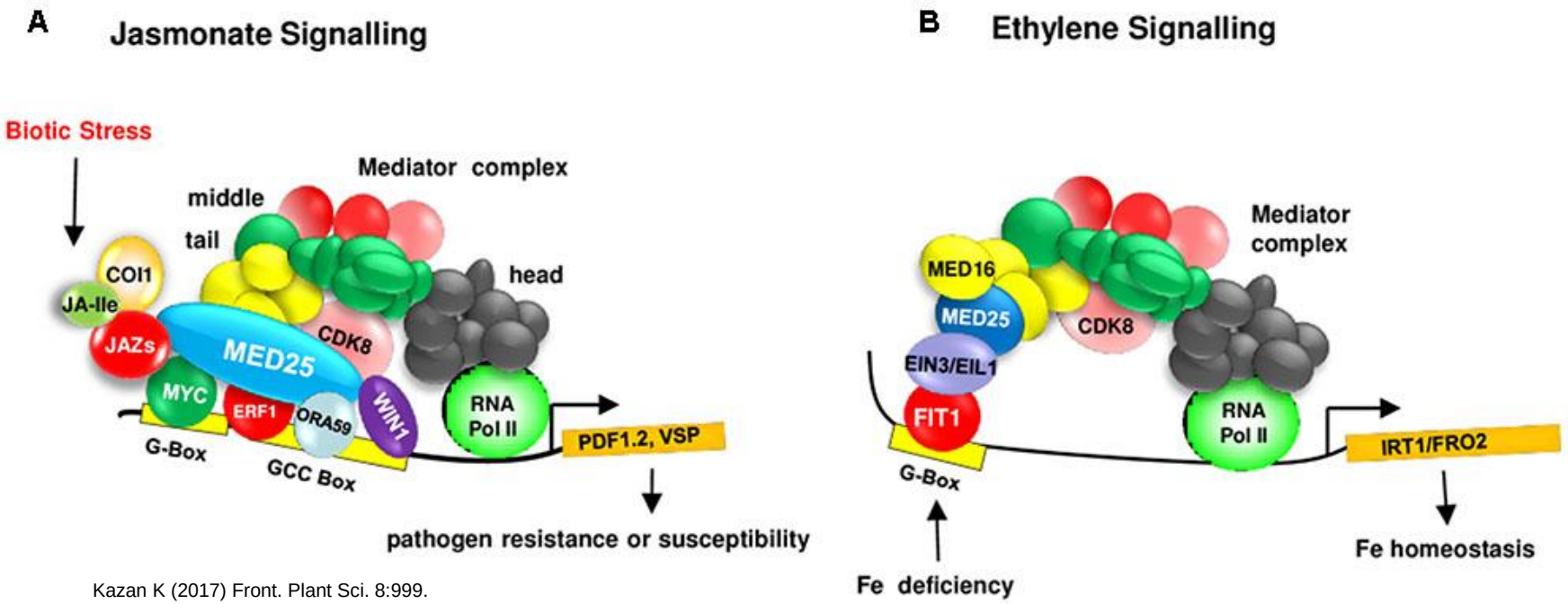


TILLING population

CRISPR gene edits

Introgression into elite varieties

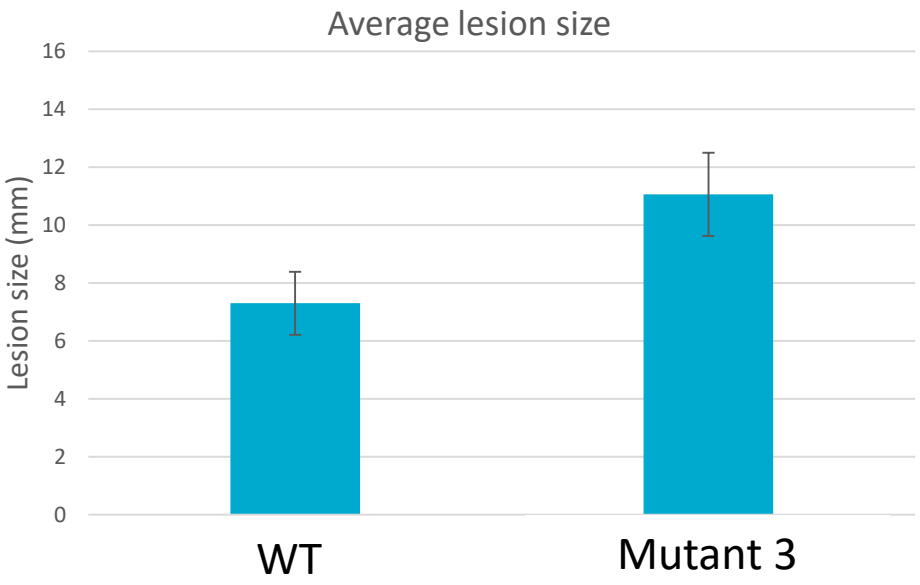
Regulators of defence/immunity in Arabidopsis



