ABSTRACT PROCEEDINGS

II Conference FoodWaStop

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Sustainable Network for agrofood loss and waste prevention, management, quantification and valorisation

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FoodWaStop COST OVERVIEW

The **FoodWaStop COST**, is a scientific cooperation network, "CA22134 – Sustainable Network for agrofood loss and waste prevention (FLW), management, quantification and valorisation » funded by COST ACTION programme that addresses the following challenges and aims to: (i) build an interdisciplinary and multi-actor European Network that will also connect with non-EU Mediterranean countries, to promote knowledge on FLW beyond the state of the art; (ii) determine incidence of FLW in the critical points of the fruit and vegetable value chain; (iii) foster technological innovations and sustainable management strategies to reduce and prevent FLW; and (iv) valorise agrofood waste to promote a circular bio-economy.

The experience of the Coordinators and Participants gained from other related projects (e.g., PRIMA, H2020), the background from diverse EU and extra-EU countries, and the involvement of stakeholders and industry partners will contribute to increase awareness of this problem, to determine its incidence, to seek strategies for its management through exploitation of the potential of innovative technologies, and to define good practices to prevent FLW.

The **FoodWaStop** Network will provide benefits to various stakeholders and end-users, including all actors in the agrofood value chain, from farmers (Farm) to consumers (Fork). Moreover, **FoodWaStop** will create a knowledge platform that will promote innovation, deliver guidelines, and favour dialogue with policymakers, to focus their attention on the social and economic implications of FLW.

P2.13. Polyphenol Release from Wild Thyme Dust Extract in Simulated Gastrointestinal Fluids

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In traditional medicine, wild thyme (*Thymus serpyllum* L.) is a part of various herbal medicines because of the presence of various bioactives, includinh luteolin, apigenin, catechin, rutin, quercetin, and chlorogenic, caffeic, salvianolic, and rosmarinic acids. Plant waste or dust possesses plenty of active compounds that can be applied in various food, functional food, and pharmaceutical products. Due to the dominant per os application of the plant and its formulations, polyphenol release from wild thyme dust extract in simulated gastrointestinal fluids was investigated.

The extract was prepared using wild thyme dust and 50% ethanol with hydrochloric acid in maceration at a solid-to-solvent ratio of 1:30 g/mL, for 60 min. The particle size of the plant material was 0.3 mm, as a result of the intensive comminution of the starting herbal matrix. An in vitro release study was performed using the Franz diffusion cell with two compartments separated by the acetate-cellulose membrane. The study was conducted in simulated gastric fluid (SGF) and simulated intestinal fluid (SIF). SGF contained hydrochloric acid, sodium chloride, and pepsin (pH 1.2), whereas SIF contained potassium phosphate, sodium hydroxide, pancreatin, and bile salts (pH 6.8). The data has shown that the release of polyphenol compounds in SGF continuously rose during 240 min and reached a value of 56.64% of recovered phenolics. Nevertheless, the quantity of polyphenols in the receptor compartment did not reach a plateau after 240 min of the tested period. At the same time, the diffusion of polyphenols from the extract in SIF was slower, and only 20.95% of phenolics were released during 420 min. The steady state in SIF was achieved after 360 min. The presence of pancreatin and bile salts (in SIF) can decrease the polyphenol diffusion from extract through a hydrophilic acetate cellulose membrane of the Franz diffusion cell, thus the percentage of released polyphenolics was significantly lower. Wild thyme extract was prepared at an acidic

pH value allowing the extraction of bioactive compounds soluble in this pH range. Thus, the extracted bioactive compounds showed faster and higher release in gastric conditions.

The polyphenol diffusion from the extract in SIF was slower in comparison to the gastric environment. In addition, the content of released polyphenolics was lower in SIF. The data obtained encourage encapsulation of wild thyme extract polyphenols to protect them from acidic conditions and provide prolonged/controlled diffusion in the intestine.

The study showed a higher polyphenol release from wild thyme dust extract in SGF compared to SIF. Since the release of phenolics in the gastric environment is not desirable, the study confirmed that the protection of sensitive bioactives and their prolonged and controlled release in intestinal conditions using various carriers is necessary.

Keywords: *NA*

P2.14. Protein Extraction from *Daucus carota* L. Root Peel: Optimization of Extraction Solvent and Procedure

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Daucus carota L. (carrot) is used due to its nutraceutical and health benefits, related to the presence of phenolic compounds, carotenoids, and ascorbic acid which possesses antioxidant, anti-aging, anti-inflammatory, and anti-proliferative activities. In addition, the anti-freeze proteins from *D. carota* can be successfully extracted and are more suitable for industrial applications as cryoprotectants. Thus, in the present research, polyphenol and protein extractions from *D. carota* root peel were optimized to obtain polyphenol- and/or protein-rich extracts from waste.

Polyphenol and protein extractions from carrot root peel were performed *via* varying extraction mediums (water, 30% ethanol, and extraction buffer) and extraction techniques (heat- and ultrasound-assisted procedures, HAE and UAE, respectively). The total polyphenol content was in a range of 1.04 to 1.91 mg gallic acid equivalent/g of fresh plant material, achieving the highest values in the following samples: water and UAE>ethanol and HAE. The total protein content values varied in a range of 5.21 to 8.76 mg albumin equivalent/g of fresh plant material, achieving the highest yields in the following extracts: extraction buffer and HAE≥water and HAE≥water and UAE. Since polyphenol and protein extracts can be further used for food products, the choice of solvent was an essential step. In all samples, extraction solvent type significantly affected polyphenol and protein yields. Ethanol carrot extracts showed significantly lower protein content but high polyphenol yield. Water extracts showed high polyphenol and protein contents, while the samples prepared using extraction buffer possessed high protein yield but low polyphenol concentration. On the other hand, only in the case of the extraction buffer, the high temperature provided the extract with a statistically significantly higher protein yield in comparison to the UAE parallel. Namely, the extraction procedure did not have a significant influence on the protein concentration of the water and ethanol extracts, while in the case of extraction buffer, the high temperature provided the extract with a statistically significantly higher protein content compared to the parallel obtained by ultrasound waves. However, the

extraction technique significantly affected the polyphenol content depending on the employed extraction medium.

The highest polyphenol yield was achieved using water and UAE, while the highest protein content was in the sample prepared using extraction buffer and HAE. Future experiments can be focused on the investigation of individual target polyphenols and proteins of *D. carota* peel and their potential implementation in food and functional food products.

The potential application of prepared extracts into food, functional food, or dietary supplements would realize the principle of the circular economy - from waste to bioactive formulation or value-added product.

Keywords: *NA*