

Classification of Polish honeys by Mid-Infrared Spectroscopy and Multivariate Statistical Analysis

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There is a great scientific and commercial interest around the world in the characterization of unifloral honeys because of their unique chemical composition and biological properties [1, 2]. Honey is an extremely variable and complex mixture of mono and polysaccharides and other components but consists mostly of glucose and fructose. The actual proportion of these monosaccharides in any particular honey depends largely on the source of the nectar.

Mid-infrared Fourier transform spectroscopy with attenuated total reflection (ATR) sampling and multivariate analysis were used for identification and classification of Polish honey. This method is rapid, non destructive, with high precision and reliable detection. The 65 honey samples from different floral sources (acacia, buckwheat, heather, lime, rope, honey-dew and polyfloral) and from different locations across Poland, were spectrally measured in middle infrared region of 4000-500 cm^{-1} . Spectra were recorded with resolution of 1 cm^{-1} using the Bio-Rad FTS-6000 spectrometer equipped with Pike MIRacle™ ATR accessory.

Partial least squares and principal component regression analysis were used for quantitative analysis of spectral data while linear discriminant analysis, canonical variate analysis and classification tree analysis were used to discriminate honey samples. Classification accuracy near 100% was achieved by discriminant and classification tree analysis.

The use of these good quality spectra of both: honeys and properly prepared sugar samples, together with application of multivariate statistics methods, allowed us to specify among others measurands the glucose/fructose ratios in honey samples.

The obtained results show that mid-infrared spectra contain valuable information on the botanical origin of honey and can be used for qualitative analysis of main components in honey and for their classification as well.

[1] E. Anklam, Food Chemistry 63 (1998) 549-562.

[2] E. Etzold, B. Lichtenberg-Krag, Eur. Food Res. Technol. online 10 October 2007.