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Regulation of Expression of D3-type Cyclins and ADP-Glucose Pyrophosphorylase Genes by Sugar, Cytokinin and ABA in Sweet Potato (*Ipomoea batatas* Lam.)

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Abstract: The productivity of sweet potato is governed by both the rate of cell division and sink activity of its tuberous root. The aim of this study was to reveal the mechanisms that regulate cell division activity and sink activity during tuberous root formation. As an indicator of the cell division activity, we used the transcript level of two D3-type cyclins, which regulate cell cycle progression through the formation of the regulatory subunit of the cyclin-dependent kinase complex. As an indicator of photosynthetic product sink activity, we used the gene expression of ADP-glucose pyrophosphorylase (AGPase), one of the key enzymes of starch synthesis. During tuberous root formation, the expression of D3 cyclin genes increased to the maximal levels and then decreased. In contrast, the expression of the AGPase gene increased continuously. Sucrose enhanced the expression of D3 cyclin and AGPase genes, but a high concentration of sucrose repressed the expression of a D3 cyclin gene. In the presence of sucrose, cytokinin increased the expression of D3 cyclins, but abscisic acid (ABA) did not. However, cytokinin and ABA repressed the induction of AGPase gene expression by sucrose. These results suggested that sugars, cytokinin and ABA regulate the cell division activity and the sink activity in sweet potato.

Keywords: Abscisic acid, ADP-glucose pyrophosphorylase, cytokinin, D3-type cyclin, gene expression, *Ipomoea batatas*, sugar, tuberous root formation

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