Project Newsletter

SW-Grow is an EU funded project with sole focus on the seaweed industry in the Northern Periphery and Arctic region. This press release contains an outline of the work that has been achieved in the past few months.

DNA Genetic Toolkit

NUI Galway are developing a highly reliable genetic toolkit to identify the geographic provenance of Palmaria palmata and Alaria esculenta. This involves DNA next generation sequencing to identify single nucleotide polymorphisms (SNPs). So far they have received seaweed samples from Faroe Islands, Ireland, UK, France, Denmark, Norway and Greenland, covering a wide area of NPA region (see figure 1). In addition, they could assemble a reference nuclear genome of Alaria esculenta. These developments are allowing them to identify discriminatory SNP markers for the development of a strong brand label for NPA seaweed products.

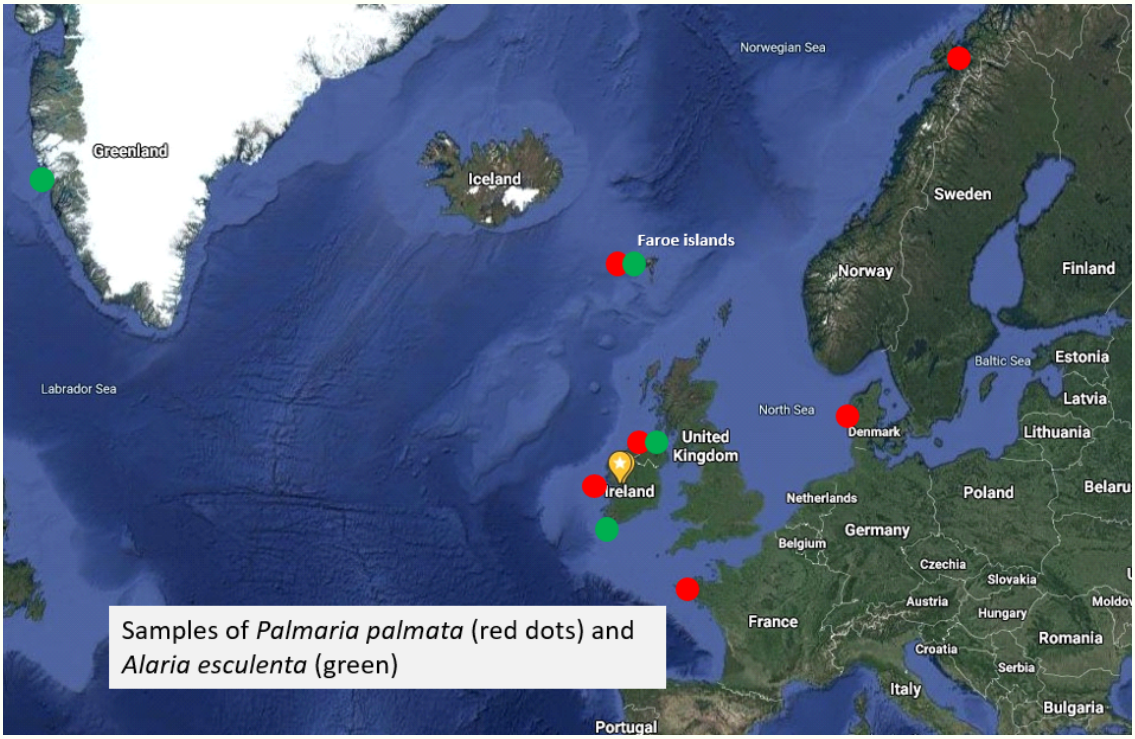

Figure 1. DNA Samples Received

Increased Seaweed Yield

TARI have been examining the growth and impact on yield by the geographical location of seaweed, and the relative exposure of the seaweed farm. Figure 2 shows the results from the yield of Alaraia Esculenta, growing at two different locations on the same fjord. Location A10 is sheltered and AA02 is more exposed.

