

Seaweed as construction material: SeaPlates

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B: Design Flagship Proof of Principles

Objective(s)

Aim of the project is to utilize different streams of seaweeds to develop sustainable building materials. The streams are either waste streams from seaweed cultivation, or naturally occurring sources such as the massive beaching occurrences of *Sargassum sp.* in the Caribbean.

The first steps

The first step made within the project was to select available seaweeds that are somewhat similar to the species found in the envisioned streams. This resulted in the following selection: *Ascophyllum nodosum*, *Sargassum muticum* and *Chondrus crispus*.

After selection of the species the first trials were made testing the seaweeds on their potential. This started by investigating processing methods, involving air drying, forced drying, soaking with fresh water, and high pressure pressing to make the first 'SeaPlates'

Ascophyllum nodosum, a common species at the Dutch coast that contains relevant binding agents (alginates) which are also found in kelp species.



Sargassum muticum; closely related to the sargassum species that cause the massive beaching events in the Caribbean.



Chondrus crispus; a red seaweed containing carrageenan, a potentially interesting binding agent.



Source: marinespecies.org

During the desk study the team found two products that fit the objective of this project. These involve the start-ups Blueblocks and Sargoblocks. Both use seaweed as a component in building material: insulating wall plates and brick-like building blocks, respectively.

Lessons learned

In the first tests it became clear that all three species show potential for utilization in construction materials. However, it also became clear that seaweeds contain low quantities of cellulose or other types of fibres, making the plates lack structural integrity. At the same time, hot pressed pure seaweed resulted in brittle material (picture below).



In a follow up, seaweed was pretreated and mixed with reed as a fiber source, aiming to move properties towards conventional particle board materials (picture right).



Present state & Future steps

The test plates now produced are far from application level, but have contributed substantially to understanding the potential of seaweed in construction materials. Applying seaweed in the production of construction materials has received very little attention so far, as the majority of the harvested seaweed biomass is used for food or feed purposes, or the extraction of compounds. Investigating seaweed that is not suitable for these applications and as a whole product is only done on very small scale.

The team aims to gain insight in the distribution and interaction of cellulose and alginate in SeaPlates that have been produced at different pressing temperatures with the goal to improve their strength and durability, hereby coming closer to application level.

