Effect of Ultrafiltration on Marker Substances in Honey Dew Honeys

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Introduction

Certain phenolic acids and flavonoids are described as useful for the characterisation of some kinds of honey [1, 2, 3, 4]. Already in 1988, Steeg & Montag reported protocatechuic acid as a marker substance for honey dew honey [2] and later, in addition, abscisic acid and ellagic acid [3, 4].
However, these substances as well as pollen and proteins are diminished in their contents in ultrafiltered honeys [5, 6]. So far, no quantitative data are available describing the effects of the filtration process on the amounts of phenolic acids and flavonoids. To study the influence of ultrafiltration on each particular marker substance, several honey dew honeys were analysed before and after ultrafiltration. Selected phenolic acids and flavonoids were quantified applying HPLC-DAD and HPLC-MS/MS.

Experimental

Eight different European honey dew honeys before and after ultrafiltration were analysed. Each honey was diluted with water 1:1 and, after addition of 1% active charcoal according to the amount of honey, the mixture was filtered under pressure (4 bar) through a cellulose acetate membrane (pore size 0.45 µm). The ultrafiltered and the unfiltered honeys were then congenerously cleaned up and analysed by HPLC-DAD and LC-MS/MS. The MRM transitions were optimised using standard substances before carrying out the quantitative analysis of the ultrafiltered and unfiltered honeys with the 3200 QTRAP.

Results

In Figure 1 the contents of certain phenolic acids and flavonoids of different honey dew honeys are presented. The individual amounts ranged from < 0.005 to 7.8 mg/kg. Thus, honey dew honeys are known for their high yield of phenolic compounds. Most of the honeys analysed show a similar profile in the HPLC-DAD chromatogram.
Although, honey 1 and 2 differed notably comparing the content of ellagic acid, they can be considered as honey dew honeys due to their high amount of protocatechuic acid, one of the known marker substances of honey dew honey. This assessment was confirmed by pollen analysis.
Furthermore, it is interesting that the honeys 6, 7, and 8 which were harvested in the same region contained similar amounts of salicylic acid and had a greater content of this phenolic acid compared to the other ones.

In Figure 2 the results for the same honeys after ultrafiltration are displayed. All components were dramatically reduced. Particularly, the flavonoids were affected resulting in a lighter colour of the ultrafiltered honeys. It is assumed that the reduction of the phenolic compounds between 57% and 100% was caused by the use of active charcoal.

Conclusion

- Ultrafiltration using active charcoal as a filter aid diminishes the colour of the processed honeys.
- Ultrafiltration reduces the amounts of selected phenolic compounds in the range of 57% and 100%.

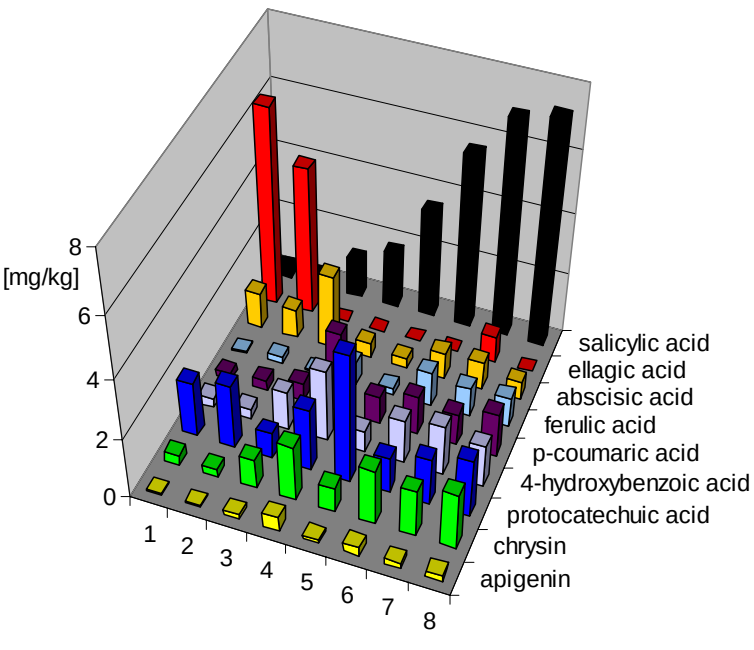

Fig. 1. **Contents of selected phenolic acids and flavonoids in honey dew honeys**

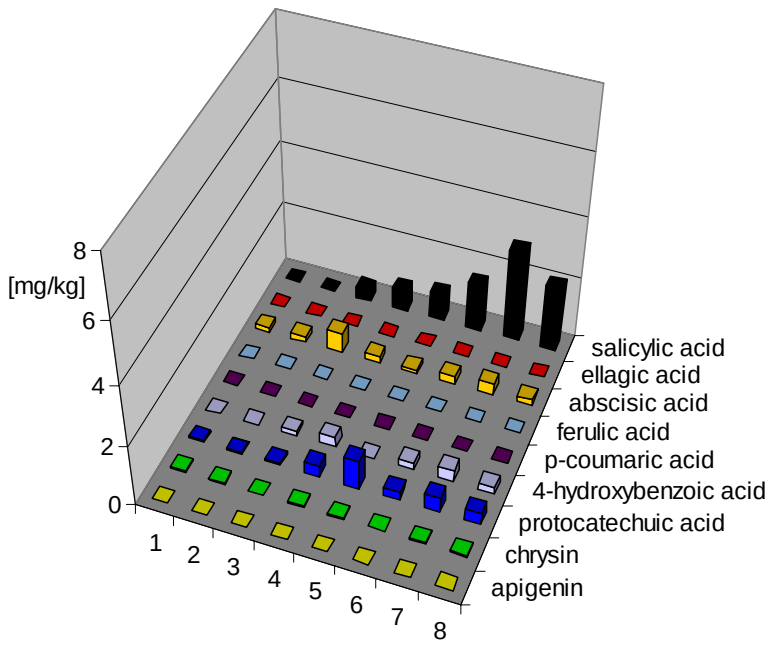

Fig. 2. **Contents of the phenolic acids and flavonoids after ultrafiltration**

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