Abstract:

Time-resolved reflectance spectroscopy (TRS) is a non-destructive method for optical characterization of highly diffusive media by using a pulsed laser source. The absorption coefficient μa and the transport scattering coefficient μs' are estimated by fitting the time distribution of the diffusely reflected light pulse with a theoretical model of light distribution. Pears in CA storage can show brown heart (BH), an internal disorder which is only detectable after cutting the fruit. Aim of this work was to test if BH could be detected in intact pears by TRS methods and to assess the depth of the probed volume. 'Conference' pears with low risk of BH (normal picking time, storage in CA with 0.7% CO2 and 2% O2) or high BH risk (late picking, storage in 5 % CO2 and 2% O2) were measured by TRS (20 replications) after 6 months' storage and again after shelf life of 7 days at 20°C. TRS measurements were performed at 720 nm and 690 nm scanning each fruit on the equator at eight equidistant reference points. After the last TRS measurement the fruits were cut equatorially and the presence and position of disorders in the internal tissue (browning and cavities, over ripening, bruises) was examined. Sound and BH affected fruits were discriminated by the absorption coefficient μa at 720 nm. The development of over ripening and of bruises could be detected by μs' at 720 nm. Absorption at 690 nm, near the peak of chlorophyll, was related to maturity of fruit. This technique allows a description of the virtual appearance of the internal tissue in the intact fruit to a depth of about 2 cm, of the presence of defects and of their position inside the fruit, as it can be visually assessed only after cutting the fruit.