

WET PRESERVATION OF ALGAE CONCENTRATES OBTAINED BY MEMBRANE FILTRATION

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Introduction

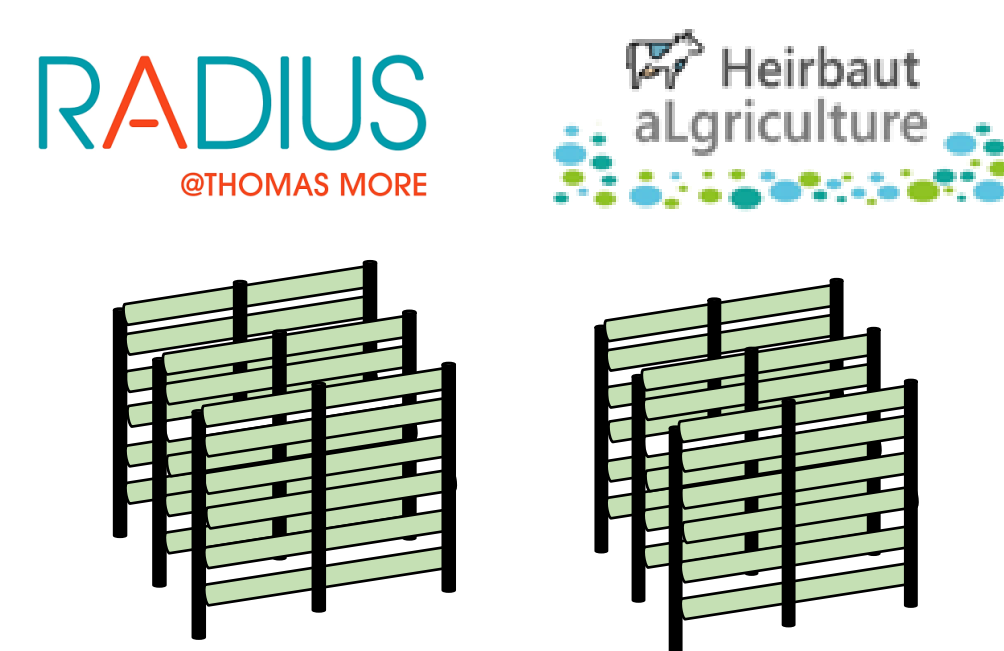
Wet preservation of algae allows bridging the time period between algae harvest and processing. A new preservation approach is presented: First, algae are preconcentrated by membrane filtration to obtain so-called pre-concentrates. Next, pre-concentrates are stored at 4°C and finally centrifuged to obtain a final concentrate ready for processing.

Aim

This study aimed to evaluate organic matter and lipid losses during the storage of pre-concentrates obtained by membrane filtration.

Materials & methods

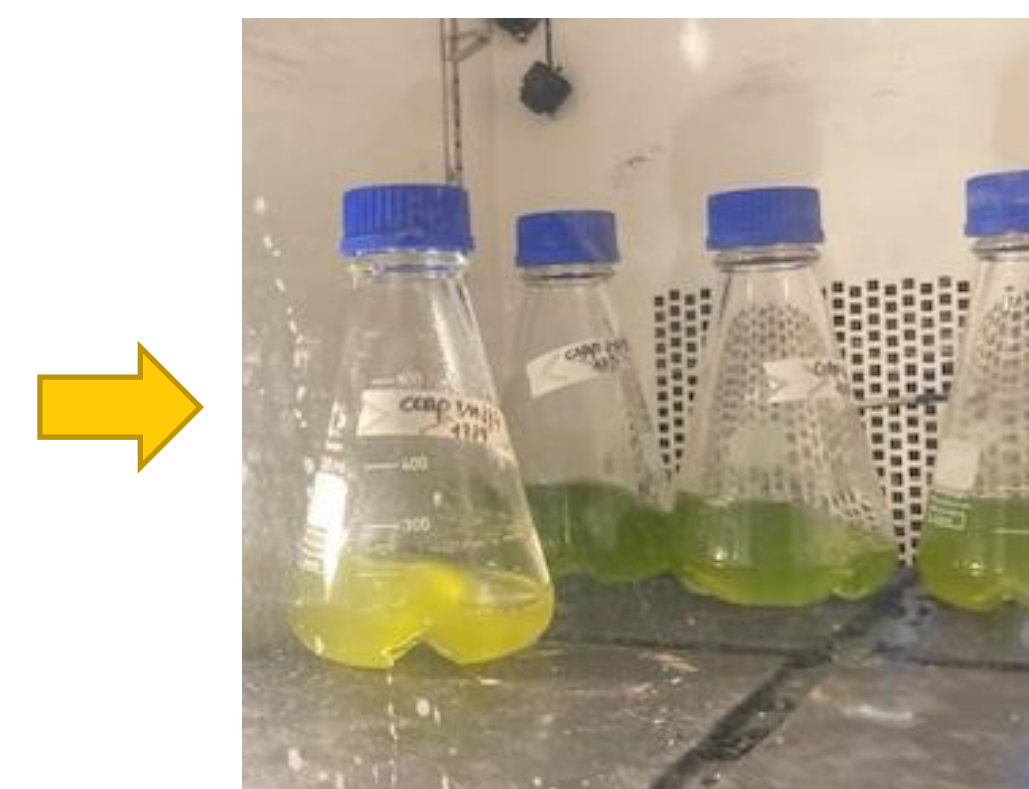
Nannochloropsis gaditana and *Chlorella sp.* were grown in tubular photobioreactors at Sunbuilt (Thomas More/VITO) and Heirbaut Algriculture, respectively. Algae were concentrated by low-shear membrane filtration using VITO's membrane algae filtration technology (MAF). The obtained pre-concentrates (3 L) were stored at 4°C with orbital shaking and a perforated lid enabling gas exchange with the environment. Samples were taken at regular time intervals and concentrated by batch centrifugation (10 min, 15,000g).



