

Title Harvested broccoli (*Brassica oleracea*) responds to high carbon dioxide and low oxygen atmosphere by inducing stress-response genes

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Abstract

Broccoli (*Brassica oleracea* L.) tissue held in a controlled atmosphere (CA; 10% carbon dioxide and 5% oxygen) senesces more slowly than tissue held in air. CA-treated broccoli tissues lose less water and soluble sugars, have lower protease activity, and have no significant loss of color (hue angle, chlorophyll content) for 96 h after harvest (20 °C, dark) compared to tissue held in air that starts to senesce and yellow after 48 h. The current study examined differential gene expression in broccoli tissues in response to postharvest CA treatment. This genetic analysis was undertaken to identify CA-responsive genes that may act as signaling elements and repress postharvest senescence processes. CA-responsive genes with up- and down-regulated expression (compared to air controls) were isolated after a 6 h CA treatment by differential display-polymerase chain reaction. The candidate CA-responsive genes included a number of novel genes without previously assigned functions, and genes of known function previously found to be regulated by stress (e.g. dehydration, salt stress, low temperature, and sugar starvation).