Effect of short-term anoxia treatment on endogenous ethanol and postharvest responses of broccoli florets during storage at ambient temperature

Chairat Techavuthiporn, Manasikan Thammawong and Kohei Nakano

Scientia Horticulturae; Volume 277: 109813. (2021)

Abstract

Color change is the main factor limiting quality and shelf-life of broccoli florets. The aim of this recent work was to investigate the effectiveness of anoxia treatment on appearance and the contents of chlorophylls and ascorbic acid of broccoli florets during storage at ambient temperature. In preliminary experiment, the broccoli florets were treated in anoxia condition for 24 h. It was found that the exposure period between 18–24 h was the most effective for delaying broccoli florets yellowing. Therefore, the confirmatory experiment of short-term anoxia treatment for 18, 20, 22 and 24 h was carried out to verify ethanol concentration after treatments and color, chlorophylls and ascorbic acid contents were investigated in broccoli florets during storage at 20 ± 1 °C (85–95% RH) for 3 d. It was found that the longer exposure time was used, the more production of ethanol occurred which the highest level of ethanol was recorded in the treatment of 24 h (951.98 mg kg^{-1}). Anoxia treatment maintained both L^* and hue angle values by delaying the degradation of chlorophyll contents during storage. Florets started to turn yellow when total chlorophyll content was about 500 mg kg^{-1}. It was also noted that during 20 h of anoxia treatment, the total ascorbic acid losses was relatively delayed in broccoli florets better than that of other treatments. However, higher ethanol content was observed in an excessive treatment of anoxia-treated broccoli for 22–24 h which contributed to a dark colorization and water soaking of floret tissues. It revealed that, broccoli florets with an appropriate level of endogenous ethanol is a relevant method to retard yellowing of broccoli floret stored at ambient temperature. Our purpose in this present work also indicate that anoxia treatment practicable for using as non-chemical and simple postharvest technology in maintaining visual appearance and delaying the loss of ascorbic acid in broccoli florets during short-term storage at ambient temperature.