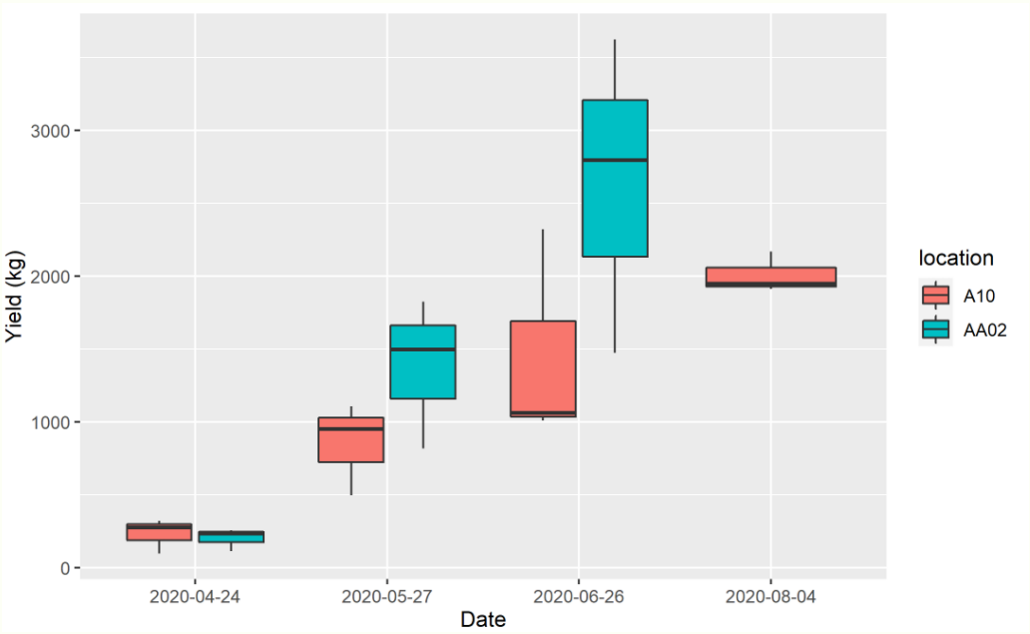

Figure2. Seaweed Yield

The yield was significantly higher at the more exposed location. Due to the better yield, TARI is now only growing seaweed on the outer, more exposed part of the fjord.

Optimal Harvest

Figure 3. Optimal Harvest

As these images show the quality of the seaweed crop decreases rapidly from June to August due to biofouling. Harvesting time is therefore extremely important. TARI usually harvests the entire crop in early June. Now they are running an experiment to see if the growth season can be prolonged by harvesting the blades partially in June and leaving approx. 10 cm of the blade to regrow. In August they are going to evaluate the quality of the regrown crop.

Chemical & Biochemical Analysis

Swedish University of Agricultural Sciences (SLU) task is the chemical and biochemical characterisation of the seaweeds received from the other project participants. At SLU in northern Sweden they have received several samples from the project participants TARI (Faroe Islands), Lews Castle College (Scotland), Arctic Technology Center (Greenland) and from Irish seaweeds producers thanks to the very active help of Údarás na Gaeltachta (Ireland). They have received also algae from Tromsø in Northern Norway.

Once received the seaweeds have been milled to a fine powder and successively analysed for carbon and nitrogen content and, for few samples of Alaria esculenta and Palmaria palmata, a full chemical characterisation of 23 elements including heavy metals have been performed.

Some of the samples received have been analysed for amino acids content, soluble sugars, total carbohydrates and fatty acids composition. To analyse lipids the first step is extraction, by pressurized liquid extraction, using the SpeedExtractor (Fig. 4). With this instrument they could extract seaweed lipids (Fig. 5) in a time efficient way using non-toxic organic solvents compared to traditional extraction methods. The work they are doing will showcase the chemical and biochemical properties of seaweeds in the NPA and will enable analysis of different seaweed samples across the NPA.

Figure 4. SpeedExtractor

Figure5. Lipid extracts

Branding

An Lanntair have been busy working on the final branding aspect of SW-Grow. This brand will represent a sustainably sourced, origin certified high quality seaweed from the NPA. Within the development stages of this brand, extensive research has been carried out on past and existing seaweed brands, products and research that is in the market. Figure 6 & 7 below showcase just some of the work that the team have been producing for the brand.

Figure 6. Product Growth

Figure 7. Sector Growth

Seaweed Seminar Series

SW-Grow via Údarás Na Gaeltachta, are hosting a series of seminars, with the first one taking place on the 16th June. Topics to be discussed are Seaweed Hatchery, Cultivation, Energy Efficiency in seaweed, Processing & Applications, and Branding & Traceability. These seminars will be taking place every few months. To ensure you don't miss out keep your eyes on SW-Grow Facebook, YouTube & Twitter for event dates being announced.

This seaweed series will share updates from the SW-Grow project, alongside presentations from leading experts coupled with practical "how to" and top tips from businesses in the NPA region to help you along your seaweed journey.

