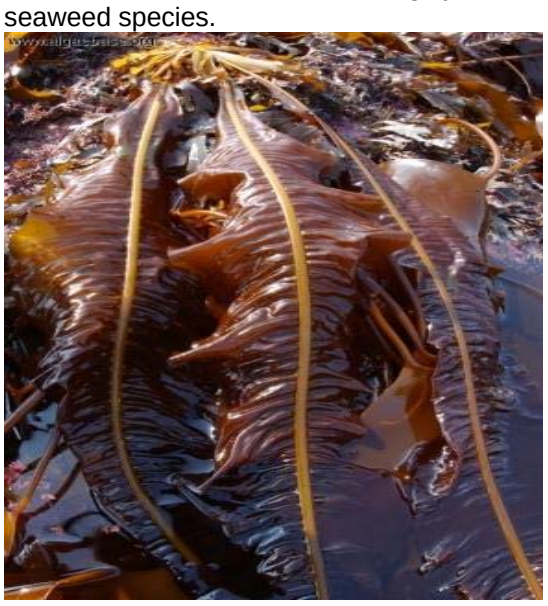
SINTEF Fisheries and Aquaculture
Newsletter 5 – 2010

Cultivation of the seaweed *Alaria esculenta* for biofuels

Seaweeds are interesting as raw material for use in human food, animal feed, biochemicals as alginate, agar and carrageenan, and last but not least, in production of 3.generations biofuel. Production of seaweed biomass at an industrial scale will probably demand a year-round cultivation. This is a challenge because of the reproduction biology of the seaweeds.

The brown algae *Alaria esculenta* is a northern seaweed species that grow along the Norwegian coast, except from in the Skagerak where the summer temperature gets too high. The Alaria are adapted to wave exposed localities with temperatures up to 16°C. It grows very fast and has a composition rich in sugars, protein, vitamins and trace metals. The high sugar content makes the Alaria a promising species for production of biofuel, especially bioethanol.

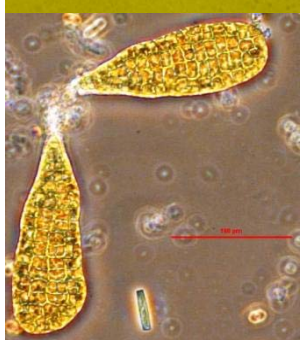
The Alaria reproduces by releasing zoospores from special blade structures that develops on the stalk from October to May (see figure upper right). The zoospores attach to suitable surfaces and grow up to large kelps. Recently we succeeded in the induction and production of zoospores from the Alaria outside the natural reproduction cycle for this species. This progress is vital for a year-round cultivation and represents a basis for further work with this highly interesting seaweed species.



The seaweed *Alaria esculenta* grows fast from January to May and can reach lengths of 2-3 meters in this period.

Reproductive structures on Alaria (dark fields).
Foto: Silje Forbord

Zoospore from Alaria (5 µm).
Foto: Johanne Arff



Small seedlings, 26 days old (0,1 mm long).
Foto: Silje Forbord

The project MacroBiomass is financed by the program “Natur og Næring” in the Research Council of Norway.

Contact info:
Senior scientist Jorunn Skjermo
Tel:: +47 982 45 040
jorunn.skjermo@sintef.no

Scientist Silje Forbord
Tel: 971 22 001
silje.forbord@sintef.no

High pressure cleaning of net pens

Wear and tear on net pens as a result of high pressure cleaning, were measured at SINTEF Sealab, in order to examine the influence these operations provide on net pens in the fish farming industry.

Challenges related to escapes of farmed fish are of major concern for the aquaculture industry, and financial resources have increasingly been used in effort to solve this task. At least two thirds of the total amount of escaped farmed salmon disappeared through damages and holes in the net, and several causes behind these occurrences have previously been unveiled.

High pressure cleaning of net pens are operations that fish farmers have to implement, due to increased biofouling of algal species, blue mussels and hydroids.
Biofouling cause reduced water circulation in the cage, and may increase the risk of damages on the net pen material.

