Title Estimation of oxygen uptake rate of tomato (*Lycopersicon esculentum* Mill.) fruits by artificial neural networks modelled using near-infrared spectral absorbance and fruit mass

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Abstract

The oxygen uptake rate of tomato fruits was estimated by an artificial neural network (ANN) model using near-infrared (NIR) spectral absorbance and fruit mass. The absorption peak apex from cytochrome c oxidase (COX) was confirmed at 841 nm for mitochondrial preparation and at 833 nm for intact fruits. The results of a proteome analysis that detected the putative COX subunit II PS17 from the mitochondrial preparation biochemically supported the presence of the absorption peak due to COX. An ANN model for estimating O2 uptake rate was developed from the absorbance data at 11 wavelengths from 645 to 979 nm including 833 nm and fruit mass as input variables. The O2 uptake rate was estimated by the proposed model with a correlation coefficient of 0.79 and a standard error of prediction of 0.091 mmol kg−1 h−1. This method may be effective for rapid estimation of shelf life and physiological activity of tomato fruits.