

Title Non-destructive measurement of flavonoids in vegetables and fruits

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Citation Book of Abstracts, Southeast Asia Symposium Quality and Safety of Fresh and Fresh Cut Produce Greater Mekong Subregion Conference on Postharvest Quality Management in Chains, August 3-5, 2009, Radisson Hotel, Bangkok, Thailand.

Keyword non-destructive; flavonoids; fruit

Abstract

All flavonoids absorb UV – radiation and parts of the visible light spectrum. In most plants the highest concentration of flavonoids is in the epidermis. These properties can be exploited for non-destructive measurement based on chlorophyll fluorescence (ChlF) excited by two or more wavelengths, that is, at least one wavelength that is absorbed by flavonoids and one that is not. The ChlF method was tested on broccoli heads, curly kale leaves and apples. As a reference the concentration of selected flavonoids was measured by high performance liquid chromatography. The concentration of flavonoids in broccoli flower buds was well correlated with the epidermal absorbance of blue light, with the highest correlation found for quercetin ($r = 0.77, P < 0.001$). The epidermal absorbance of UV-A radiation in curly kale leaves was well correlated with the concentration of flavonoids, also here especially with quercetin ($r = 0.76, P < 0.001$). In apple peel, the concentration of total flavonoids was well correlated with the epidermal UV-A absorbance ($r = 0.95, P < 0.001$), whereas the anthocyanin concentration was well correlated with the epidermal blue light absorbance ($r = 0.94, P < 0.001$). In conclusion, the ChlF method can be used for non-destructive measurement of flavonoids in a diverse range of fruit and vegetables and can be a valuable tool for monitoring the concentration and distribution of flavonoids in plants both pre- and postharvest.