



TITLE

Evaluating the biocontrol potential of spore forming bacteria

LAB & PEOPLE

- **Name of the hosting lab:** Laboratoire Universitaire de Biodiversité et Ecologie Microbienne (LUBEM) -Quimper, Université de Brest, INRAE
General activities of the lab: Study of the biodiversity and ecology of microorganisms, mainly in food and environment.
Website: <https://www.univ-brest.fr/lubem/>
Number of staff / PhD: 35/10
- **Supervisor name and contact:** Noémie Desriac, assistant professor (noemie.desriac@univ-brest.fr) and Anne-Gabrielle Mathot, assistant professor (mathot@univ-brest.fr)

TOPIC OF THE INTERSHIP

- **Scientific context of the internship (max 20 lines)**

The FAO's 2030 Agenda defined 17 goals to fulfil the basic human needs to everyone by using intelligent and sustainable science. The food and agriculture lie at the heart of this Agenda and in this perspective, microorganisms can play a major role¹. Indeed, history made clear that microorganisms which have to withstand various conditions, play key role in the environment and if used wisely, they can contribute to a sustainable development. Bacterial endospores have been known since the dawn of microbiology although they are mostly studied for their pathogenicity and spoilage issues in the food science. However, the ubiquitous character of endospore forming bacteria linked to the variability in their phenotypic behaviour (*e.g.* psychrotrophily, mesophily, thermophily, acidophily,...) and resistance make them good candidates for direct applications in agriculture and food industry. Furthermore, their ability to form heat- and desiccation-resistant endospores allow them to survive the preparation of bacterial formulations for further use in food industry. In addition to FAO's agenda, consumers become more conscious of food safety significance which is associated with a strong demand for more natural products and production ways. Thus, the use of novel biocontrol methods is gaining further interest². Biological control agents have been the focus of considerable research in agriculture and food fields. In that context, the biological agent was mainly investigated for limiting pathogenic microorganisms for plant or human. In the food chain, one battle for better controlling pathogenic microorganisms and thus ensure food safety is the biofilm. On most occasion, biofilms are formed or colonized by spoilage or pathogenic microorganisms and can serve as source of cross-contamination in foods³. Thus, the present project aims at exploring the biocontrol potential activities of spore forming bacteria against these harmful biofilms.

Keywords: Spore forming bacteria; Biocontrol; antibacterial; biofilms



Bibliography

1. Akinsemolu, A. A. (2018). The role of microorganisms in achieving the sustainable development goals. *Journal of cleaner production*, 182, 139-155
2. Gray, J. A., Chandry, P. S., Kaur, M., Kocharunchitt, C., Bowman, J. P., & Fox, E. M. (2018). Novel biocontrol methods for *Listeria monocytogenes* biofilms in food production facilities. *Frontiers in microbiology*, 9, 605.
3. Alvarez-Ordóñez, A., Coughlan, L. M., Briandet, R., & Cotter, P. D. (2019). Biofilms in food processing environments: challenges and opportunities. *Annual review of food science and technology*, 10, 173-195.

- **Tasks and duties entrusted to the student:**

The student will realise different antibacterial assays will against *Salmonella enterica* and *Staphylococcus aureus* bacteria. Classical method of antimicrobial discovery will be used meaning well diffusion and deferred antagonism assays. Anti-biofilm effects will be tested at different biofilm phase meaning at the adhesion level, during and after the formation. At last, quorum quenching activity will be evaluated using reported strains.

- **Skills to be acquired or developed:**

The student should acquire expertise in microbiology, in the evaluation of different biocontrol activities as well as an ability to perform biofilm and evaluate quorum quenching activity for further use in a context of food.

PROFILE OF THE DESIRED STUDENT

- **Minimum level of study required:** Second year of Master
- Field(s) of study: Microbiology, Biotechnology
- Scientific skills : Cultural microbiology, quality assurance (*i.e* good traceability of data/ results)
- Language skills required: Spoken and written English

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 5 months

Desired Starting date of the mission: Jan-March

Indicative weekly schedule: 35h / week

Remuneration: 600€/month, paid on French SEA-EU funds for a maximum of 5 months; additional Erasmus grant could be asked to your own university

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested please send your CV and letter of motivation to the scientist in charge, noemie.desriac@univ-brest.fr before the date 15/10/2023.