Probiotication of fruit juices for the development of functional beverages

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State-of-the-Art

Vegetarian and vegan diets

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Human health and gastrointestinal microbiota health

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Role of nutrition in health

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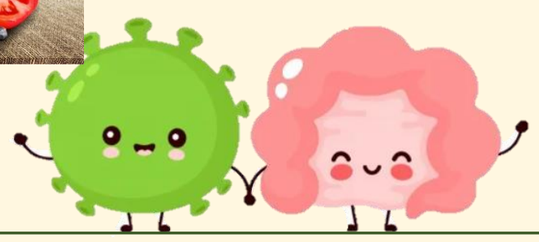
Fruit juices as probiotics carriers



That of probiotic foods, is a dynamic market with a strong potential for innovation. In this context, fruit juices would seem suitable for the development of new probiotic beverages.
The biggest challenge concern the study of matrix-probiotic interactions that can affect both the survival and functionality of the microorganism; and the physico-chemical and sensory characteristics of the beverage. Direct exposure to a new environment can represent a stress for the cells leading to viability loss. Traditionally, cells viability is determined by its cultivability. However, the existence of a viable but non-cultivable state (VBNC) was found. Instead, probiotic functionality can be controlled by multiple interventions. Through attenuation treatments it is possible to slow down and/or neutralize the influence of the microorganism on the matrix; the development of a transport system for probiotics can ensure their survival both in food and in the gastrointestinal tract. Finally, sensory analysis and consumer response are essential for the development of an industrial process and to evaluate the marketing potential of the final product.

Objectives and Milestones

The PhD thesis project will integrate multidisciplinary skills, including microbiology, food technology, sensory and nutritional sciences. The project is organized in macro-chapters: selection of probiotic strains; probiotic fruit juice formulation; validation of the product as a functional beverage. The main objectives are:
A1) **Evaluation of potential probiotic strains that present characteristics suitable for addition to fruit juices: s**election, isolation and identification. Then a characterization will be carried out on the basis of compatibility with the food matrix.
A2) **Preparation of probiotic cultures to improve their performance in the juice:** activation by repeated stages of propagation in the fruit juice to ensure greater adaptation and a consequent increase in survival; implementation of physical attenuation and study of its effects on the probiotic overall profile; a transport system will be chosen through the comparison between embedding technologies and coating technologies
A3) **Fruit juice probiotication:** food matrix selection; addition of the probiotic and definition of its viability by metabolic and physiological test; selection of packaging and storage conditions.
A4) **Validation of probiotic fruit juice:** simulation of gastrointestinal passage in Simulator of Human Intestinal Microbial Ecosystem (SHIME) and sensory analysis.

References

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