Relationship of the optical properties with soluble solids content and moisture content of strawberry during ripening

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Abstract

To understand the relationship of optical properties with soluble solids content (SSC) and moisture content of strawberry during ripening, a single integrating sphere system was built to estimate the absorption coefficient (μ_a) and reduced scattering coefficient (μ_s') of strawberry in white, color turning and red ripening stages over the wavelength range of 550–850 nm and 950–1650 nm. The relationship between optical properties and SSC and moisture content was analyzed, and the determination models for SSC and moisture content were established by using partial least squares regression and support vector machine methods based on the spectra of μ_a, μ_s', and μ_a together with μ_s'. The results showed that the absorption peaks of strawberry were at 675, 975, 1197 and 1411 nm, and the μ_s' generally decreased with increased maturity of strawberry. The μ_a was positively correlated with SSC and negatively correlated with moisture content, while the μ_s' was positively correlated with moisture content and negatively with SSC. The best correlations of μ_a with SSC and moisture content were found at 1411 nm with the correlation coefficients of 0.72 and -0.74, respectively. The established support vector machine models based on the μ_a spectra in 950–1650 nm and 550–850 nm had the smallest root-mean-squares error of calibration set of 0.98 % and 0.89 % for SSC and moisture content, respectively. This study indicates that SSC and moisture content mainly affect the absorption property of strawberry, and μ_a has greater potential than μ_s' and μ_a together with μ_s' in determining the internal quality of strawberry.