

Transcriptomic and phosphorylomic analysis revealed the molecular regulation of sucrose on bamboo shoot growth

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Abstract: Carbohydrates play an important role in the growth and development of bamboo shoots, but the molecular mechanism of sucrose regulating the growth and development of bamboo shoots is still unclear. In this study, the application of exogenous sucrose in the early stage of bamboo shoot growth can promote rapid growth. Transcriptome sequencing results showed that sucrose mainly regulates the growth of bamboo shoots through pathways such as starch and sucrose metabolism and auxin signal transduction. Phosphoproteome analysis showed that the phosphorylation state of 297 proteins significantly changes under exogenous sucrose treatment, including multiple key proteins in sugar metabolism. Sucrose non-fermenting protein kinase *PheSnRK1.6* was upregulated in darkness and after shoot harvesting, and overexpression of *PheSnRK1.6* in Arabidopsis plants leads to higher growth than empty carrier Arabidopsis. Yeast one-hybrid experiments showed that the early auxin signal factors *PheIAA4.2* and *PheIAA16.3* can bind to the promoter of *PheSnRK1.6*. The results of this study indicated that sugar and auxin jointly regulate the growth and development of bamboo shoots, and *PheSnRK1.6* plays an important role in this process. This study provides a research basis for better understanding the regulatory mechanism of energy metabolism in the formation process of bamboo shoots, and also provides theoretical basis for the regulation of longer internode materials and bamboo plant height.

Keywords: Phosphoproteome, *Phyllostachys edulis*, SnRK, Sucrose, Transcriptome