ABSTRACT

This diploma thesis is devoted to the proteomic identification of selected nuts in festive cookies. Two types of mass spectrometry were used for the nut identification; their outcomes allow for comparison and completeness of the data. The theoretical part provides a comprehensive overview of the nutritional values of nuts and the issues of food fraud and authenticity. It concludes with a didactic view and potential applications in chemistry lessons and other school subjects.

The experimental part analysed eleven different nuts, submitted to high temperatures, which simulated baking and seven different types of festive cookies (six mass-produced cookies and one type of cookie with priorly unknown content of nuts). Mass spectrometry MALDI-TOF was used with subsequent evaluation using relational database system PostgreSQL to obtain characteristic m/z values for each of the eleven heat-subjected nuts. These values were then compared to the m/z values of the festive cookies to identify declared nuts and nuts used in the "unknown" sample. This identification was proved with various success rates in four of six mass-produced samples. The success rate was derived from the number of unique m/z values found in each of the nuts. The "unknown" sample was correctly identified based on the presence of one third of unique m/z values characteristic of the nuts.

Furthermore, an additional method used to analyse the protein components of the festive cookies samples was mass spectrometry LC-ESI-Q-TOF, which provided more detailed information about the present peptides and the amino acid sequences. The m/z values obtained from this method were compared to the unique values from MALDI-TOF MS; however, the data overlap was relatively low. This result suggests that the MALDI-TOF MS method is more accurate; nevertheless, a relevant comparison of both methods is ambiguous for now.

Nonetheless, considering the higher accuracy and sensitivity of the LC-ESI-Q-TOF MS method, it is to be expected its wider use and even the possibility of surpassing the success of measurements from MALDI-TOF MS.

KEYWORDS