# WET PRESERVATION OF NANNOCHLOROPSIS AND PORPHYRIDIUM PURPUREUM: LESSONS LEARNED FROM PILOT-SCALE STUDIES

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## Introduction and aim

Due to scale-effect, findings from lab trails cannot always be directly extrapolated to the full-scale situation. Pilot-scale studies were therefore performed to evaluate the feasibility of wet preservation of *Nannochloropsis* and *Porphyridium purpureum* biomass.

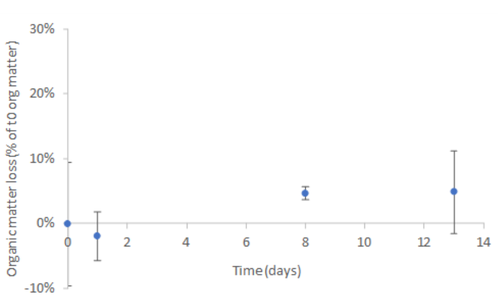
## Materials and methods

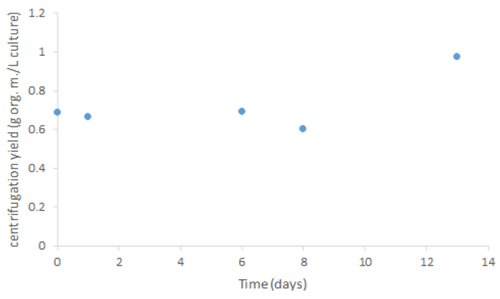
The Sunbuilt infrastructure (Geel, Belgium) is equipped with 2 storage tanks (2 $m^3$) of which one can be used for cooled storage with continuous monitoring of the volume and temperature of the stored culture. Storage tests were performed at 8°C and under continuous stirring of an algae culture coming straight from the photo-bioreactors. Three different tests were performed with either (1) *Nannochloropsis gaditana,* (2) *Nannochloropsis oceanica* and (3) *Porphyridium purpureum.*

## Results

### *Nannochloropsis gaditana* test

No large organic matter loss were observed during *N. gaditana* storage (left figure below). When this culture was centrifuged, the same or a slightly higher organic matter yield was noted (right figure below). The latter was probably due to some enrichment of organic matter at the bottom of the vessel where samples were taken.




The lipid content increased from 28.3 ± 0.5% ($t_0$) to 32.7 ± 0.1% (day 8). The FFA content was high (13.7 ± 0.5% at $t_0$ and 14.3 ± 5% at day 8). The fluorescence intensity (excitation wavelength 438 nm) decreased only slightly during storage, suggesting that chlorophyll activity was little or not affected by storage.

### *Nannochloropsis oceanica* test

After storing *N. oceanica* for 6 days, organic matter losses were limited (7.2 ± 0.5%), lipid content was fairly stable (33.3 ± 0.3% and 31.9 ± 0.4% at day 0 and day 6, respectively). The individual fatty acid (FA) concentrations (as % of lipid content) were stable for most FA and decreased only slightly (±10-14%) in the case of poly-unsaturated FA.

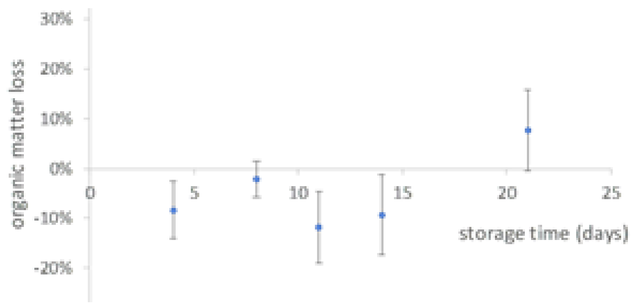
## Conclusions

**Storing *Nannochloropsis* biomass** can be done at 8°C at pilot scale with limited changes in the lipid and organic matter content. In the case of in *N. gaditana,* free fatty acid (FFA) formation was also limited but difficult to assess due to high initial FFA levels.

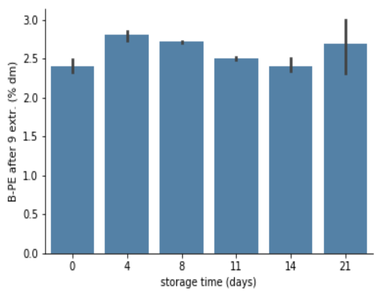
**Storing *P. purpureum* biomass** at 8°C had little impact on the culture's organic matter content, carbohydrate content and B-phycoerythrin level.

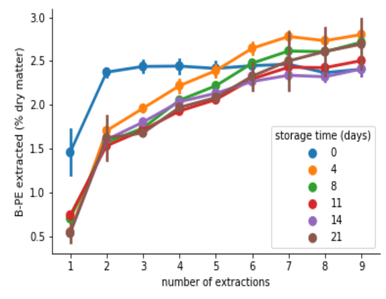
### *Porphyridium purpureum* test

A 400 L *P. purpureum* culture was maintained at 8°C for 21 days. There was no large loss of organic matter and even slightly negative 'loss' values were noted. Again, this was possibly due to sedimentation of organic matter material at the bottom of the vessel where samples were collected.




Carbohydrate losses were minimal during the first two weeks. Only after 21 days, a glucose loss became clear (not shown). The total B-phycoerythrin (B-PE) level remained rather constant (left figure below). It was more difficult to extract the pigment from the stored biomass than from the fresh biomass (right figure below).




Storage impacted rheological behavior as observed when rheology analyses were performed on the pellets obtained after centrifugation of the fresh/stored culture (not shown).

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