

To Grow or Not to Grow: Control of Meristem Fate in Maize

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Abstract

Plants grow indeterminately, a feature of meristems that produce new organs throughout the life cycle. Much of the variation in plant shoot architecture is governed by the fate of meristems, for example whether to grow out to make a branch or to remain dormant. Such decisions are influenced by physiological conditions as well as the external environment. We found that trehalose-6-phosphate (T6P) is an important signal governing branch determinacy, and acts as a signal to control meristem fate. The proteins that catalyze T6P production appear to have moonlighting functions in control of development, independent of their enzymatic activity. In a genetic screen to uncover additional players in T6P signalling, we came across a classical mutant of maize, *terminal ear1*. TE1 encodes an RNA binding protein, and mutants have pleiotropic phenotypes in shoot and inflorescence architecture. Our results suggest that TE1 controls meristem fate to enhance branching through a pathway acting in parallel to T6P. We performed RNA-immunoprecipitation and sequencing (RIP-Seq), and found that TE1 binds preferentially to mRNAs of many maize developmental genes. TE1 binding to these mRNAs appears to inhibit their translation, and may be part of a mechanism to slow down plant development during periods of stress.