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Understanding the roles of phytohormones and enzymes activities in enhancing sucrose content by potassium application in vegetable soybean (*Glycine max* L. Merr.)

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In order to understand the physiological mechanism of potassium (K) application in enhancing sugar content of vegetable soybean seeds, a pot experiment with two cultivars under three K fertilization treatments: No K application (K0), 120 kg K<sub>2</sub>SO<sub>4</sub> ha<sup>-1</sup> at seeding (K1), and 120 kg K<sub>2</sub>SO<sub>4</sub> ha<sup>-1</sup> at seedling + 1% K<sub>2</sub>SO<sub>4</sub> foliar application at flowering (K2) were conducted. K application significantly increased seed sucrose concentration, and highest seed sucrose concentrations were observed in K2 treatment. K application increased the activities of sucrose phosphate synthase and sucrose synthase in synthetic direction, but reduced the activities of sucrose synthase in decomposition direction. K application also reduced the activities of acid invertase and neutral invertase. K fertilization increased the contents of IAA, GA, ZR, but reduced ABA content consistently. When the sucrose content reached the highest level at 7 weeks after flowering for the 2 cultivars, the contents of IAA, GA, ZR all reached the lowest level in general. The content of ABA in seed was negatively correlated with the sucrose content. The changes in ratio of ABA to (IAA+GA+ZR) after flowering affected by K application were coincident to the changes of sucrose accumulation. The balanced endogenous hormones, particularly the reduced ratio of ABA/(IAA+GA+ZR) by K nutrition plays a critical role in enhancing sucrose content, which might be a partial mechanism involved in K nutrition to improve the quality of vegetable soybean.