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Innovative circular processes for bivalve shells valorisation

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ANFACO-CECOPESCA

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Hello and welcome again to this unit coordinated by Anfaco, and produced by Martiña Ferreira, Diego Méndez and Leticia Regueiro.

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Part 4: Innovative processes studied in the GAIN Project (A) Shells as a substrate for the production of seaweed seedlings

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In this part we introduce the first of two innovative uses for bivalve shells that were investigated as part of the GAIN project, which is their use as a substrate for the production of seaweed seedlings.

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Innovative processes in GAIN project

-The first was the use of shells in the production of seaweed seedlings.

- Bivalve shells play an essential role in the life cycle of the rhodophyta belonging to the genera *Porphyra* and *Pyropia*, both of commercial importance.

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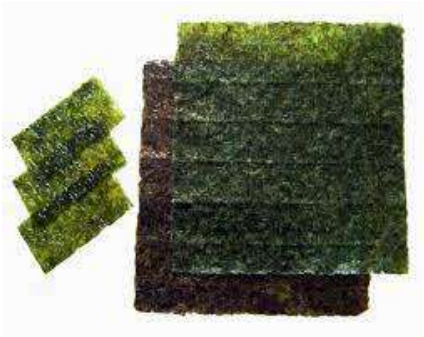
Substrate for algae

- Shells as substrate for cultivation of nori (*Porphyra spp*., *Pyropia spp*.), a high value seaweed.
- Industrial nori production relies on the availability of shells to cultivate conchocelis, a microscopic stage in the life cycle of nori algae.
- A typical Japanese seedling producer uses about 200,000 oyster shells to cultivate nori conchocelis for seedling production purposes.
- In Europe; no industrial nori production exists so far; however, a variety of local species with good food properties are native in European waters.
- Preliminary cultivation experiments at GAIN partner Salten Havbrukspark exhibit conchocelis growth on all six types of shells investigate.



In the same way that happens in the sea naturally, the shells can be used as substrate for algae.
Shells are used as a substrate for the cultivation of nori (*Porphyra spp*., *Pyropia spp*.), a high value seaweed.
Industrial nori production relies on the availability of shells to cultivate conchocelis, a microscopic stage in the life cycle of nori algae. A typical Japanese seedling producer uses about 200,000 oyster shells to
cultivate nori conchocelis (*P. yezoensis*) for seedling production purposes. These shells are used to seed up to 20,000 nets, corresponding to a nori farming area of approximately 55 ha. In Europe; no industrial nori production exists so far, however, a variety of local species with good food properties are native in European waters.
Preliminary *P. purpurea* cultivation experiments at GAIN partner Salten Havbrukspark, exhibit conchocelis growth on all types of shells investigated (6 different species).

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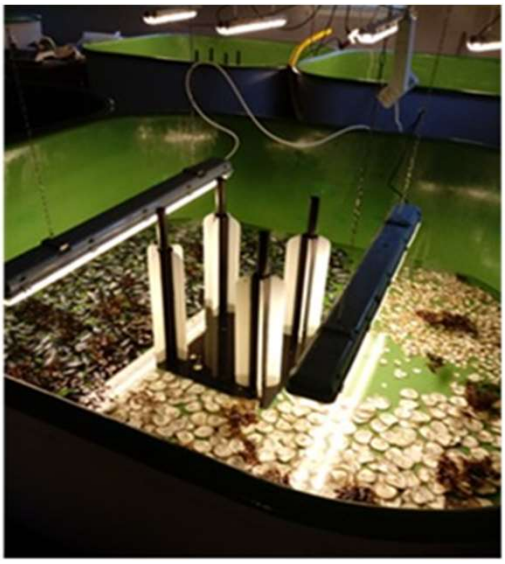
Substrate for algae

- In Gain experiments, cockle, oyster and blue mussel shells were inoculated with fertile *Porphyra umbilicalis* gametophyte, i.e. the conchocelis phase



In Gain experiments, cockle, oyster and blue mussel shells were inoculated with fertile *Porphyra umbilicalis* gametophyte, i.e. in the conchocelis phase.
Bivalve shells play an essential role in the life cycle of the rhodophyta belonging to the genera *Porphyra* and *Pyropia*, both of commercial importance. Several *Pyropia* species constitute raw material for the manufacturing of nori, and some *Porphyra* species are also used for human consumption. Their life cycle comprises two phases, a laminar gametophyte and a filamentous sporophyte that develops from spores that attach to bivalve shells to develop a filamentous thallus which penetrates the shell. Cultivation of *Pyropia* and *Porphyra* spp. requires the replication of its life cycle and thus the use of bivalve shells as a substrate for development of the conchocelis phase.

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Substrate for algae

- *Porphyra* conchocelis grew well in the tested shells. In the pictures you can recognize it as red to purple colour.
- Oyster shells deliver optimal results in terms of growth and ease of handling.

Porphyra conchocelis grew well in the tested shells. In the attached pictures you can recognize it as red to purple colour patches on the shell.

Oyster shells show good conchocelis growth and exhibit a robustness and size that support handling in manual processes, as e.g. sorting or cleaning by a brush.

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Substrate for algae

Conchocelis also grew on other shells, however, for practical handling, especially for the physical removal of contaminants, blue shells are too fragile and cockles too small

In these two images, both the blue shells (left) and the cockle shells (right) also showed the visible red to purple patches. However, the manual work with these two shell types is difficult, and the extrapolation to industrial scale seems more challenging.

Specifically, for practical handling, especially for the physical removal of contaminants, blue shells are too fragile and cockles too small, compared with oyster shells.

The results of this trial are promising and promote new uses of the shells as substrates for Conchocelis in future aquaculture systems for Europe.

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End of Part 4
Thank you for you attention

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This is the end of part 4. We hope you have found it interesting. When you are ready, you can proceed to Part 5.