Genetic identification of a novel bolting locus in Beta vulgaris which promotes annuality independently of the bolting gene B

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Abstract:

Bolting tendency in the crop species Beta vulgaris, which includes sugar beet, is a complex trait governed by various environmental cues, including prolonged periods of cold temperatures over winter (vernalization) and photoperiod, and multiple genetic factors. Two loci which promote bolting in the absence of vernalization are known in beet, the major bolting locus B on chromosome II and the B2 locus on chromosome IX. Here, genetic linkage and quantitative trait locus analyses in two populations derived from a cross between a biennial genotype, which was identified in a phenotypic screen for EMS-induced bolting mutants and requires vernalization to bolt, and an annual wild beet accession revealed the presence of a novel major bolting locus B4 which is linked to the B locus but promotes annual bolting independently of B. The genetic distance between B and B4 on chromosome II is 11 cM. A sequence-based marker was identified which co-segregates with bolting behavior and co-localizes with the B4 locus.

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