Understanding the genetic and molecular basis of tolerance to sclerotinia stem rot (SSR) and alternaria black spot (ABS) in Brassica juncea

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Summary:

An international consortium of partners from the UK and India has been assembled for a BBSRC/Newton-Bhabha-funded project entitled "Genomics-led improvement of biotic and abiotic stress tolerance in mustard rape for economic and environmental sustainability" led by Prof. Ian Bancroft, University of York. As part of this project, we will study sclerotinia stem rot (SSR), caused by the phytopathogenic fungus Sclerotinia sclerotiorum, a major disease of Brassica species. The alternaria black spot (ABS) pathogen Alternaria brassicae also causes serious crop losses. A. brassicae can interfere with seedling establishment and decrease yield of Brassica juncea (Indian mustard) cultivars. These two major diseases have prompted our search for sources of genetic resistance against both pathogens. Diverse B. juncea cultivars and pathogen isolates will be used to identify differences in host-pathogen interactions. RNA sequencing of SSR-tolerant and SSR-susceptible B. juncea cultivars will be used to find genes potentially involved in tolerance to stem rot. In parallel, the A. brassicae genome will be sequenced, combined with gene expression analysis of putative pathogenicity genes.

Key words: Brassica juncea, stem rot, black spot, genes for tolerance.

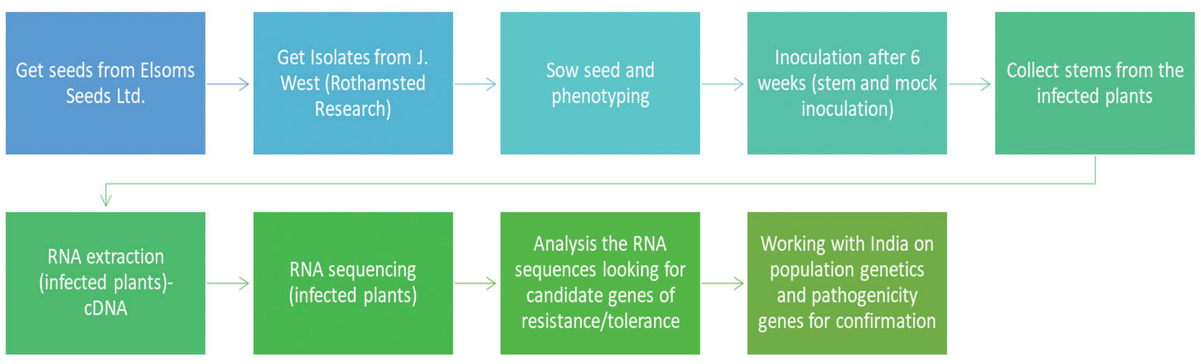
WP8: Understand the genetic and molecular basis of stem rot (Sclerotinia sclerotiorum) tolerance.

M8.1 Month 12 - Air sampling & analysis protocol for Sclerotinia spores established
M8.2 Month 15 - B. juncea diversity panel analysed for tolerance to stem rot (Sclerotinia sclerotiorum)
M8.3 Month 24 – Diversity of pathogen population related to B. juncea in India assessed
M8.4 Month 35 - Diversity of pathogenicity genes in S. sclerotiorum populations in India understood
M8.5 Month 36 - B. carinata DH population developed and used for mapping stem rot resistance
M8.6 Month 36 - Candidate genes for stem rot tolerance validated.

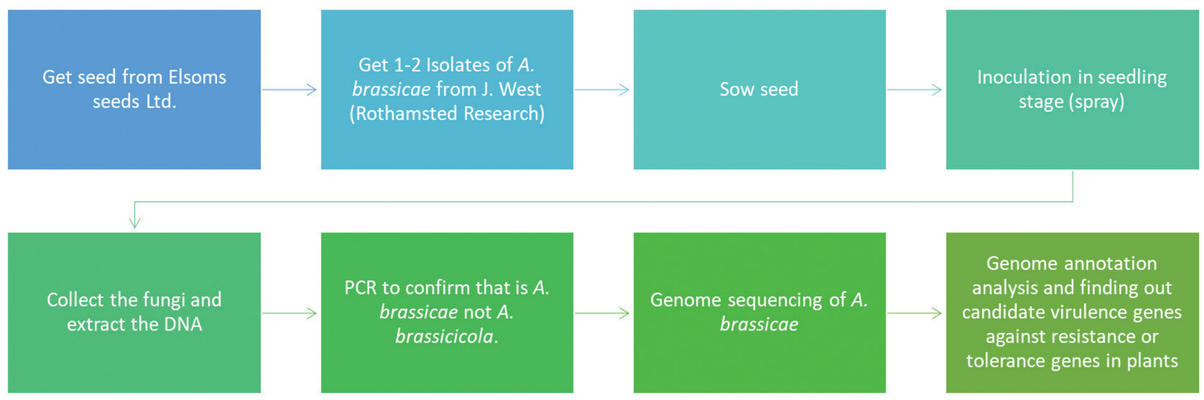
WP9: Understand the genetic and molecular basis of black spot(Alternaria brassicae) tolerance.

M9.1 Month 15 - B. juncea diversity panel analysed for tolerance to black spot (Alternaria brassicae)
M9.2 Month 24 - Sequencing & annotation of the A. brassicae genome
M9.3 Month 35 - Population genetic analysis of A. brassicae, including toxin genes, completed
M9.4 Month 36 - Candidate genes and pathways for D. erucoides–derived resistance to Alternaria in NRCPB introgression lines identified
M9.5 Month 36 - Candidate genes for black spot tolerance validated.

WP8. Understand the genetic and molecular basis of stem rot tolerance:



WP9. Understand the genetic and molecular basis of black spot tolerance:



1- Salad leaves Mustard colour & Bite
2- Salad leaves Mustard oriental Ruby streaks

Commercial verities

Achievements:

MTA has been developed by UoH
21 Brassica accessions were received from University of York (Ian Bancroft)
5 Brassica lines were received from Elsoms Seeds Ltd.
6 Sclerotinia isolates has provided by J. West (RRs).

Serial No.	Accession	Serial No.	Accession
1	Chhutki	11	Sej-2(2)
2	Sej-2(1)	12	RH-30
3	BEC-161	13	Pusa Jaikisan
4	D-247	14	Laha T-59
5	BFF-5	15	Pusa barani
6	Leh-1	16	Pusa bold
7	D-205	17	Varuna
8	GM-1	18	RL-1359
9	RLM-619	19	Kanpur
10	BJ-1	20	Proagro-4
		21	Heera

Accessions provided by Prof. Ian Bancroft (University of York)

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