

Title Effects of postharvest ethanol vapor treatment on activities and gene expression of chlorophyll catabolic enzymes in broccoli florets

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Abstract

Postharvest yellowing of broccoli (*Brassica oleracea* L. Italica Group) is an important indicator of quality deterioration and occurs with chlorophyll (Chl) degradation. Postharvest ethanol vapor treatment could delay the yellowing of broccoli florets, through the suppression of Chl degradation. As the first step in identifying the mechanism of this delay, the effects of postharvest ethanol vapor treatment on activities and gene expression of the Chl catabolic enzymes in broccoli were determined. Broccoli branchlets were placed in a perforated polyethylene bag with or without (control) an ethanol pad and stored at 20 °C in darkness. The Chl contents of the control broccoli florets decreased remarkably after three days in storage, whereas the contents of the ethanol-treated broccoli showed no significant changes except at day one. Changes in chlorophyllase activity in the ethanol-treated broccoli were similar to those of the control until three days in storage, but then the activity tended to decrease. Mg-dechelataase and Chl-degrading peroxidase activities, which increased greatly with senescence in the controls, remained unchanged in the ethanol-treated broccoli. *BoCLH1* expression showed changes almost similar to those of chlorophyllase activity. *BoPAO* expression in the control broccoli increased greatly at day one in storage and was maintained at a high level until three days. In contrast, this expression in ethanol-treated broccoli was suppressed until two days. *BoRCCR* expression in the control broccoli increased until two days in storage, while the expression in the ethanol-treated broccoli showed no change during storage. These results show that postharvest ethanol vapor treatment suppressed the activities and gene expression of Chl catabolic enzymes, resulting in delayed yellowing of broccoli florets.