Fine mapping of a locus controlling vigour in chickpea

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Early vigour is considered a valuable trait for chickpea, and is identified as a key breeding target for Australia's central, southern and western chickpea growing regions. These regions are characterised as having very cold winters, short growing seasons, and low rainfall, meaning that a good early start to growth is imperative. Seedling vigour promotes strong establishment and overcomes early weed competition which is particularly relevant in pulses. Early vigour also results in early canopy closure, minimising evaporative loss, maximising water use efficiency and conserving soil moisture in the profile for later in the season. Recent studies have identified a locus on chromosome 4 that is known to control several vigour-related traits (plant height, water use, projected shoot area) and agronomic traits (100 seed weight, harvest index, seed number) under both glasshouse and Australian field conditions. A range of complimentary approaches are now being used to determine the molecular control of vigour at this locus. The genetic size of the region has been delimited using populations derived from residual heterozygosity found in recombinant inbred lines. Sequence capture technology is now under way to obtain a 2Mb sequence across the QTL locus from a collection of 100 Australian chickpea breeding lines. Analysis of sequence haplotypes observed at the locus with field and glasshouse phenotypes relating to vigour is being investigated to identify association of genetic changes and the vigour phenotype. This information will provide knowledge on the extent of genetic variation for genes controlling vigour at this locus in chickpea breeding program and could provide molecular tools to select vigour alleles targeted to specific environments.