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Fine mapping of soybean iron deficiency chlorosis tolerance QTL from Fiskeby III

*Ryan Merry**, Agronomy and Plant Genetics, University of Minnesota, Minnesota, USA
Benjamin Campbell, Department of Plant Pathology, University of Minnesota, Minnesota, USA
Karl Butenhoff, Plant Breeding and Genetics, University of Minnesota, Minnesota, USA
James Orf, Minnesota Crop Improvement Association, University of Minnesota, Minnesota, USA

Soybean (*Glycine max*) is particularly susceptible to iron deficiency chlorosis (IDC) when grown in high alkaline soils. IDC tolerance historically has been difficult to achieve in the narrow U.S. breeding base. 'Fiskeby III' (PI 438471), a 00 maturity group Swedish edamame variety released in 1949, shows exceptional tolerance to a wide range of abiotic stresses, including IDC. To investigate the abiotic stress tolerance of 'Fiskeby III', the USDA-ARS developed a 'Fiskeby III' x 'Mandarin (Ottawa)' (PI 548379) bi-parental mapping population, which was previously used to map stress tolerance QTL. Major IDC tolerance QTL were discovered on chromosomes 5 and 6 in this population. Near isogenic lines (NILs) were developed from 20 heterogeneous inbred families (HIFs) from the 'Fiskeby III' x 'Mandarin (Ottawa)' bi-parental mapping population. F6 families that were heterozygous in the 1.5 mega-base chromosome 5 QTL were advanced. F7:8 plants that were homozygous for the 'Fiskeby III' or 'Mandarin (Ottawa)' genotype in the region were planted in an IDC nursery in 2015 to validate the QTL. Plants homozygous for the 'Fiskeby III' genotype were significantly more tolerant than plants homozygous for the ‘Mandarin (Ottawa)’ genotype ($p < 0.001$). 11 HIFs from the 'Fiskeby III' x 'Mandarin (Ottawa)' bi-parental mapping population are also being developed to fine map the Chr 6 IDC QTL.