The cultivation of seaweeds on-land can result in high quality, standardized biomass for use as food, and as raw material for the extraction of bioactive compounds. The highly controlled and traceable nature of on-land cultivation systems allows optimal expression of target species' genetic potential. High value products can be produced with the efficient use of labour and energy, resulting in successful operations. In Nova Scotia (Canada) Acadian Seaplants Limited has established itself as a world leader in high quality, cultivated seaweed food for Asian markets, produced in a large, highly controlled on-land system. Here, an overview Acadian Seaplants' on-land process is presented, and recent advancements are discussed.

OR 33-3

Land-based cultivation of the atlantic nori species *Porphyra dioica* in Portugal

Helena Abreu[*1], Rui Pereira[1], Sara Morgado[1], Andreína Azevedo[1], Bárbara Pitarma[1], Andreia Rego[1]

[1] *Algaplus Lda, Portugal*

Porphyra (some of them now *Pyropia*) species are among the most valued seaweeds in the world. Aquaculture production of *Pyropia* in Asia is responsible for the world supply of the most appreciated nori sheets. In Europe, the local supply of organic certified nori species, such as *P. dioica* and *P. umbilicalis*, is totally dependent on the wild-harvest occurring mainly in France, northern Spain, the UK and Ireland but is not enough to meet an increasing demand from the food (mainly) and cosmetic markets. In the early 2000s, a few papers were published on several ecophysiological aspects of *P. dioica* thriving in the northwestern coast of Portugal, including its life-cycle. Based on this knowledge, a cultivation program for *P. dioica* and *P. umbilicalis* was started by ALGAplus in early 2014. Taking advantage of the optimal temperature, light and nutrient conditions existent at ALGAplus site (land-based integrated fish and seaweed farm in Ria de Aveiro lagoon, Portugal), the full control of the life cycle has been successfully achieved. Twenty-four conchocelis strains (21 from *P. dioica* and 3 from *P. umbilicalis*) were first selected and are kept in the company's collection. Nonetheless, the focus is currently on the production of *P. dioica*, using 2 strains (P1.05.7.1, P1.02.10.4). In the lab, the formation of conchosporangia, release of spores and first stages of blade germination occurs continually, lasting on average between 6-7 weeks. The indoor and outdoor blade grow-out phase typically lasts around 8 weeks. During 2018 an average of 0.55 kg fw/month of young blades was transferred to a small outdoor area (max. 48m2) yielding an average of 60.2 kg fw/month during spring/summer and 66.0 kg fw/month during autumn/winter months. The potential to grow Atlantic *Porphyra* species in nutrient rich-waters of the Ria de Aveiro lagoon is now validated and opens the door for a commercial scale operation.

OR 33-4

Thermo-physical properties and stickiness of sugar kelp influence process parameters during drying

Balunkeswar Nayak[*1], Peter VanWalsum[1], Praveen Sappati[1], John Belding[1]

[1] *Food Science, School of Food and Agriculture, University of Maine, United States of America*

Post-harvest processing of sugar kelp in the state of Maine, United States of America is extremely important considering the recent increase in the number of producers in the state. The processing steps with various treatments, including drying, influence the development of new products from kelp as well as their long-term preservation and long shelf-life. Although drying has been used in a classical manner (i.e. under the sun or hot air convective drying in a shed or other storage location) by most of the producers and processors, effects of these drying methods on the safety and quality of the developed products has not been well tested. In a controlled drying system with multiple sensors attached to the kelp blades and dryer, relative humidity and drying temperature data, in addition to other process parameters, were collected in the chamber. In our initial test, the drying system could dry the kelp within 2 hours from fresh (92%) to ~15% moisture. The experimental data were used to validate a multiphysics software model simulating the drying dynamics with consideration of the product composition and process parameters. It was found that stickiness and adhesion of the kelp blades to each other is critical to the diffusion and evaporation of water from the blades in the drying chamber. Information on the stickiness will be valuable in estimating critical moisture content and/or moisture transfer during the falling rate of drying.

OR 33-5

Preliminary performance assessment of *Kappaphycus alvarezii* mechanical harvester prototype

Leila Hayashi[*1], André Luís Tortato Novaes[2], Alex Alves dos Santos[2]

[1] *Aquaculture Department, Federal University of Santa Catarina, Brazil*
[2] *Centro de Desenvolvimento em Aquicultura e Pesca, Empresa de Pesquisa Agropecuária e Extensão Rural de Santa Catarina, Brazil*

This work presents the first results of a trial using a mechanical harvester prototype to harvest *K. alvarezii* cultivated in Brazil. This prototype is a modification of the mechanical harvester used in mussels farms cultivated in a continuous system. Using the same system, seedlings of *K. alvarezii* were cultivated in the summer using tubular nets in the summer time, in rafts floated with specifically designed buoys. When the seedlings achieved the harvesting size, preliminary field trials were carried out to assess the operational performance of the mechanical harvester. Data of a) Operational Production Capacity (OPC), which corresponds to the amount of seaweed the prototype can harvest per unit of time; b) Seaweed Damage Index (SDI), and c) Return Index (RI), the later corresponding to the amount of seaweed remaining in the tubular nets during the mechanized harvest, were assessed. The tubular nets had a mean length of 2.6 m and a mean weight of 30.6 kg with the seaweed at the moment of the harvest. The average OPC assessed was 1.8 kg s^{-1} (SD = 0.27) which corresponds to 6,624.2 kg h^{-1} (SD = 987.4); the SDI was 0% and the average RI was 11.6% (SD = 1.47). Based on these preliminary results, we believe that an OPC around of 11,000 kg h^{-1} could be achieved when considering an average of 11.8 kg m^{-1} biomass contained in the tubular nets, in an individual or in a continuous tubular net.

OR 34-1

Probiotic fortified marine silage as supplement in marine fish hatchery

Charles Santhanaraju Vairappan[*1], Hsin Lin Tan[1], Sangeetha Priya Anandan[1]

[1] *Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Malaysia*

Marine capture fisheries constitute close to 87% of Malaysia fish landing and coastal fisheries holds a major share. Effort to enhance marine aquaculture hatcheries is being intensified however, low hatching rates and high