Abstract

The botanical origin of the nectar has an outstanding influence on the chemical composition of honey. Honeys originating predominantly from a single plant species and exhibiting the corresponding physical, chemical and pollen analytical characteristics can be designated as unifloral honeys. They show considerable differences in their sensory properties as well and achieve remarkably higher prices than the common polyfloral honeys due to variable consumer preferences.

Over 650 acacia (*Robinia pseudoacacia*), alpine rose (*Rhododenron* spp.), heather (*Calluna vulgaris*), chestnut (*Castanea sativa*), lime (*Tilia* spp.), dandelion (*Taraxacum* s.l.), rape (*Brassica* spp.), Metcalfa honeydew (*Metcalfa pruinosa*), oak honeydew (*Quercus* spp.) and fir honeydew (*Abies* spp., *Picea* spp.) as well as polyfloral honeys were analysed and characterised with classical physical, chemical and pollen analytical methods.

In order to find alternatives to the time consuming and uncertain classical methods new analytical approaches were looked for. Infrared and front-face fluorescence spectroscopic methods were developed and evaluated. Mid-infrared spectra recorded using an attenuated total reflectance accessory and fluorescence excitation spectra registered between 220 – 400 nm with the emission measured at 420 nm showed the most characteristic differences between the unifloral honeys.

Fluorescence and mid-infrared spectroscopy proved to have an equal potential for the determination of the differnt honey types while near-infrared spectroscopy allowed only a classification of some characteristic unifloral honeys and blossom and honeydew honeys. Data evaluation with regard to a discrimination of the various honey types was performed by using principal component analysis and linear discriminant analysis. It was clearly demonstrated that the unifloral honeys can easily be distinguished from each other while it is much more difficult to differentiate between unifloral and polyfloral honeys. The approach using several subsequent classification functions allowed a reliable determination of both polyfloral and unifloral honeys. The error probabilities (misclassification of a sample of unknown botanical origin) for the eleven honey types studied were generally as low as 3 % with a maximum of 10 % found for alpine rose honey.

In addition to the determination of the botanical origin especially mid-infrared spectroscopy allowed a quantitative determination of water, glucose, fructose, sucrose and melezitose contents as well as fructose/glucose ratio, glucose/water ratio, electrical conductivity, pH-value and free acidity with a satisfying accuracy.

Chemometric evaluaton of the mid-infrared and fluorescence spectra in respect to a determination of the geographical origin of honey showed very promising results as well. However these findings have to be studied in more detail on a more appropriate set of samples.

The present study shows that spectroscopic techniques represent a valuable alternative to the classical methods for a rapid and reliable authentication of the botanical origin of honey.