



Microbial quality, safety and diversity of brown algae *Alaria esculenta* deriving from two geographical areas

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Introduction & Objectives

The increasing interest for cultivation of marine algae for human consumption and the limited number of studies about their microbiological quality and safety enhance the need for relevant studies.

In the present work, we studied microbiological aspects associated with the brown algae *A. esculenta*, by assessing the microbial quality and safety, the shelf life of fresh produce as well as the microbial diversity during the spoilage phenomenon on algae harvested from different geographical areas.

Methodology

Microbiological analyses performed:

- Total Viable Counts (TVC)- Marine Agar
- *Pseudomonas* spp. - CFC
- Enterobacteriaceae - VRBGA
- *Bacillus* spp. - Mannitol Egg Yolk Polymyxin agar
- Yeasts and moulds - RBC

Investigation on the presence of *Salmonella*, *Listeria monocytogenes* and *Vibrio* spp.

Culture depended bacterial composition:

Bacterial colonies (10-20%) from Marine Agar medium were isolated throughout the storage period and subjected to partial 16S rDNA sequencing (V1-V3)

Scotland

• 2020

Ireland

• 2020
• 2021

Alaria esculenta



Samples:

- harvested and transferred fresh to the lab
- stored under aerobic conditions at 5 °C

Origin of algae	Initial TVC (log CFU/g)	Shelf life at 5° C	Main spoilage bacterial groups
Scotland harvest 2020	3.2 ± 1.37	4 days	<i>Bacillus</i> spp. <i>Pseudomonas</i> spp.
Ireland harvest 2020	3.0 ± 0.87	4 days	
Ireland harvest 2021	2.3 ± 0.38	>7 days	not identified

Table: Initial TVC values (mean ± std), shelf life and main spoilage bacterial groups of algae harvested in different geographical regions or years. Shelf life is determined by the number of days when the TVC value does not exceed the limit of 7 log CFU/g .

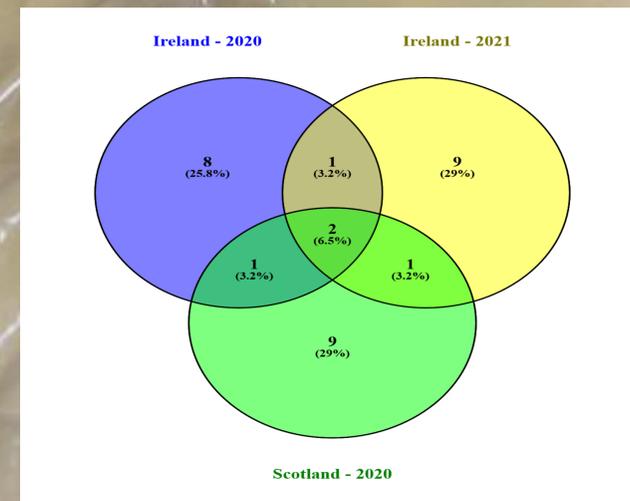


Figure 1: Venn diagrams depicting the number of bacterial species shared among algae harvested in Scotland 2020 (green), Ireland 2020 (blue) and Ireland 2021 (yellow) throughout the storage period. The number and percentages represent the common OTUs and percentage of common OTUs, respectively.

Results & Discussion

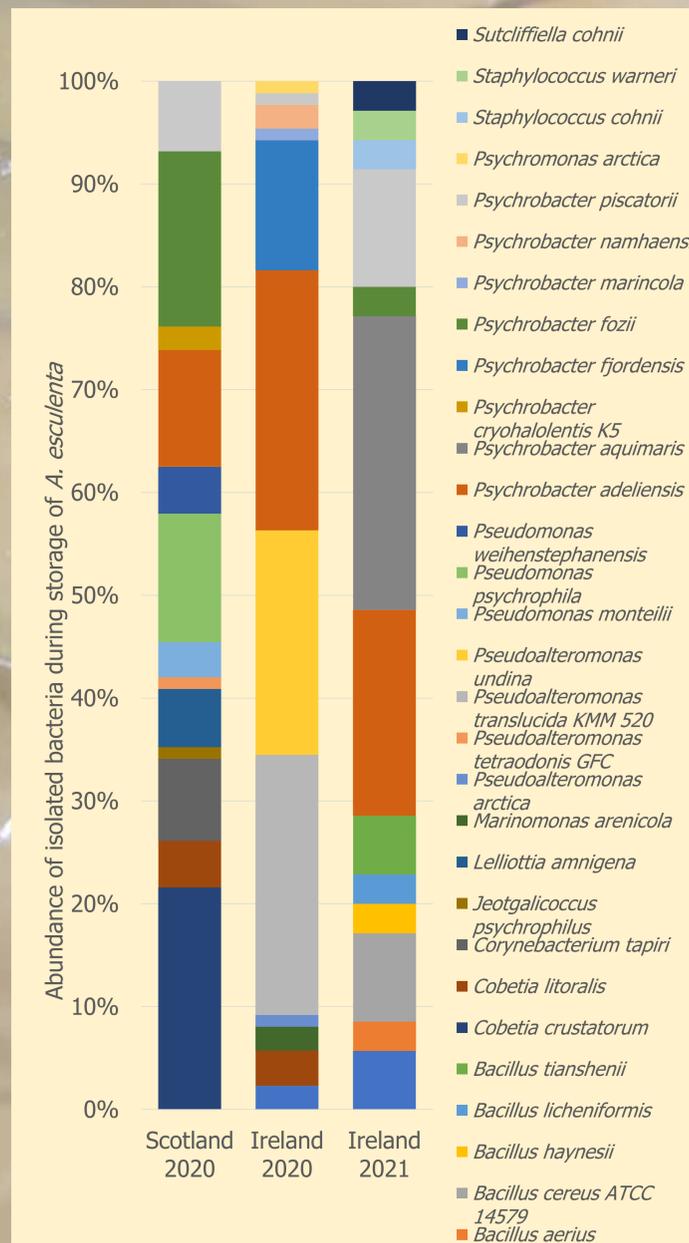


Figure 2: Bacterial species isolated and identified during the spoilage of *A. esculenta* stored at 5 °C . Values represent the abundance of species (% of isolated and sequenced colonies isolated throughout the storage period).

- ✓ The initial TVC of *A. esculenta* from Ireland for 2020 was also similar to this from Scotland, while products of 2021 were of enhanced microbiological quality and microbial counts did not exceed the level of 7.0 log CFU/g even after 7 days of storage
- ✓ DNA sequencing results revealed the presence of *Psychrobacter*, *Cobetia* and *Pseudomonas* species in algae cultivated in Scotland, whereas *Pseudoalteromonas* and *Psychrobacter* species were found predominant during the spoilage of algae cultivated in Ireland in 2020. *Psychrobacter* and *Bacillus* species were identified during the spoilage of algae harvested in 2021

Bacterial composition during spoilage of *A. esculenta* is influenced by culture region as well as harvest year.