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Sugar beet (*Beta vulgaris*) is a biennial crop species that is essentially grown for the production of white sugar. One of the key parameters in the breeding of sugar beet concerns the susceptibility to vernalization and subsequent bolting. Apart from the apparent change in plant morphology, the source-sink status in bolting plants has shifted thereby preventing the accumulation of sucrose in the taproot and thus causing substantial losses. Resistance to bolting is a polygenic or quantitative trait, subject to environmental conditions including temperature and day length, and therefore difficult and time-consuming to assess for breeders. Consequently, the use of molecular markers for bolting resistance may substantially facilitate the breeding process. Based on the current understanding of the flowering-time control in *Arabidopsis thaliana*, the combination of forward and reverse genetics allowed for the partial dissection of the bolting response in sugar beet and has resulted in the identification of QTLs and candidate genes for marker development. In addition to marker applications, the dissection of the flowering time control in both sugar beet and *Arabidopsis* opened avenues for engineering bolting resistance in sugar beet. By suppressing the vernalization response the growing season of sugar beet may be prolonged which is predicted to increase yield. Ideally, the growing practice of sugar beet would shift from a spring into a winter crop leading to substantial gains in the profitability of the sugar beet crop and its competitive position with respect to sugar cane. One obvious candidate gene for engineering bolting resistance in a biennial crop like sugar beet is FLC. Constitutive expression of the FLC gene from *Arabidopsis* delivered substantial delays in bolting depending on the phenotypic screens applied, but did not overrule the vernalization response under simulated field conditions in the greenhouse. Data obtained on FLC and other genes for bolting control will be presented and discussed.