

Abstract

The relationship between sugars and ethylene was investigated in harvested broccoli (*Brassica oleracea* L. var. *italica*) florets. Broccoli florets senesced rapidly after harvest at ambient temperatures, accompanied by the yellowing of sepals, ethylene production and degradation of sugars. In harvested broccoli, continuous uptake of a 10% sucrose (Suc) solution through the cut surface of the stem enhanced ethylene production in florets with simultaneous increases in 1-aminocyclopropane-1-carboxylic acid (ACC) synthase (ACS) activity and ACC content. In spite of the increased rate of ethylene production, the yellowing of sepals and the expression of ACC oxidase (ACO) gene were suppressed by the Suc feeding. When florets were immersed in a 50 mM glucose (Glc) or Suc solution for 24 h, ethylene production was increased by both treatments, and ACS activity and ACC content were the highest in Glc-treated samples. The expression of the ACO gene was enhanced in florets exposed to ethylene ($82 \mu\text{l l}^{-1}$). However, the increases in ethylene production and ACO mRNA accumulation observed in the samples treated with ethylene were suppressed when broccoli plants were treated with ethylene and Suc together. These results indicate that Suc and Glc can affect the rate of ethylene biosynthesis and that high levels of sugars decrease ethylene sensitivity in harvested broccoli florets.