

Sucrose alleviated programmed cell death in broccoli after harvest

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Abstract

The effect of sucrose treatment on morphological and biochemical features of programmed cell death (PCD) in broccoli florets was explored. The apoptosis of untreated and treated cells was evaluated by flow cytometry (FCM) and by laser scanning confocal microscopy (LSCM). DNA ladders, resulting from the cleavage of nuclear DNA into oligonucleosomal fragments in PCD, were evaluated by gel electrophoresis. DNA fragmentation and nuclear DNA condensation were further confirmed by using the terminal deoxynucleotidyl transferase (TdT)-mediated dUTP nick end in situ labeling (TUNEL). The results revealed that sucrose treatment inhibited DNA degradation, and delayed the early apoptosis of broccoli cell as demonstrated with FCM and LSCM. DNA laddering was observed in control broccoli florets, which could not be detected in sucrose-treated samples. In addition, the caspase-like activities in broccoli cells were suppressed under sucrose treatment. Taken together, our results suggested that PCD was delayed in sucrose-treated broccoli florets, which provided a new model to investigate the mechanism of sugar in regulating PCD during postharvest storage.