

Genetic analysis of flowering genes and their associated effects on agronomic performance and stress tolerance in chickpea

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Co-funders	Total Project Cost
\$172,736.90	Completed	February 2017 – February 2020	Saskatchewan Ministry of Agriculture – Agriculture Development Fund (ADF)	\$322,943.90

Project Description

To evaluate the flowering genes and their associated effects on agronomic performance and adaptation in chickpea.

Outcome

This research examined the genetic basis of flowering time and its associated effects on other traits in chickpea. Three genetic panels were developed and used in the study. The first panel contained near isogenic lines (NILs) for the analysis of the association of the circadian gene, CaELF3 (Early Flowering 3), on maturity (adaptation) and response to biological stress. Field evaluation of a set of NILs derived from CDC Frontier at three locations in summer 2019 confirmed the involvement of elf3 in early maturity in chickpea while maintaining the yield potential of the recurrent parent. Results further indicated that elf3 gene may affect plant response to stress. All the NILs were genotyped using our own DNA Chip to further characterize the genetic profiles of the NILs. The second genetic panel consisted of recombinant inbred line (RIL) populations. Two genes, CaELF3 and CaFTb, were identified and gene expression analysis confirmed the importance of these genes to induce flowering. The third panel included a diverse collection of varieties, germplasm and breeding lines. Various phenological and agronomic traits were measured from field trials. These lines were also grown in phytotron under long and short day conditions to explore the photoperiodic flowering. The genetic panel was genotyped using 60K SNP Chip to allow association analysis to identify loci associated with phenological and agronomic traits segregating in the panel.

Research Objective

OBJECTIVE 1

To evaluate the flowering genes and their associated effects on agronomic performance and adaptation in chickpea.