Abstract

The feasibility of non-destructive estimation of internal ethylene concentration (IEC) in apple fruit *via* fruit reflectance using recently developed approaches and a fiber-optics reflectometer was investigated. The relationships between IEC and fruit reflectance in the 400–800 nm range were studied in stored apple (*Malus × domestica* Borkh., cv. Antonovka) fruit. A strong correlation between IEC and optical reflectance spectra taken from sunlit surfaces of the fruit was detected whereas reflectance of the shaded fruit surface showed a weak correlation with IEC. The increase of the reflectance in the red occurred along with IEC build-up during ripening resulting a strong ($r^2 > 0.80$) correlation. By contrast, reflectance in the blue-green part of the spectrum remained low and was negatively ($r^2 \approx 0.65$) correlated with IEC. These observations are consistent with the phenomenon of degradation of chlorophylls which often occurs in parallel with the retention of carotenoids in ripening apple skin. As a result, IEC showed a significant correlation ($r^2 > 0.69$; $P < 0.001$) with the index based on reflectances in the red and blue-green regions of the spectrum $(R_{678} - R_{480})/R_{800}$. The effects of strong solar light on the relationships between IEC and fruit reflectance are considered. The possibilities and limitations of a non-destructive reflectance-based assay of IEC in apple fruit are discussed.