PhD Project Advertisement

Project title: SALTernatives from seaweed: salt reduction of foods by using seaweed extracts to deliver umami flavour
Project No: FBS2023-01-Adams-ab

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Kerry Whiteside, Samworth Brothers Ltd

Project description:

This is a highly interdisciplinary, varied project, providing training in analytical chemistry, Life Cycle Assessments and an industrial placement including taste testing. Samworth Brothers, the CASE partner, are also providing an extra £2,000 per year stipend uplift.

Excessive salt intake in the diet increases blood pressure and the risk of developing heart disease and strokes. However, reducing salt content is not always possible without impacting the quality of the food as salt provides flavour and increases shelf life. This project intends to use seaweeds to generate an alternative, low-sodium, 'healthier' salt replacement and amino acid flavour enhancers (including the 'umami' taste) which can reduce total salt addition into prepared foods.

The PhD is based at Aberystwyth University, mid-Wales, extracting and characterising salts and flavour-enhancing amino acids from different seaweeds. It will involve placements at Brunel University (west London) to learn and develop life cycle analysis skills and techniques including a visit to Ayr, Scotland, to enable monitoring of a commercial seaweed biorefinery (Marine Biopolymers Ltd). In the third year, material produced at scale using Aberystwyth's Innovation and Enterprise campus will be trialled during a three-month placement with Samworth Brothers in Leicester.

Seaweed extractions made from Aberystwyth-locality seaweeds under a range of temperatures and conditions will be analysed for elemental composition and amino acid profiles following separation and purification using novel filtration technologies followed by chromatography and mass spectrometry. Methodologies will also be comparatively applied to process and waste stream liquid extracts from commercial seaweed processors Marine Biopolymers Ltd. Salt and amino acid composition and quantity from different seaweed species, seasons and extraction processes will be used to determine the optimal conditions for production of these two extracts.

During an initial visit to Brunel (year 1), values generated from local seaweeds and MBL process and waste streams will feed into LCA studies including carbon footprint and energy demand, providing 'hotspot' analysis to determine the main contributors to identify and test improvement opportunities. A second placement at Brunel (year 2) will also incorporate a visit to MBL to set up process monitoring which will enhance the LCA models and simulations; determining the potential viability of seaweed salts and flavour enhancers.

In Aberystwyth, the optimised seaweed salt and/or flavour enhancers would then be produced, purified and concentrated at scale using Aberystwyth's Enterprise facility AberInnovation where pilot-scale food-grade processing can occur. This material would be used in the industrial placement (year 3) with CASE industrial partners Samworth Brothers. Working in savoury pastry, the seaweed salt and/or flavour enhancers would be used for trials by industrial chefs followed by larger-scale taste tests within commercial product(s). Data from this placement would again feed back into the LCA model to further enable simulations and predictions regarding viability to be determined.

This project is a fantastic journey from novel ingredient extraction to taste tests with LCA included to determine ingredient viability. It is a partnership between both academics and industry and is intended to provide you with a range of interdisciplinary skills suitable for an industrial or academic future.

Training opportunities:

The project will be based in Aberystwyth, Wales and you will be expected to complete 40 credits of post-graduate training from a range of post-graduate courses provided by Aberystwyth University as well as training provided by the FoodBioSystems DTP. In addition to these, there will be a number of visits and training with other project partners as detailed above. The placements at Brunel in year 1 and 2 have been planned as 2x 4 weeks and the industrial placement as a 3-month appointment; but if the applicant is unable to commit to such time periods due to family or other commitments, a flexible policy has been considered and could be applied.

If additional training is identified and required within the DTP, this will also be planned and provided through internal or external funds.

Student profile:

This project would be suitable for a broad range of applicants including those with a degree in biology, chemistry, food science or modelling related subject areas. Applicants from minority backgrounds or with disabilities are particularly welcome to apply; any queries please contact Dr Adams to discuss (jaa@aber.ac.uk). We are looking for a self-starter, a motivated researcher who is interested in both the underlying science and the industrial application.

Stipend (Salary):

FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2022/23 this will be £17,668 and this will increase slightly each year at rate set by UKRI.
This is a four-year CASE-funded PhD position with living costs met during the industrial placement and a £2,000 a year uplift from Samworth Brothers. It also has costs met by Marine Biopolymers Ltd for the visit to their facility in year 2.

Equality Diversity and Inclusion:

The FoodBioSystems DTP is committed to equality, diversity and inclusion (EDI), to building a doctoral researcher(DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups. Our actions to promote diversity and inclusion are detailed on the FoodBioSystems DTP website.

In accordance with UKRI guidelines, our studentships are offered on a part time basis in addition to full time registration. The minimum registration is 50% FT and the studentship end date will be extended to reflect the part-time registration.

For up to date information on funding eligibility, studentship rates and part time registration, please visit the FoodBioSystems website.