ABSTRACT

This bachelor thesis investigates the possibility of differentiation of certain kinds of nuts with the help of mass spectrometry used in protein analysis. The theoretical part provides an overview of nuts – their morphology, systematics, and their nutritional value. It also reports on the benefits and risks of their consumption. The theoretical part concludes with analytic methods for protein analysis in general and touches on specific studies related to the research of nuts.

The experimental part solely reflects on the protein composition of nuts. Eleven different samples of nuts were used, the specimens were very finely ground, and their proteins were broken down by the enzyme trypsin. Afterwards with the use of mass spectrometry MALDI-TOF (Matrix-Assisted Laser Desorption/Ionization Time-of-Flight) mass spectrum of each sample was obtained. These spectra were later analysed with the use of PCA (Principal Component Analysis) to simplify them for easier comparison. The PCA based comparison was successful, therefore further evaluation was conducted. A next goal was to obtain unique m/z values for each nut that was also successful. In addition, a more specific method of mass spectrometry LC-ESI-Q-TOF (Liquid Chromatography Electrospray Ionization Quadrupole Time-of-Flight) was able to identify typical peptides. These peptides determined proteins contained in samples.

All findings are applicable for further research into plant proteins in botany. There is also a potential for a study of found proteins as possible allergens. All outcomes of this thesis could be used for the identification of plant-based proteins in certain processed food and possible exposure of counterfeit food.

KEYWORDS

Mass spectrometry, nuts, proteins, principal component analysis