

# FACTSHEET

## Factsheet on advanced, mechanized and large scale seaweed cultivation

Key findings from the ALGAEDEMO project

<https://www.algaedemo.eu/>

*“AlgaeDemo is an EASME/EMFF funded project in the area of Sustainable Blue Economy. AlgaeDemo demonstrated the advanced, mechanized cultivation and harvesting of seaweeds at the ha scale in the Oosterschelde (NL), remote monitoring of the farm with AUV’s, and accurate determination of the environmental bioremediation capacity of such seaweed farms.”*

## AlgaeDemo

An EASME/EMFF funded project in the area of Sustainable Blue Economy.



## Our approach

Within the AlgaeDemo project the project partners had access to a 7 ha area in the Oosterschelde in the Netherlands. This area was characterized by limited depth (appr. 2-3 m at low tide), good nutrient levels and easy accessibility. As a result of the limited depth and corresponding high turbidity levels, we were limited to twine seeding (i.e. parallel direct seeding tests by ourselves and others gave poor results). Therefore our approach to achieve advanced, mechanized and large scale seaweed cultivation consisted of:

- Preparation of seeding twines of sugar kelp (*Saccharina l*) and wakame (*Undaria p*) in a state of the art hatchery
- Mechanized seeding of these two seaweed species onto cultivation ropes
- Rope cultivation at 30 km scale
- Mechanizes harvesting
- Processing of harvested seaweeds

The results of our challenging work are summarized in this factsheet.

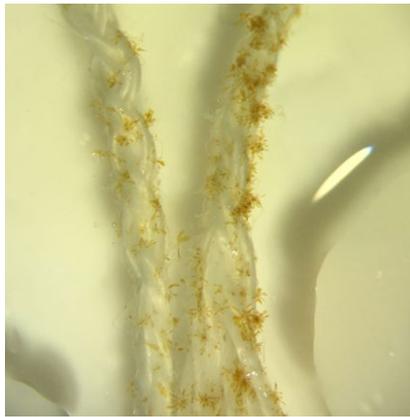


*Photo: AlgaeDemo demonstration farm in the Oosterschelde (Netherlands)*

## Project results

### Preparation of seeding twines

Project partner DSG developed a state of the art hatchery for twine seeding. Cultivation was focused on two kelp species: sugar kelp (*Saccharina l*) and wakame (*Undaria p*). Juveniles of both these species were raised in the hatchery and applied onto twine spools by means of spraying. After 4-6 weeks the seeding twines were ready to be deployed at the AlgaeDemo demonstration farm in the Oosterschelde. The first seeding twines were deployed at the end of September 2021, the last ones at the end of December 2021. The photos underneath visualize the different stages of twine seeding development.



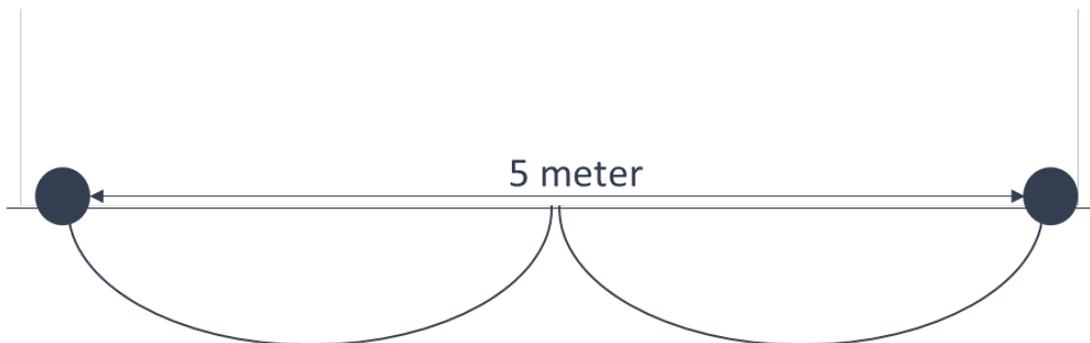
*Photo: Wakame juveniles attached to seeding twine.*



*Photo: Seeding twines at day 1, day 22 and day 63, resp. after spray seeding.*

### **Mechanized rope seeding and cultivation**

Partner DSG developed a robust seeding machine within the AlgaeDemo project. This machine automatically twists the seeding twine around a 22 mm cultivation rope at a speed of appr. 30 m per minute. Subsequently the seeded rope is deployed within the farm infrastructure in a V-shape, the lowest point of the rope at -2 m.



*Photos: above) Seeding twine is automatically twisted around a 22 mm cultivation rope; below) cultivation rope is deployed in V-shape underneath the floating backbone.*

During the 2021/2022 winter season the growth of both kelp species was monitored closely. Two months after the September deployment of wakame juveniles the plants had reached significant sizes already, clearly indicating the excellent seaweed cultivation potential in the Oosterschelde area. In February 2022 the farm faced a number of consecutive storms that damaged a part of the crop.



*Photos: wakame plants in November 2021, 2 months after being deployed in the Oosterschelde.*

### **Mechanizes harvesting**

In April and May 2022 the AlgaeDemo consortium harvested both kelp species. Partner DSG developed a semi-automated harvesting machine that was installed on its vessel. This machine takes the cultivation rope out of the water, washes the plants with seawater and subsequently the plants are manually cut from the rope. A final cleaning unit removes residual biomass, leaving a clean rope.



*Photos: semi-mechanized harvesting of kelp species at the farm.*

### **Processing of harvested seaweed**

Freshly harvested kelp needs to be processed immediately after harvesting in order to prevent it from degrading. Partner DSG studied two stabilization processes at its processing plant in Yerseke (NL): drying and freezing. The first step of both processes was to wash the plants in order to remove sand and marine organisms. Subsequently the plants were blanched for a short period, thereby turning

the brown leaves into dark green leaves. Finally the blanched leaves were frozen or dried, thus yielding clean and stable kelps.



*Photos: Harvested kelp is stored in big bags and brought on land.*



*Photos: left) washing process, right) blanching process.*

## Conclusions

The AlgaeDemo project has been highly successful as it provided important data on advanced, mechanized and large scale seaweed cultivation in the Schelphoek/Oosterschelde area (NL). Based on these data we can draw the following conclusions:

- Brown seaweeds such as sugar kelp and wakame can be successfully cultivated despite the limited depth (max. 3 m) in the Schelphoek/Oosterschelde area
- Twine seeding yields much better results than direct seeding
- As twine seeding is the preferred seeding technology one typically uses 1D ropes as cultivation substrates instead of 2D net substrates
- Mechanized seeding and harvesting were successfully demonstrated at 6 ha farm scale size
- The Schelphoek/Oosterschelde area has a huge potential for sustainable, large scale seaweed cultivation

## Way forward

Despite the successful demonstration of advanced, mechanized and large scale seaweed cultivation in the Schelphoek/ Oosterschelde area (NL), there are still a number of challenges that have to be overcome in the coming years:

- Large scale cultivation of a wide range of novel, commercially profitable seaweeds, including several green and red seaweed species
- Year round cultivation of seaweeds
- Further mechanization of seeding, cleaning and harvesting activities to lower the cost of cultivation

## Project Identity

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### Consortium



**Project duration** 01/2019 – 12/2022

**Website** <https://www.algaedemo.eu/>

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If you have any further questions and for further discussions, please contact via the contact form at

<https://www.algaedemo.eu/>



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