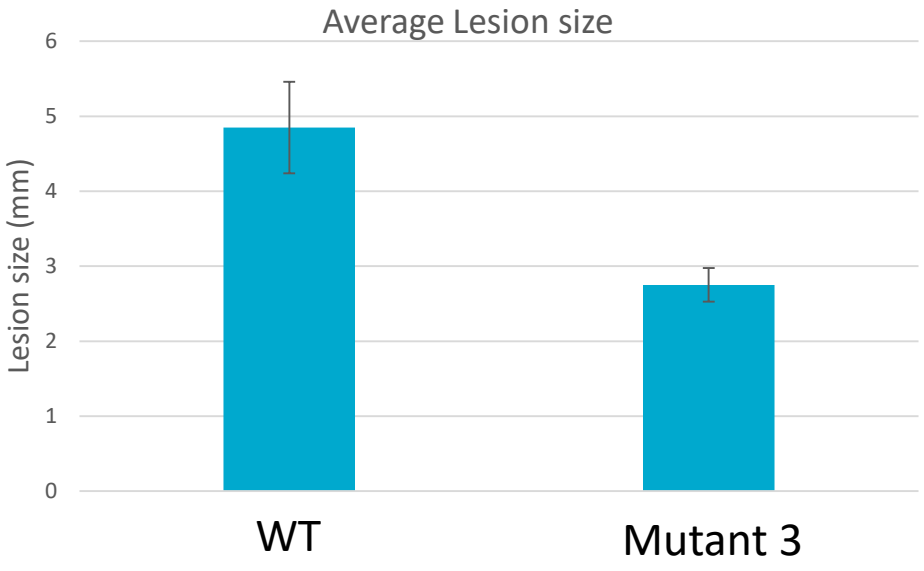
Kazan K (2017) Front. Plant Sci. 8:999.

Testing a TILLING mutant for altered disease susceptibility

Sclerotinia



L. biglabosa



Does the contrasting response relate to the latent phase of infection in L. b. versus the aggressive necrotrophy of sclerotinia?

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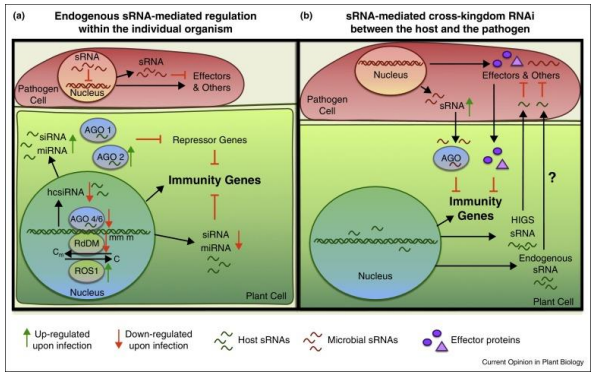
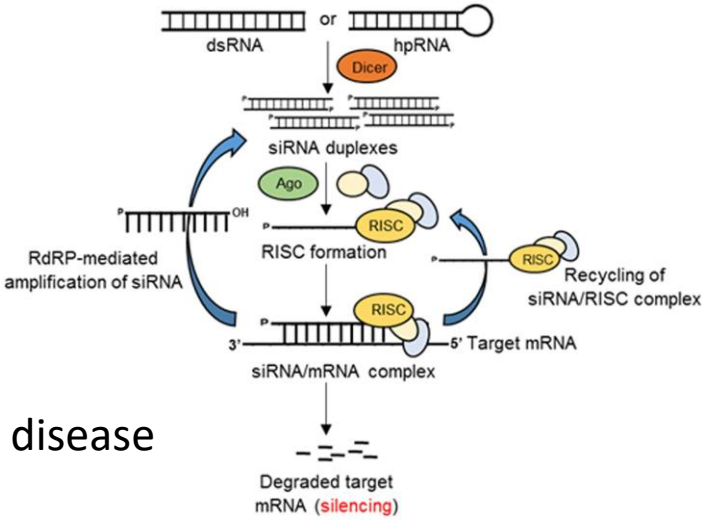
Small RNAs in plant-pathogen interactions

Small RNA molecules (20 to 24 nt) have been shown to be involved in several plant-pathogen interactions

- RNAs can be pathogen effectors conditioning the plant to susceptibility
- RNAs can control the plant immune responses



Double stranded (ds)RNAs can induce silencing of genes by co-opting virus defence systems



Can RNAi alter plant or pathogen gene expression and reduce disease severity?

Thank you

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