



H.F.R.I.
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Research & Innovation

Description of the funded research project
2nd Call for H.F.R.I. Research Projects
to Support Post-Doctoral Researchers

Title of the research project: Study of the engineering and physicochemical parameters involved in the development of novel, instant kefir based products



Left to right S. Exarhopoulos (PostDoc Res.), D. Georgiou (PostDoc Res.), E. Kalogianni (Assoc. Professor), G. Dimitreli, (Assoc. Professor), A. Goulas (Asst. Professor)

Principal Investigator: Stylianos Exarhopoulos

Reader-friendly title: “InstaKef”

Scientific Area: Agricultural Sciences–Food Science & Technology

Institution and Country: Department of Food Science & Technology, IHU, Greece

Host Institution: International Hellenic University

Budget: 170000 €

Duration: 36 months

Research Project Synopsis

The research project constitutes a novel approach to the technology of powdered kefir based products. Its main goal is the total comprehensive development of new, convenience, functional food products (instant kefir) with favorable sensory properties and standardized quality that will meet consumers' demands. Two drying methods, spray- and freeze-drying, will be used and studied for their efficiency. The effect of spray-drying conditions, kefir pre-treatment and the use of carriers during spray- and freeze-drying will be evaluated based on the resulting products' quality and properties. Determination of the physicochemical, functional (kefir microflora viability and antioxidant activity) rheological and sensory properties of kefir and the reconstituted kefir powder based products will be used to effect evaluation. Further analyses will include powder properties, morphology, particle size distribution, and physical state. The development of a brand new line of products with enhanced functional properties by concurrent spray- and freeze-drying with pomegranate juice will be also attempted. Finally, the product self-life and quality deterioration through time and the effectiveness of different packaging parameters (flexible packaging materials and Modified Atmosphere Packaging-MAP composition) in preserving it will be studied.

Project originality

The novel aspects of this research project are:

- (i) The investigation of the parameters affecting long term kefir microflora viability in conjunction to fermentation and stress responses
- (ii) The use of kefir as a microencapsulation protective medium for improving kefir microorganism survival during spray- and freeze-drying
- (iii) The optimization of spray-drying conditions, with regards to certain quality attributes, based on a drier productivity approach, rather than the temperature profile approach usually applied
- (iv) The investigation of the spray- or freeze-drying properties of other well established carbohydrate carriers in protecting microorganism viability and retaining organoleptic qualities
- (v) The development of an organoleptic comparison model between a sensory panel and certain measurable sensory qualities of the specific product
- (vi) The creation of a novel product through the use of pomegranate juice to further fortify the functional properties of kefir observing at the same time the variations introduced
- (vii) The development of novel instant functional kefir based products with favorable sensory properties and stable quality

Expected results & Research Project Impact

The expected results of the project are: (i) Optimization of the engineering and process parameters of spray- and freeze-drying, including pre-treatment conditions and the use of drying aids with regards to microorganism viability and final product quality, (ii) Evaluation of powder products properties and morphology, (iii) Comparison of the fresh unprocessed kefir properties and the kefir powder derived products following reconstitution, (iv) Utilization of kefir and its properties to act as a thermo- and cryo-protectant for the viability preservation of probiotic microorganisms, (v) Enhancement of the functional/nutritional and sensory properties of the products with concurrently pomegranate juice, (vi) Enhancement of the convenient use of the product including powder rehydration properties and (vii) Determination of product quality deterioration through time and the effectiveness of different packaging parameters in order to extend shelf-life and preserve its quality.

Scientific Impact: InstaKef will provide new fundamental and applied knowledge on the effect of drying process on the functional properties of kefir determining the degree of survival of health promoting microorganisms and antioxidant properties, as well as on the structure of complex foods which further affects its rheological, sensory and reconstitution properties. The project will extend the knowledge related to spray- and freeze-drying processes and their effect on complex food colloidal systems which could further develop new areas of application. Moreover, the knowledge gained from the production of dried kefir products could be potentially applied to other novel dairy products.

Societal and economic impact: A health promoting instant product that will be easy to reconstitute, with comparable quality characteristics with drinking kefir will be available to consumers at their daily activities. The exploitation of the proposed project achievements will enhance the national dairy industry competitiveness and create new market opportunities. The capability of new products to transport and store at ambient temperature will increase the profit margin of the industry keep contributing at the same time to a lower overall energy consumption that will benefit the environment.

The importance of this funding

The funding of the research project InstaKef by H.F.R.I. is an honor for our team and a recognition of our research activity over the last years.

The financial support of H.F.R.I. is beneficial to me and the other members of the research team, a postdoctoral researcher and a PhD candidate.

An opportunity is also given to me to gain experience in coordinating and managing research projects.

Finally, the results from the implementation of the program can be the basis for future collaborations.

Principal Investigator
Stylianos Exarhopoulos



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COMMUNICATION

185 Syggrou Ave. & 2 Sardeon St. 2
171 21, N. Smyrni, Greece
+30 210 64 12 410, 420
communication@elidek.gr
www.elidek.gr