

## PROJECT DETAILS

Project Title:

**Multi-Omics Dissection of Stress-Induced Bioactive Compound Production Across Different Seaweed Species.**

Project Summary:

This project aims to quantify stress-induced changes in bioactive compound production across representative brown, red, and green seaweed species and to elucidate the molecular mechanisms governing their accumulation using integrated metabolomics and proteomics.

By linking environmental stress responses to bioactive yield and nutritional value, this research will advance fundamental understanding of macroalgal biochemical adaptation while identifying the metabolic and protein networks that regulate high-value compound accumulation. In particular, it will clarify how stress modulates antioxidant phenolics, carotenoids, and sulfated polysaccharides that are associated with anti-inflammatory, cardiometabolic, and gut-health benefits.

The project will generate predictive molecular biomarkers of high-bioactive states and inform sustainable cultivation strategies that enhance nutritional quality, supporting climate-resilient seaweed production and future functional food and health applications. In the longer term, this research will provide a mechanistic foundation for evaluating how stress-optimised seaweed bioactives may contribute to disease prevention strategies, including modulation of oxidative stress, chronic inflammation, metabolic disorders, and microbiome-associated conditions. By bridging marine biotechnology, nutrition science, and systems biology, the project will position seaweed as a scientifically validated resource for next-generation nutraceutical and preventive health innovations.

Preferred Applicant Skillset:

We seek a highly motivated PhD candidate with excellent organisational, problem-solving, time management, and project management skills. The successful applicant will demonstrate the ability to work both independently and collaboratively, effectively balancing multiple tasks while maintaining a high level of accuracy, productivity, and scientific rigor. Strong quantitative and statistical skills are essential, along with prior experience or familiarity with mass spectrometry techniques, particularly Liquid Chromatography–Mass Spectrometry (LC-MS). Experience in metabolomics or proteomics is desirable. The candidate must also be willing to undertake marine laboratory work and participate in field-based marine sample collection.

Primary Contact:

Dr Armaghan (Ari) Shafaei Darestani.

[a.shafaeidarestani@ecu.edu.au](mailto:a.shafaeidarestani@ecu.edu.au)

+61 8 6304 5952