



SWGROW

UHI



NUI Galway



An Lanntair



Údarás na Gaeltachta



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DNA PROFILING

Dr. Ronan Sulpice and his group, our project partner from NUI Galway was involved in two recent papers entitled “A sequencing-free assay for foliose Ulva species identification, hybrid detection and bulk biomass characterisation” and “Exhaustive reanalysis of barcode sequences from public repositories highlights ongoing misidentification and impacts tax diversity and distribution”. Ulva genus, which comprises foliose species (sea lettuce) has tremendous ecological and industrial impacts, from the negative effects of green tide events to the industrial production of food, feed, and value-added products. Their species identification is a challenge. It is explained by their morphological similarities, and as result their identification requires the use of “barcoding”, which relies on the sequencing of short fragments of DNA and the comparison of the obtained sequence to that of

sequences present in public repositories. However, sequencing can be costly when hundreds of samples need to be analysed. In addition, “barcoding”, which uses Sanger sequencing, cannot be applied directly on bulk biomass which contain several species, and requires independent assessment of the individuals within, which is often not possible in commercial products. Dr. Ronan Sulpice and his team have developed a novel “sequencing-free” method for species identification of foliose Ulva species that by-passes the drawbacks associated with Sanger sequencing. The assay uses restriction digestion enzymes which target species-specific changes in DNA sequence of the sea lettuce species. Of the species tested, only *U. pseudorotundata* and *U. arasaki* show the same digestion pattern, and all other sea lettuce species could be identified successfully, including when mixed together in bulk biomass which could allow for traceability and characterisation of the purity of Ulva

Ulva species identification that could readily be extended to other species.

In the second study, Dr. Sulpice and his team assessed the reliability of genetic information present in the NCBI database for three seaweed genus, and provided a novel pipeline to avoid incorrect species identifications. Their results demonstrated a large degree of species misidentification. It was estimated that 24%-32% of the entries pertaining to foliose species were misannotated, and an exhaustive list of NCBI sequences reannotations was provided. An analysis of the global distribution of registered samples from foliose species also indicated possible geographical isolation for some species, and the absence of *U. lactuca* from Northern Europe. The analytical framework was extended to three other genera



Fucus, Porphyra and Pyropia and also identified erroneously labelled accessions and possibly new synonymies, albeit less than for Ulva spp. Altogether, exhaustive taxonomic clarification by aggregation of a library of barcode sequences highlighted misannotations and delivered an improved representation of species diversity and distribution

PUBLICATIONS

<https://pubmed.ncbi.nlm.nih.gov/34153167/>

<https://www.sciencedirect.com/science/article/pii/S2211926421000990?via%3Dihub#s0075>

SW - GROW PARTNER MEETING

Údarás na Gaeltachta hosted a successful partner meeting at the beginning of April in Galway which partners presented on the following topics:

- Marketing and cultural story of seaweed
- Demonstration of web-based app for energy assessment
- Report on drying methods
- Advances in nutritional workstreams outcomes
- Use of water turbine for powering hatchery in Fámjín



- DNA profiling workstream outcomes
- Seaweed to fuel

During this partner meeting we also collaborated with the Marine Institute and their National Small Business Innovation Research (SBIR) project to develop new ways of assessing seaweed resource in Ireland.

David O'Sullivan from the Marine Institute presented to project partners on the SBIR project. He explained that the project aims to address the challenge towards achieving a national baseline of intertidal seaweed resource distribution in Ireland. The Marine Institute and Enterprise Ireland have awarded Phase 1 Small Business Innovation Research (SBIR) contracts to three Irish consortia, collectively involving four SMEs, two research groups and two industry partners.

Phase 1 contracts will run over four months and expertise in satellite earth observation, drone and light aircraft operations, and multi frequency imagery analytics (multispectral and hyperspectral) will be deployed to assess and improve our understanding of Ireland's coastal marine habitat and ecosystems. Successful Phase 1 projects may proceed to scaled up demonstration activities and regional resource mapping

This challenge aims to produce accurate estimates of seaweed resource distribution and biomass through development and application of the latest technological innovations. Conventional ground surveys to estimate seaweed biomass are time-consuming, expensive and sometimes dangerous due to inaccessible terrain. Recently however the application of satellite and/or drone technologies with the use of hyperspectral and/or multispectral cameras has emerged as a potential method to accurately quantify species specific seaweed biomass when supported by adequate groundtruthing. We look forward to the outcomes of the project.



Mungo Murphy's Seaweed Company

<https://www.mungomurphyseaweed.com/> and participated in a seaweed and abalone aquaculture farm tour. Following a tour around the modern land-based aquaculture farm, we were provided with light tasting fresh seaweed dishes including: cooked abalone, seaweed tempura, seaweed salad and seaweed cookies. Many thanks to Mungo Murphy for your hospitality.