Figure 8. Seaweed Hatchery Agenda

Drying System Development

Lews Castle College are developing a precision drying system to evaluate the effect of different drying cycles on seaweed quality and energy consumption. This data will be used to optimise industrial drying systems with available intermittent renewable energy. The rig has been constructed. First tests to dry lettuce were successful and showed good temperature uniformity across the trays. Load cells that measure the change in moisture content are mounted externally to the drying cabinet to reduce temperature effects on the cells and to ensure a "steady state" resulting in high accuracy and repeatability.

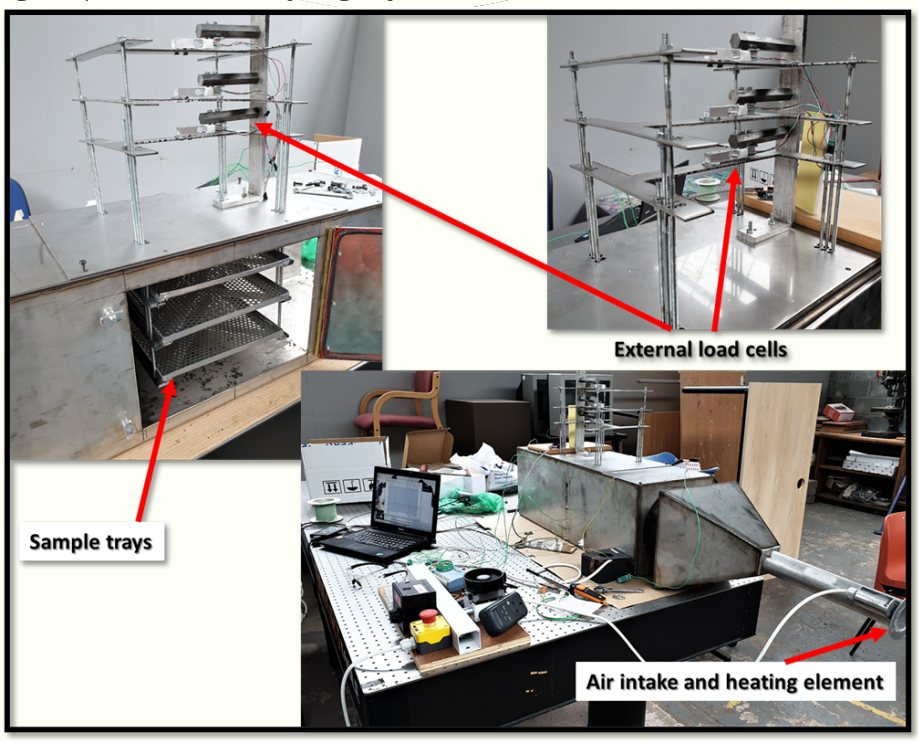

Figure 9. Drying Rig

They are developing software using multivariate optimisation techniques, such as the genetic algorithm, to optimise a seaweed drying system using wind and solar power according to the priorities of the user (e.g. minimum initial expenditure, minimum payback period, maximum lifespan, return on investment). In addition, they are evaluating two meteorological data sources, one which is the European Union's ERA5 and the other is the NASA MERRA-2 data set against the UK Met Office experimental data to evaluate which of these is more representative of the real world. They can then incorporate the most accurate data model into our optimisation software.

Greenlandic Seaweed, a sustainable alternative

Seaweed has traditionally been a regular part of the Greenlandic diet, but over time, imported vegetables have become popular leading to seaweed being a rare feature nowadays in the average diet. Replacing some of the imported goods with naturally occurring Greenlandic seaweed, which in many ways has a nutrition profile that is similar to various vegetables, would have a positive effect on the climate impact of the diet. A PhD study from the National Food Institute has therefore studied 10 different Greenlandic seaweed species to assess whether they are suitable for human consumption.

Information supplied by DTU. For more information on this research go to; https://orbit.dtu.dk/en/publications/greenland-seaweeds-for-human-consumption-2

Creating Seaweed Pellets from waste product

The team at University of Iceland has been making progress in the palletisation of waste seaweed for use in a gasfier CHP system. The team has been carrying out experiments using various combinations of raw materials to gain insight into the best production methodology. The end goal of this task is the procedure to make waste seaweed-based pellets that can be gasified for energy production (both heat and electrical power). The process of pelletizing the seaweed includes drying. The team has made a prototype drying cabinet for bulk drying and has been carrying out experiments to determine the best operating parameters to have seaweed with humidity levels that are appropriate for the pelletizer and close to what is needed for ample gasification.

Figure 10. Seaweed Pellet Process

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