

# Role of white light intensity and photoperiod during retail in broccoli shelf-life

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## Abstract

White light illumination during retail has been suggested as a simple, non-chemical way to extend the shelf-life of green vegetables. Unfortunately, the influence that key factors like radiation intensity and photoperiod have on the efficacy of such treatments efficacy is barely understood. Herein, we evaluated the influence that the intensity and photoperiod of white light illumination during retail, had on the shelf-life of cold stored broccoli. Broccoli florets were stored at 5 °C and illuminated with white light emitting diodes (LEDs) under three different light intensities (*Low*, 3.6; *Mid*, 9.5; and *High*, 19.0 W m<sup>-2</sup>). At each light intensity condition samples were subjected to four different light:darkness cycles (3h:21 h;6h:18 h;12h:12 h or 24h:0 h). One set of samples packed and stored at 5 °C, but kept in darkness, was used as a control. After 0, 11 or 19 d of storage we evaluated weight loss, color, chlorophylls, total sugars, sucrose, glucose and fructose contents. We also assessed the changes in ascorbic acid, carotenoids and phenolic antioxidants. *Mid-* and *High-intensity* treatments proved highly beneficial to delay senescence. Storage under *Mid-* and *High-* intensity white LEDs for 3–12 h per day was markedly more effective to prevent yellowing than continuous illumination. Exposure to *Mid-intensity* light, 3 h a day also reduced dehydration, chlorophyll, sucrose, glucose and fructose losses. In addition, broccoli maintained higher levels of ascorbic acid, carotenoids and phenolics at the end of the storage period. These results show that white LED illumination during retail may be used to extend the shelf-life of refrigerated broccoli and set the stage for proper intensity and photoperiod usage.