Zeewieren in gesloten systemen

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Summary

Seaweed in closed systems (SICS)
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Seaweed is a potential source of green raw materials. They are used for human consumption, contain specific thickening agents such as alginates and carrageenans, and can be applied as growth-promoting fertilizers, in animal feed and for the cultivation of shellfish (abalones). In addition, extracts from seaweed are used in cosmetics and pharmaceutical products and seaweeds also constitute a possible source of biofuels. Seaweed can possibly also serve as a protein platform for catering to the steadily growing demand for fish protein and soy protein.

Though the Netherlands has a good reputation in offshore and hydraulic engineering as well as in seed cultivation and improvement, the knowledge of cultivating and harvesting seaweed is very limited. With the advent of wind farms in the North Sea and the commercial exploitation of the continental shelf, the opportunities for cultivating seaweed are now also being explored. Both extensive and intensive cultivation systems as used in agriculture and horticulture are being considered.

Certain applications of seaweed require more controlled cultivation conditions. This is the case with specific plant substances, nutritional factors and with the propagation of seaweed for large-scale cultivation. Wherever the value of the cultivated seaweed increases, and hence the need for harvest security and risk control, closed systems are probably the best approach.

As the cultivation conditions can be more easily controlled in closed systems, the yields are expected to be bigger, the quantities of plant substances more consistent and the overall quality better. In addition, pests are easier to control or prevent. In contrast with land-based seaweed cultivation, closed systems benefit from the abundant availability of clean and relatively low-mineral seawater. This makes it possible to control the temperature with the aid of seawater. The concept of seaweed in closed systems is in some ways comparable to greenhouse horticulture.

Given the present prices for seaweed, the cultivation of mature plants in closed systems for industrial applications is not feasible. Even with fast-growing types and relatively expensive seaweeds, the investment costs of a closed cultivation system are too high. Palmaria Palmata can be commercially cultivated from basic material into mature plants for consumption using concrete tanks, but not using steel tanks. Ulva lactuca cannot be commercially cultivated for consumption purposes, whether in concrete tanks or steel tanks. In addition, consumer demand for Ulva lactuca in Europe is currently very small.

Nurturing basic materials into young plants in steel tanks is feasible in economic, technical and social terms. The preference is for steel tanks with a tidal upweller system, which is very flexible and can also be used as a fully closed system.
Young plants can also be nurtured in concrete tanks at sea. However, concrete tanks are more vulnerable and less flexible at sea compared to steel tanks.
Young plants can also be nurtured in onshore tanks. In view of the great need for clean seawater, the problems in maintaining the right water temperature on land and the bigger risk of tank pollution, a closed offshore system is the preferred option. The use of offshore closed systems for propagating plant materials for large-scale cultivation appears to be an indispensable link in the chain.
In view of the nature and scope of this feasibility study, not all questions can be answered in detail. However, the conclusion is that seaweed cultivation in offshore floating systems is viable in the Dutch situation. The nurturing of young plant material in closed systems may be an essential link in the large-scale offshore cultivation on lines and/or nets.