Identification of a QTL-hotspot region for resistance to Ascochyta blight in lentil

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Lentil, like all pulses, is an important crop that will help address global food security and environmental sustainability worldwide. However, pulses suffer from the devastating fungal disease known as ascochyta blight (AB). In lentil, *Ascochyta lentis* is responsible for AB which can infect all above-ground parts of the plant, reducing grain quality and yield, and resulting in yield loss of up to 40% under severe infection [1].

Three lentil recombinant inbred line (RIL) populations were generated to better understand the genetics of AB resistance. Resistant ILL7537 and Indianhead were independently crossed with highly susceptible ILL6002, and the Australian cultivars Nipper and PBA Bolt with each other. The resulting RIL populations were genotyped and phenotyped with Pathotype 1 and 2 isolates of *A. lentis*, and the results underwent QTL analysis. All three populations displayed significant QTLs at the beginning of chromosome 2, marking a hotspot for resistance-associated elements. This was the only major QTL within the ILL7537 x ILL6002 population, effective against both pathotypes and distinct from the Indianhead x ILL6002 population. As such, heterogeneous inbred families (HIFs) were generated to fine-map the location of the resistance gene. In addition to the major loci present on chromosome 2 in both Indianhead x ILL6002 and Nipper x PBA Bolt populations, which corroborates previous studies [2], QTL analysis identified multiple novel pathotype-specific loci in both populations. The markers associated with this resistance can be implemented in lentil breeding programs, allowing breeders to fast-track integration and stacking of resistance sources in future lentil varieties.

***References:***

[1] Gossen BD, Morrall RAA (1983) Effect of ascochyta blight on seed yield and quality of lentils. Canadian Journal of Plant Pathology 5, 168-173.

[2] Sudheesh S, Rodda MS, Davidson J, Javid M, Stephens A, Slater AT, Cogan NOI, Forster JW, Kaur S (2016) SNP-Based Linkage Mapping for Validation of QTLs for Resistance to Ascochyta Blight in Lentil. Frontiers in Plant Science 7.