



## ***ABSTRACT***

*“Cell-cycle control in Arabidopsis roots by internal and external factors”*

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Plant roots respond to various internal and external signals and adjust themselves to changes of environmental conditions. Previous studies indicate that an antagonistic interaction between auxin and cytokinin hormones determines meristem size. We found that, in *Arabidopsis*, cytokinins promote the transition from the mitotic cell cycle to the endocycle, a modified cell cycle in which DNA replication is repeated without mitosis and cytokinesis. The cytokinin-activated type-B response regulator up-regulates the expression of *CCS52A1*, which encodes an activator of an E3 ubiquitin ligase, anaphase-promoting complex/cyclosome (APC/C), thereby promoting the onset of the endocycle and restricting meristem size. Our results indicate that cytokinins directly control the cell cycle and maintain root meristem size. Under stressful conditions, however, down-regulation of mitotic activity in the meristem plays an important role to sustain the suppressive state of root growth. Recently we found that repressor-type MYB transcription factors are essential to suppress mitotic activity in DNA-damaged cells, causing cell death in the stem cell region and promoting endocycle onset in the root meristem. We shall discuss how different types of MYB transcription factors control mitotic activity, and how cyclin-dependent kinase activities are involved in the regulation under changing environmental conditions.