Title of the PhD project: Smart systems for food biopreservation by lactic acid bacteria

Disciplines: Biotechnology and Food microbiology

Laboratory (lab. name, director name): BioDyMIA, Pr Pascal DEGRAEVE

Doctoral school: Interdisciplinary Doctoral program in health-sciences (EDISS) - ED 205

Description

Scientific background and rationale: While fermentation of foods by lactic acid bacteria (LAB) has proved its efficiency since ancient times, the use of selected bioprotective LAB strains sprayed on the surface of perishable foods such as seafood is still in its infancy. In a previous study, we designed an original aqueous two-phase system (ATPS) suitable for bioprotective LAB viability preservation as well as antimicrobial metabolites production [1].

Aim: The aim of the present study will be to investigate the different mechanisms by which LAB control the growth of unwanted microorganisms in order to provide the scientific basis for the rational design of smart biopreservation systems suitable for perishable foods preservation.

Description of the project methodology:

- (i) Investigation of the respective contributions of the different mechanisms by which LAB entrapped in systems such as ATPS (colonization, competition for nutrients, production of non-volatile antimicrobial metabolites, respiratory activity, redox potential modification...) control unwanted microorganisms.

- (ii) Study of the effect of factors such as temperature abuse on the antagonistic activity of LAB (biopreservation of foods by LAB can be considered as a smart solution since LAB antagonistic activity (e.g. production of antimicrobial metabolites) would be promoted by the same factors than growth of unwanted microorganisms)

- (iii) (i) and (ii) will provide scientific basis for the rational design of smart biopreservation systems. The proof of concept of the efficiency of such systems will be tested on high-value perishable foods such as packaged raw meat [2].

Expected results:

- Scientific knowledge regarding the physiology of entrapped LAB and their antagonistic activity against food-spoiling and food-borne pathogenic bacteria

- Proofs of concept regarding smart biopreservation systems based on LAB association to biopolymers for perishable foods preservation

Perspectives:

- scientific expertise regarding physiology and antagonistic activity of LAB in polymeric matrices

- smart perishable foods biopreservation systems based on LAB association with biopolymers

Skills required: practical skills in biotechnology & microbiology, good written and oral communication skills will be an asset

Bibliography:


Keywords: lactic acid bacteria, entrapment in biopolymers, biopreservation of perishable foods

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Application should include: CV, application letter, Names and addresses of two references. The application file should be sent before May 14, 2017 to: nadia.oulahal@univ-lyon1.fr

The open competitive recruitment process is in two steps: 1. Internal laboratory procedure. 2. Interdisciplinary jury of EDISS.