

M-14

SoyaGen: An integrated and applied genomics project for short-season soybean
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SoyaGen is a translational genomics project that aims to exploit genomics to consolidate and further expand the soybean crop, already the third most important in Canada at close to 7.3M acres in 2017. An extensive characterization of genetic diversity, both at the nucleotide and structural levels, was achieved through whole-genome sequencing of a representative set of lines, yielding a catalogue of close to 5M SNPs/indels and 100K structural variants. Having captured haplotype diversity in Canadian short-season soybean in this fashion, these variants can be rapidly and accurately imputed following inexpensive genome scans (using GBS or arrays) on any line. To render this information more useful to breeders, we have developed a tool to facilitate the translation of SNP haplotype information in genic regions into a set of alleles. Thanks to a detailed characterization of the allelic combinations at four known genes controlling maturity (*E1* to *E4*), we are studying how these maturity “packages” perform under a broad range of agro-climatic conditions in Canada. These powerful genotyping tools and extensive datasets are also being used to identify new genes/QTLs underlying additional traits of interest to breeders, such as resistance to pest and diseases. One such example will be provided in the form of a genome-wide association study for partial resistance to *Sclerotinia sclerotiorum*, the causal agent of Sclerotinia stem rot, or white mold. This collaborative project represents a highly concerted research effort and enjoys strong financial support from a wide array of stakeholders (grower organizations and seed companies) as well as both Genome Canada and Génome Québec.