APPLICATION OF FLORAL SCENT ANALYSIS IN THE VERIFICATION OF HONEY AUTHENTICITY

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INTRODUCTION

The price of honey depends on its origin, monofloral honeys being the most highly appreciated. Certain types of honeys have been acknowledged by the European Union as a PDO (Protected Designation of Origin) product, which means among others that the product has unique quality. (*E.g.: Meli Elatis Menalou Vanilia, Mel de Galicia, Miel de Provence.)* Therefore (apart from deliberate honey adulteration, which is a major concern in honey trade and marketing) verification of the floral and geographical origin of a honey is in the focus of honey analysis. There are two main approaches to the problem. The first deals with several composition parameters (sugar ratio, moisture, ash content, enzyme activities etc.) and uses principal component analysis or other statistical devices for categorizing the samples [1]. The second searches for markers of the origin, *e.g.* special components deriving from the flower. [2], [3]
Our work applies this second approach searching for common compounds in the flower and the honey. In the recent study we have investigated three types of honeys and the corresponding flowers searching for identical compounds in them. The honey samples have been purchased from artisanal honey producers and derived from two consecutive harvest seasons. According to the producers' knowledge honeys were monofloral. Flower samples originate from bee pastures near to the nectar collecting fields. The honey samples were stored in screw-capped glass sample jars at room temperature in dark until required for analysis. Flower samples were processed immediately (*i.e.* during the ensuing day of the collection.)

MATERIALS AND METHODS

Sample preparation
Flower samples: Solidago, Tilia, Limonium sp. flowers
200 g sample, homogenization, chopping.
Internal standard: 0.4 mg undecan-1-ol

200 g sample+900 cm^3 distilled water+200 g NaCl (salting out)+internal standard – distillation in modified Likens-Nickerson distillation-extraction apparatus for 1,5 hour, extract in n-pentane
Extract drying over dehydrated sodium sulphate
Extract concentration by evaporation to 1 cm^3
1 ml extract gas chromatographed
Honey samples: Solidago, Tilia, Limonium unifloral honeys
900 g of honey sample+600 cm^3 distilled water+
0.4 mg ISTD+200 g NaCl – distilled according
to the flower method

GC-MS analysis
Instrument: Hewlett Packard 5890/ II GC - 5971A MSD
Column: 60 m x 0.25 mm ID Supelcowax 10 (fused silica)

RESULTS AND DISCUSSION

In the recent study three honey samples have been investigated which some way or other could be regarded as specialities.
Limonium species could be find on saliferous soils and its honey is very rare as monofloral nonetheless it is a delicious honey.
Solidago or goldenrod is a late bloomer, flowering in late summer into the fall and gives beekeepers the last opportunity of collecting honey. Solidago honey therefore appears as monofloral only in the "bad" harvest seasons, when producers are compelled to take advantage of the autumn collecting season. Solidago honey is dense and aromatic.
Linden honey is not exactly rare, but is highley appreciated and a pricey one. The cause is the erratic nature of Tilia trees, which give nectar mainly during the night and therefore beekeepers do not prefer. Because of high price it is prone to be adulterated.

The Likens-Nickerson simultaneous distillation-extraction equipment proved to be very suitable for sample preparation giving solutions rich in volatile components. The GC-MS analysis discovered numerous compounds in the distillates and made possible the characterisation of the samples.

Nevertheless no unique compound has been found in the distillates of the Limonium flower and honey in spite of the abundance of volatile and measurable components. The sample contained only derivatives that are ubiquitous in the plants and are not characteristic of the Limonium species.

In case of linden (Tilia) however three common compounds have been found in the flower and honey distillates. Linden ether (a name from the source, *i.e.* marker), cis-Rose-oxid and Chrysanthenon have not been found yet in any other investigated honey samples. These compounds could be used as marker compounds and could prove the floral origin of the honey.

Goldenrod (Solidago) honeys and flowers show very special volatile spectra due to the presence of sesquiterpene Germacrene D and its derivatives. Germacrene is not uncommon in plants because it is a key intermediate in the biosynthesis of many sesquiterpenes. Literary sources do not however report any occurence of it in honey samples neither it has appeared in our honey samples investigated so far. Germacrene D, delta- Elemene and delta-Cadinene seem to be good marker compounds of the floral origin of Solidago honeys.

REFERENCES

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MICROWAVE AND CONVENTIONAL HEATING EFFECTS ON SOME PHYSICOCHEMICAL PARAMETERS OF HIGH OLEIC AND LINOLEIC SUNFLOWER OIL

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ABSTRACT

The effect of microwave heating on some physicochemical parameters and oxidative stability of two sunflower oil (oleic and linoleic type), which have different lipid composition was studied. Each oil was heated by microwave energy of 360, 600 and 900W for 3, 6, 9 and 12 minutes. The results were juxtaposed to the ones, received by conventional heating and duration of 18 minutes. It was determined that by microwave and conventional heating of 900W for of sunflower oil no hydrolysis processes are observed. The oxidation degree in both types of oil increases with the increase of energy and the duration of microwave heating. The peroxide value and the conjugated dienes after 12