Title Low-temperature storage of cucumbers induces changes in the organic acid content and in citrate synthase activity

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Abstract

To elucidate the cause of reported pyruvate accumulation in chilled stored cucumbers (*Cucumis sativus* L.) cv. 'Toppugurin', we have examined differences in the extent of incorporation of acetate-1,2-^{14}C into the tricarboxylic acid (TCA) cycle and the specific activity of the enzyme citrate synthase between healthy and chilling-injured cucumber tissues stored in the dark for 0, 3, 6 and 12 d at 1 °C or 20 °C. Radioactive tracing, gas chromatography, and enzyme analysis suggest that the incorporation of acetate into citrate, the distribution of organic acids in the tricarboxylic acid cycle, and the specific activity of citrate synthase in the cold-storage (chilling-injured) cucumber tissues differed from those in the healthy tissues. The observed decrease in citrate synthase activity may be the cause of the observed increase in pyruvate accumulation in the chilling-injured cucumber fruit tissue compared to tissues stored at 20 °C. The results also suggest that the increased formation of pyruvate and reduced activity of citrate synthase during cold storage observed in the present study could serve as indicators (biomarkers) of stress-induced changes in chilled cucumbers. Possible mechanisms of the described effects are discussed.