ABSTRACT

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Title of the Dissertation Thesis:

The use of HPLC technique in the analysis of phenolic compounds in plant material of fruit trees

Although fruits are well studied and known for their high content of antioxidants and positive health benefits, the main aim of the presented dissertation thesis consists in the characterization of biological active compounds in individual parts of fruit tree material (leaves, bark, buds, flowers, and wood chips).

The theoretical part is focused on fruit trees and the characterization of phenolic compounds. Their properties and the effects based on current scientific studies are shown. A large part of thesis is dealing with the chromatographic methods for the separation of phenolic substances including the current trends. The extraction process is also included.

The practical part deals with the validation and development of screening HPLC-DAD method for the analysis of monitored phenolic compounds (phloridzin, phloretin, chlorogenic acid, quercitrin, rutin, arbutin, 1,5-dicafeoylquinic acid, and 3,5-dicafeoylquinic acid) in individual parts of fruit trees. The main objective of this thesis is to determine changing phenolic profile within the vegetation period. Extraction process of the monitored substances is presented in order to find the optimal conditions for the highest recovery that was the critical point. Moreover, hot water as a solvent was used to extract pear leave and antimicrobial activity of these extracts was determined.

A YMC Triart C18 ExRS (150 × 4.6 mm, particle size 5 µm) (apple tree material) and Ascentis Express RP amide (150 × 4.6 mm, particle size 2.7 µm) (pear tree material) were used for analysis. Ten apple and pear tree cultivars were harvested in period of March-April, June, August-September, and November. The major phenolic compounds were definitely phloridzin in apple trees, and arbutin and chlorogenic acid in pear trees. In terms of the occurrence of phenolic compounds, the most important is the leaves in spring season. The richest cultivars were ´Rubinstep´ (apple tree) and ´Konference´ (pear tree).

The results of this thesis offer the possibility of using abundant and unused agricultural waste material for the development of original products in the pharmaceutical, food, and cosmetic industry. The reason is the enormous amounts of phenolic compounds that concentration is significantly higher than in fruits.