Organic apples (cv. Elstar) quality evaluation during hot-air drying using Vis/NIR hyperspectral imaging

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Introduction

- Organic and dried agricultural products is continuously growing and has high market demands
- Non-invasive and non-destructive methods are useful to detect quality metrics to improve production line settings
- Method is based on models that were developed from measured and hyperspectral data relating the visual and quality parameters

Objectives

- To investigate quality metrics predictions such as moisture content and chromaticity using the visible/near-infrared (Vis/NIR) spectroscopy coupled with chemometrics during the drying process

Materials, Methods and Statistics

PLSR model
Determined in terms of regression vector (RV)

Results

- A good moisture content prediction model was achieved on the test set with highest $R^2$ (0.98) and lowest RMSEP (0.27 g Water/g D.M) (Fig 1a)
- The highest peak was observed at wavelengths 580 nm and downward peaks at 680 nm and 970 nm (Fig 2b and 2c)
- At 970 nm, there might be the non-bonded O-H stretching second or third overtone vibration in water and free water molecules in the apple slices [1,2]. Specifically, 680 nm is related to change in chlorophyll content [1]

Conclusions

- Colour ($a^*b^*$) parameter changed at each drying interval compared to the onset of drying
- RV model had a higher prediction accuracy indicating that wavelengths selected are powerful in predicting the MC and $a^*b^*$ colour of organic apple slices

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