Deutscher Tropentag, October 11-13, 2005, Hohenheim

"The Global Food & Product Chain—
Dynamics, Innovations, Conflicts, Strategies"

Non-Invasive Methods in Quality Testing of Fresh and Processed Horticultural Produce

Manuela Zude

Leibniz-Institute for Agricultural Engineering Bornim (ATB), Horticultural Engineering, Germany

Abstract

The final quality of a horticultural produce after minimal and intensive processing is highly dependent on the quality of the product entering the process, on the technology applied, and on the storage conditions. Measuring the product maturity and evaluating the impact of processing technologies on the product quality with respect to its anti-oxidant nutrient content is an important task to determine strategies for quality optimization and monitoring in the frame of a reasonable process management.

New methods are recently evaluated for this purpose taking into account their accuracy and feasibility. In this contribution 3 applications of optical technologies are presented for monitoring the maturity, nutritional value, as well as internal damage of fresh and processed horticultural produce:

- In commercial citrus production the fruits' soluble solids content (SSC) is used for determining the optimum harvest date. NIR spectrometry became recently available for measuring the citrus SSC non-destructively. In the present study, monitoring the citrus SSC was carried out on 8 citrus varieties in a shade house and on the farm by means of spectrometric readings (MMS1 NIRenh., Zeiss, Germany) during the harvest period. Comparing the SSC values from fruit grown on the farm and in the shade house indicate a higher variance in fruit grown unprotected. On the farm, trees planted in sandy soil, more severely suffering from water stress developed fruits with slightly higher SSC in the period reported. Such additional information on the fruit maturity at different locations in the production are valuable for an appropriate harvest management.
- Fluorescence spectrometry was applied for analyzing fluorescent nutrients. Polyphenols, vitamin E, and pro-vitamins were measured in extra virgin olive oil subjected to heat impact. Data acquired by means of conventional chromatographic techniques and fluorescence spectrometry were used to monitor the nutritional damage due to processing. Reproducibility of fluorescence spectrometry applied non-destructively appeared with errors of >15 %. High errors are mainly caused by reabsorbing compounds present in the complex product matrix. Therefore, application of laser-induced, time-resolved fluorimetry is presently studied for optimizing the measuring set-up with respect to characteristic life-times of the molecule under question.
- Matrix properties of *Lycopersicum esculentum* were analyzed for monitoring the fruit response to sanitizing treatments as high pressure and washing with ozonized water. Physicochemical tissue parameters of tomatoes were measured regarding the spectral reflectance and light scattering behaviour. Readings of light scattering in the tissue

Contact Address: Manuela Zude, Leibniz-Institute for Agricultural Engineering Bornim (ATB), Horticultural Engineering, Max-Eyth-Allee 100, 14469 Potsdam, Germany, e-mail: zude@atb-potsdam.de

provided a sensitive method to quantify the internal damage due to the treatment conditions applied.

Keywords: Citrus production, fluorescence spectrometry, horticultural produce, product maturity, non-invasive quality testing, soluble solids content