

From plant extracts to functional composites for food applications

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Colored fruits and vegetables represent an important source of biologically active compounds, such as polyphenols, carotenoids, flavonoids, anthocyanins, phenolic acids etc. Most of these natural compounds have been demonstrated to have potential health benefits, such as antioxidants, anti-inflammatory activities, etc. Therefore, these compounds may represent natural plant-derived alternatives to synthetic and insect-based dyes, which are under disrepute due to potentially harmful effects to human health.

However, when applying plant pigments to food, their limited stability needs to be considered. Their stability can be improved by extraction and microencapsulation in order to protect and to control the delivery of the target compound at the right time and the right place.

These issues were the main objectives of the project **Functional composites based on whey protein and vegetable extracts for food applications**, acronym **FunFood** developed between 2015 and 2017 by the „Dunărea de Jos” University of Galati and UEFISCDI (www.uefiscdi.ro) (HUMAN RESOURCES PROJECTS - PNII-RU-TE-2014-4-0115, Contract No. 42/2015).

The **FunFood** project aimed to:

- ❖ Develop new concepts for improving the functionality of biologically active compounds extracted from different fruits and by-products, such as: sea buckthorn and sour cherries skins;
- ❖ Design new food composites with high functionality by using modern techniques, such as microencapsulation;
- ❖ Develop new functional food products by using the microencapsulated composites in different formulation, such as: yogurt, biscuits, muffins, jellies, etc.

From a scientific perspective, the **FunFood** project aligned at Horizon 2020 strategy, namely **increasing the innovation capacity, through achieving the necessary skills and developing new products with high potential for technology transfer**. The project aimed to contribute to outsourcing research results with a higher technological transfer potential in order to reduce the gap between research and innovation.

The **FunFood** project obtained composites with high functionality through a *bottom-up* (scientific background regarding the binding mechanisms between whey protein and polyphenolic compounds) and *top-down* (designing new functional food) approaches in order to control the process-structure-function relationship. Therefore, two major classes of biologically active compounds were considered: polyphenolic compounds, especially **anthocyanins** from sour cherries skins and **carotenoids** from sea buckthorn. These compounds were extracted from their natural environment, characterized in terms of phytochemical profile and stability at different processing parameters, and successfully microencapsulated in different matrices. These resulted in a series of **composites**, with highly functionality, such as: antioxidant activity, higher processing stability, *in vitro* digestibility, antifungal activity, etc. Further, the microencapsulated powders were used to develop value-added food products.

More details on the project results: www.funfood.ugal.ro.