

Title Chlorophyll Fluorescence as a Tool for Online Quality Sorting of Apples
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Abstract

The chlorophyll fluorescence kinetics of apples (*Malus domestica* L.) and more specifically Jonagold and Cox, stored under different conditions to induce mealiness, were measured. Three levels of mealiness were assigned to three different storage conditions according to a protocol established in an EU project. Destructive measurements of the firmness, hardness, juiciness and soluble solids content of the fruit were performed. The fluorescence curves were fitted by a tenth-order polynomial and the regression coefficients were used as input parameters in quadratic discriminant analysis to assign the fruit into the different mealiness levels. The achieved classification performance was around 85%. Based on the measured curves, different fluorescence parameters could be defined. The slope of the fluorescence curve at the origin and the normalised fluorescence at 1 ms proved to be reliable parameters to classify apples according to their mealiness level (classification performance of about 80%). The big advantage of these parameters is their extremely short measuring time. From the destructive parameters, only the firmness was highly correlated with the mealiness level (coefficient of determination $r^2=0.85$) and with the fluorescence (coefficient of determination $r^2=0.75$) for Jonagold fruit. For the Cox variety, the destructive measurements did not vary much between the different mealiness levels. These results suggest that fluorescence has the potential to be used in an automatic sorting line to assess mealiness, and senescence in general, and eventually to predict the period a certain quality level can be guaranteed to the consumers under certain storage conditions.