

DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The aim of the project is development of the methods for determination of components and properties fruit juices based on spectroscopic techniques coupled with chemometrics.

The spectra recorded for food samples are determined by their chemical and physical properties and provide their overall characteristics. They are unique for the particular food products, thus constitute their fingerprints. Such fingerprints may be used for qualitative and quantitative analysis, however the extraction of analytically useful information from non-selective spectral signals requires the application of the chemometric methods of analysis.

We will develop the calibration models, which will describe the relations between the juice spectra and its particular properties, for example, concentrations of certain components or certain properties. Once such calibration models will be established, the property of interest could be predicted from spectra of the respective tested sample. As a result, complex chemical analyses could be replaced by the simpler and faster spectral measurements. The spectroscopic techniques are ideally suited for fingerprinting analysis. The measurements are relatively simple but the obtained spectra provide the vast quantities of analytical information.

We will study apple and selected berry juices – strawberry, red raspberry, black currant, chokeberry, and mixtures of apple juice with respective berry juices. The studied samples will be analysed using conventional methods to determine selected components and properties that affect the nutritional value, sensory properties and the health-promoting function of the juices

For spectroscopic analysis we will use different techniques including: NIR, MIR, and UV Vis absorption and fluorescence. These techniques will provide complementary characteristics of samples.

For investigation of relationship between spectral and analytical data we will use various chemometric methods. The preliminary analysis of data will be performed using exploratory methods. For development of quantitative calibration models we will apply different regression methods. The qualitative models will be developed using classification/discrimination methods. These models could be used for identification of juice membership to particular category. Different models will be tested, including that for individual spectroscopic method and for fused data. The performance of different methods of data fusion and pre-processing, as well as model optimization and validation, will be compared.

The result of the project will be development of new fingerprinting methods, that will be useful for comprehensive analysis of fruit juices. The results will also enable the better understanding of the relation between properties of fruit juices and their spectral characteristic.

The fingerprinting methods could be used in fundamental studies in food science, as well as, for routine food quality assessment and process control.

The developed methods have several advantages as compared to conventional analytical methods. The methods can be applied directly, on the intact samples, avoiding any pre-treatment and using chemical reagents. They are fast, simple, time- and cost- effective as well as environmentally friendly. would be particularly useful for routine, quality control, when the large number of samples is analysed.