Title Peroxidase-mediated chlorophyll degradation in stored broccoli florets and its control by heat treatment

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Abstract

One of the symptoms of senescence in stored broccoli (*Brassica oleracea* L.) florets is the loss of green color that comes with the degradation chlorophyll (Chl). Peroxidase-mediated Chl degradation in stored broccoli florets and its control by heat treatment were performed to clarify a mechanism of Chl degradation. The activity of peroxidase, which is involved in Chl degradation, increased greatly concomitant with a decrease in Chl content during storage at 15°C. Hot air treatment at 50°C for 2 hours suppressed effectively both the decrease in Chl content and the increase in peroxidase activity. In an extract from broccoli florets, Chl was broken down strongly when hydrogen peroxide was added to the extract, whereas Chl degradation of the extract was inhibited by boiling. Chl-degrading peroxidase (CPX) was partially purified by means of $(NH_4)_2SO_4$ precipitation (60-90% saturation), molecular exclusion chromatography and cationic exchange chromatography. Chl a was degraded by the purified CPX to colorless, low molecular weight compounds through the formation of $C13^2$-hydroxychlorophyll a and yellow pigment (absorption maximum-approximately 450nm) as an intermediate. The characterization of CPX was also determined. These findings suggest that CPX is involved in Chl degradation in stored broccoli florets and heat treatment could control floret yellowing by inhibiting enhancement of CPX activity.