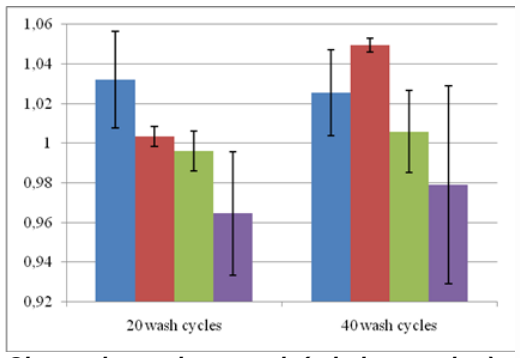
These operations are carried out when the net pens are attached to the floater, and performed by special developed cleaning discs that flush the net with water, under high pressure.

Cleaner discs utilized for high pressure cleaning of net pens. Cleaner discs are guided up and down along the net side, and flush away the biofouling under high pressure Photo: AKVAgroup ASA).

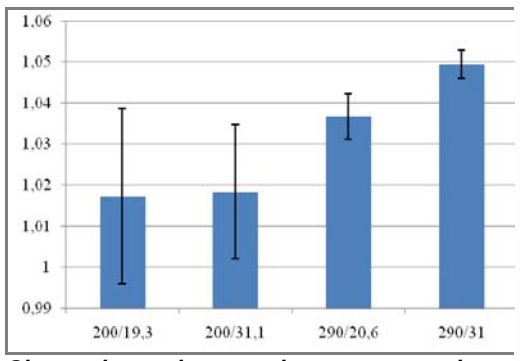
The additive effects these repetitive operations provide on the net pen material, in terms of deteriorating physical structure of the net materials, are not formerly known. These effects have now been examined at SINTEF Fisheries and Aquaculture.

Small panels of net material were located in frames and flushed under high pressure in accordance with specifications from AKVAgroup Idema, the supplier of the cleaning equipment. Variable parameters examined were impregnated / not impregnated, nylon / dynema fibers, number of washing operations and different combinations of water pressure and water volume. After treatments the net panels were tested for mesh strength in order to measure strength reduction as a result of high pressure cleaning. Reference material in this test was unwashed net.

The change in strength as a result of washing was insignificant, even after 40 treatments with highest pressure and largest water volume. The panels were not subjected to biofouling between the treatments, due to time-limiting causes.



Change in mesh strength (relative number) as a result of number of washing operations. Above 1,0 = increased strength, below 1,0 = reduced strength. N2I = supplier no. 2, impregnated nylon; N1I = supplier no. 1, impregnated nylon; N1U = supplier no. 1, unimpregnated nylon; D1I = supplier no. 1, impregnated Dynema.



Change in mesh strength on a net panel as a result of water pressure (bar) and water volume (liter).

This project was funded by The Fishery and Aquaculture Industry Research Fund, as a part of the project ”Development of secure fish farming sites”. The report is to be found on www.tekmar.no

Contact info:
Researcher Østen Jensen
Tel. +47 996 04 158
osten.jensen@sintef.no

SINTEF Fisheries and Aquaculture

Mail address:
N - 7465 Trondheim

Visiting address:
SINTEF Sealab
Brattørkaia 17 C
7010 Trondheim

Telephone: +47 40 00 53 50
Fax: +47 93 27 07 01
E-mail: fish@sintef.no
Web: http://www.sintef.no

Branch offices:

Ålesund
Contact:
Roar Pedersen
Telephone: +47 70 32 92 50

Nordsøen Forskerpark
Flume tank, Hirtshals
Telephone: +45 98 94 43 00
E-mail: fish@sintef.dk
Web: http://www.sintef.dk

SINTEF Nord AS
Contact:
Roger Richardsen
Telephone: +47 90 78 35 43
E-mail: rric@sintef.no

AVS Chile SA
Contact:
Matias Medina
Telephone: +56 09 92278767
E-mail:
matias.medina@avs-chile.cl

SINTEF