

Postharvest flavonol and anthocyanin accumulation in three apple cultivars in response to blue-light-emitting diode light

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Abstract

The effects of postharvest blue-light irradiation on the accumulation of anthocyanins and other phenolic compounds, and on phenylalanine ammonia-lyase activities and color development in the skin was investigated in fruit of three apple cultivars (*Malus domestica* Borkh.). ‘Idared’, ‘Fuji’, and ‘Carjevič’ apples were harvested at the commercial maturity stage and irradiated or not with blue LEDs (peak wavelength 444 nm) at 8 °C for 7 days. Response to the irradiation was cultivar dependent. Anthocyanin accumulation was greatest in ‘Idared’ apples; however, the anthocyanins profile differed from that in the naturally colored apples. Twelve phenolic compounds were evaluated. Among these, chlorogenic acid and total flavonols increased in all cultivars after blue-light irradiation. Structure-specific responses of quercetin glycosides were detected in terms of the sugar moieties. Three out of six evaluated quercetin glycosides increased after irradiation, with the highest relative increase seen for quercetin 3-*O*-arabinopyranoside, followed by quercetin 3-*O*-galactoside and quercetin 3-*O*-glucoside. Contents of quercetin 3-*O*-arabinofuranoside, quercetin 3-*O*-rhamnoside and quercetin 3-*O*-xyloside were not affected by irradiation. The highest phenylalanine ammonia-lyase activity was seen for ‘Fuji’ apples after blue-light irradiation. Therefore, blue-light irradiation appears to be promising to enhance color and nutritional quality of apples.