

### Abstract:

Non-destructive, objective tools are required to obtain information on preharvest fruit maturation and postharvest fruit aging. Changes in fruit carotenoid/ chlorophyll ratio (car/chl) can serve as an indicator for fruit aging and related consumer acceptance during shelf life. Fruit chlorophylls have already been successfully determined by non-destructive spectral analyses using indices and multivariate data processing and indices for car/chl prediction have been developed in photosynthesis research and stress physiology. However, a comparative study to predict fruit car/chl using these indices is not known to exist. Spectral transmittance recordings in the visible wavelength range were carried out on 'Elstar' and 'Jonagold' apple (*Malus x domestica*) fruit. The fruit chlorophyll content of 'Jonagold' apples was chemically measured and predicted by means of the specific indices: Plant senescence reflectance index (PSRI), structure insensitive pigment index (SIPI) and photochemical reflectance index (PRI) with correlation coefficients of determination  $R^2=0.21$ ,  $R^2=0.12$ ,  $R^2=0.42$ , respectively. Partial least squares (PLS) calibration models for measured spectral recordings (450 nm - 730 nm), first derivative of the spectra and second derivative of the spectra yielded multivariate correlation coefficients of determination  $R^2= 0.67$ ,  $R^2= 0.78$ ,  $R^2= 0.92$ , respectively. Similar results were found for 'Elstar' apples. In summary, the indices (PSRI, SIPI, or PRI) were poor predictors of fruit car/chl in this study. Multivariate models, especially the second derivative of the PLS-based spectra measurements, had the best ability to predict fruit car/chl in this study.