

Title Elevated sunlight promotes ripening-associated pigment changes in apple fruit
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Abstract

Content and composition of chlorophylls and carotenoids were studied with non-destructive reflectance measurements and HPLC in sun- and shade-adapted skins of apple fruit ripening on and off the tree. In on-tree ripening fruit elevated sunlight brought about a decline in chlorophyll and retention or an increase in total carotenoid content. In later harvested fruit the molar ratio between the pigments was high and exceeded unity in sunlit (but not in shaded) skin on the tree. Postharvest, apples with a chlorophyll content lower than 2 nmol cm^{-2} displayed a rapid decrease in chlorophyll and a remarkable induction of carotenoids, much more pronounced in sunlit skin. In the progress of ripening, the carotenoid pattern underwent considerable changes: a decline in lutein and β -carotene and a build up of violaxanthin and fatty acid xanthophyll esters, the latter dominating at advanced stages of ripening. The results suggest that the differences in pigment dynamics between sunlit and shaded skins both on- and off-tree could be regarded as acceleration and enhancement of ripening-specific changes. Since promotion of ripening in sunlit fruit surfaces might be considerable in apples growing under contrasting illumination this should be taken into account in planning of harvest time and selection of storage conditions for apple fruit.

Abbreviations: Antn, antheraxanthin; Car, carotenoid(s); beta-Car, beta-carotene; Chl, chlorophyll(s); FAXE, fatty acid xanthophyll esters; Lut, lutein; Neo, neoxanthin; Vio, violaxanthin; Zea, zeaxanthin