

## Identification of Quantitative Trait Loci (QTLs) for seedling resistance to ascochyta blight in the ILL6002 x ILL7537 lentil mapping population

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The lentil cultivar ILL7537 is widely recognised as highly resistant to infection by *Ascochyta lentis*<sup>1</sup>. A recombinant inbred line (RIL) population of 155 individuals was generated between the resistant ILL7537 and susceptible ILL6002 lentil accessions through *in vitro*-assisted single seed descent (aSSD)<sup>2</sup>. A genetic linkage map was constructed derived from 3,071 high quality ddRADseq SNP markers producing a final map comprising 10 linkage groups (LGs) with an average marker density of 0.9 markers per centiMorgan (cM). This includes 7 major LGs with between 766 to 45 markers and 3 smaller LGs with fewer markers.

Up to 148 RILs were screened at Curtin University in seedling assays with the *A. lentis* isolates AL4, FT16299-2 and FT14069. In addition, RILs were screened for response to *A. lentis* AL4 at Griffith University. Two week-old seedlings were inoculated with spore suspensions and stem and leaf lesion % coverage were scored at 14 days after inoculation

QTL Mapping was performed using R/qt12<sup>3</sup>. Co-located QTL peaks were identified for an 80 cM region on LG4 with significant LOD scores ( $P < 0.005$ ) for AL4 (two independent phenotyping assessments) and FT16299-2. Isolate FT14069 QTLs were identified at a similar location but were not significant ( $P < 0.005$ ). The isolates tested fall into two provisional pathotype groups, being either virulent on PBA Hurricane and avirulent on Nipper lentil (AL4 and FT16299-2), or the converse (FT14069). Our results suggest that the genetic resistance conferred by ILL7537 likely specifies a gene-for-gene interaction with different responses for different isolate types. FT14069 is PBA-Hurricane avirulent and Nipper-virulent, and displays a weak interaction with the QTL. Key gene differences at the QTL will likely provide markers to assist plant breeders in improving resistance towards *A. lentis* isolates that are virulent on PBA Hurricane and similar cultivars such as PBA Bolt and PBA Hallmark.

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<sup>1</sup>Nguyen, TT, Taylor, PWJ, Brouwer, JB, Pang, ECK and Ford, R. (2001) Aust. Plant Pathol. 30, 211–215.

<sup>2</sup>Ribalta, FM, Pazos-Navarro, M, Nelson, K, Edwards, K, Ross, JJ, Bennett, RG, Munday, C, Erskine, W, Ochat, SJ and Croser, JS. (2017) Plant Growth Regulation, 81, 345-353.

<sup>3</sup>Broman KW, Gatti DM, Simecek P, Furlotte NA, Prins P, Sen S, Yandell BS, Churchill GA (2018) Genetics 211, 495-502