



DETERMINATION OF LATVIAN HONEY FLORAL ORIGINS USING IRMS, UHPLC-HRMS, ICP-MS, FT IR AND 1H-NMR

Natural bee honey is a sweet product made by honeybees (*Apis mellifera L.*) and it has grown in scientific interest in the past decade. Modern and efficient methods of honey analysis are needed in order to assure products quality. One of many honey quality cornerstones is floral origins determination. Monofloral honey has to be gathered from one major floral source at a certain threshold level, so the presence of other plant interference is inevitable, thus making this a difficult task [1].

To investigate possibilities of Latvian honey floral origins determination, the wide instrumental analysis of isotope ratio mass spectrometry (IRMS), ultra-high performance liquid chromatography-high resolution mass spectrometry (UHPLC-HRMS), inductively coupled plasma-mass spectrometry (ICP-MS), Fourier transform infrared spectroscopy (FT IR) and nuclear magnetic resonance (NMR) methods were performed to 78 natural honey samples obtained from local Latvian manufacturers. The true floral origins for used honey samples were verified by melissopalynology analysis. Additionally, a chemometric approach was performed using principal component analysis (PCA) [2].

The preliminary results show that depletion of $\delta^{15}\text{N}$ values might be a useful indicator for heather honey due values were statistically different after ANOVA one way test and PCA indicated characteristics of C and N percentage in proteins to monofloral heather honey. Increased rutin levels were observed to buckwheat honey using UHPLC-HRMS. PCA results of FT IR spectra and ICP-MS showed potential to distinguish buckwheat honey from other floral sources while PCA of binned NMR spectra showed the most diversity of honey floral origins assessment.

References:

[1] Puścion-Jakubik, A.; Borawska, M.H.; Socha, K. Modern Methods for Assessing the Quality of Bee Honey and Botanical Origin Identification. *Foods* 2020, 9, 1028. <https://doi.org/10.3390/foods9081028>

[2] Labsvards, K.D.; Rudovica, V.; Kluga, R.; Rusko, J.; Busa, L.; Bertins, M.; Eglite, I.; Naumenko, J.; Salajeva, M.; Viksna, A. Determination of Floral Origin Markers of Latvian Honey by Using IRMS, UHPLC-HRMS, and 1H-NMR. *Foods* 2022, 11, 42. <https://doi.org/10.3390/foods11010042>

Acknowledgments:

This work was supported by grant "Recognition of monofloral honey of Latvian origin using nuclear magnetic resonance, chromatographic, isotope ratio mass spectrometry and chemometric methods" grant Nr. LZP-2020/2-0200 & "Strengthening of the capacity of doctoral studies at the University of Latvia within the framework of the new doctoral model", identification no. 8.2.2.0/20/I/006.

Primary authors: DĀVIDS, Krišs (University of Latvia, Faculty of Chemistry); Dr RUDOVIČA, Vita (University of Latvia, Faculty of Chemistry); Dr RUŠKO, Jānis (Institute of Food Safety, Animal Health and Environment "BIOR"); Mr KLŪGA, Rihards (University of Latvia, Faculty of Chemistry); Mrs BUŠA, Lauma (University of Latvia, Faculty of Chemistry); Mr BĒRTIŅŠ, Māris (University of Latvia, Faculty of Chemistry); Ms EGLĪTE, Ineta (Latvian Beekeeping Association); Ms JEVGEŅIJA, Naumenko (University of Latvia, Faculty of Chemistry); Mrs BODROVA, Marina (University of Latvia, Faculty of Chemistry); Prof. VĪKSNA, Arturs (University of Latvia, Faculty of Chemistry)