Algae cultivation



Algae preconcentration by membrane-filtration



4°C storage of pre-concentrates



Final concentration by batch centrifugation

Results

Storage of *Nannochloropsis* pre-concentrates

- The initial *N. gaditana* pre-concentrates had a dry matter and organic matter content of $2.44 \pm 0.01\%$ and $1.55 \pm 0.01\%$, respectively. The organic matter level of the pre-concentrates remained rather stable or decreased only slightly as $95.7 \pm 0.1\%$ of the t_0 value was retained after 10 days of storage (column 2, table below).

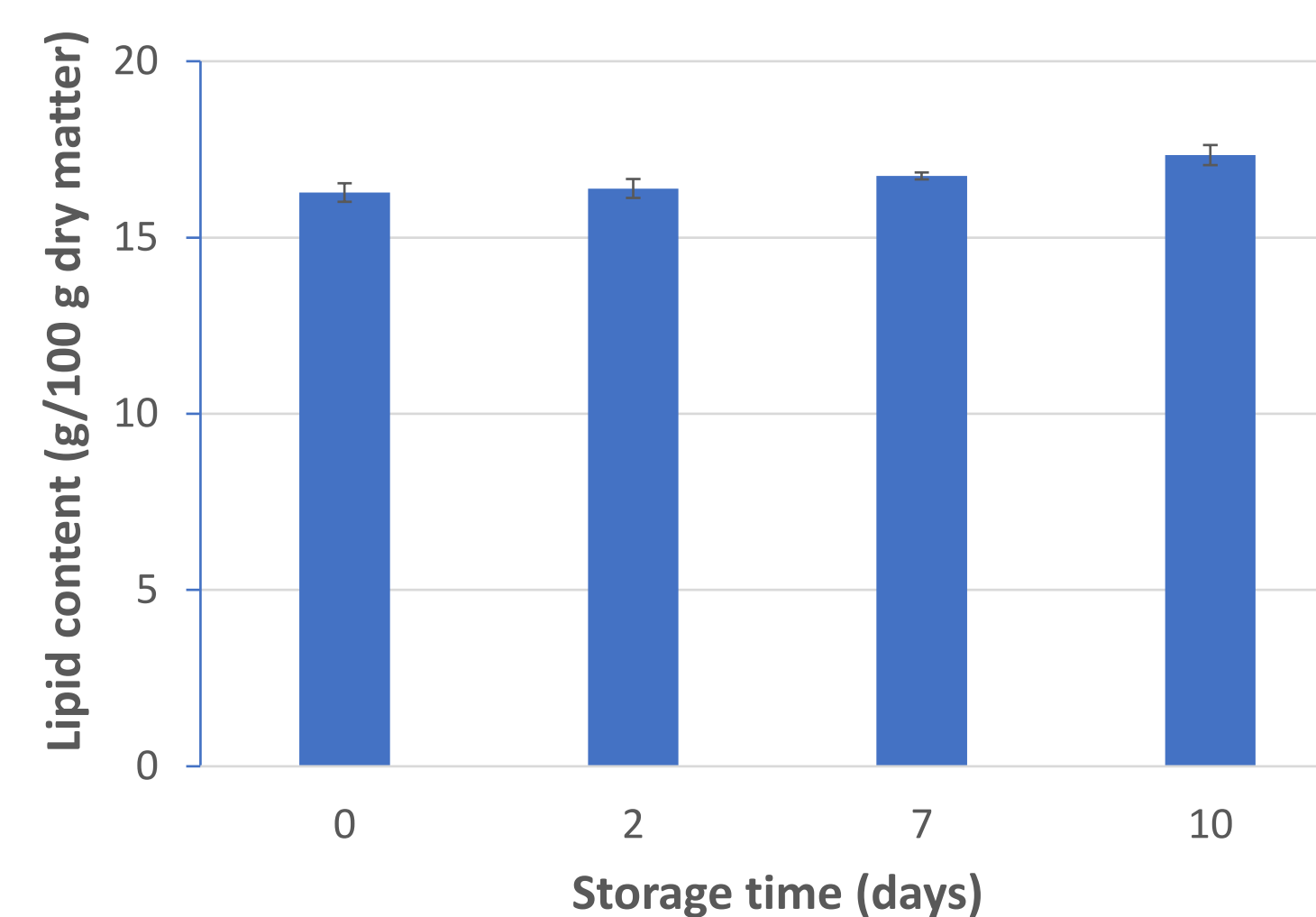
Storage time (days)	Organic matter retained (% t_0 level)	Relative centrifugation yield (% t_0 yield)	O ₂ (mg/L)
0	100.0 ± 2.6	100.0 ± 1.6%	not measured
2	91.2 ± 3.5%	93.9 ± 3.4%	0.9 ± 0.1
7	94.6 ± 6.2%	91.4 ± 1.4%	0.2 ± 0.1
10	95.7 ± 0.1%	99.4 ± 6.7%	0.1 ± 0.0

- When stored pre-concentrates were centrifuged, the centrifugation yield was also rather stable (column 3, table above).
- Lipids levels did not change significantly ($P=0.12$) between the start of the test (16.19 ± 0.70 g lipids/100 g dry matter) and day 10 (14.91 ± 0.1 g lipids/100 g dry matter).

Storage of *Chlorella* pre-concentrates

The initial *Chlorella* pre-concentrates had a dry matter and organic matter content of $2.83 \pm 0.01\%$ and $2.56 \pm 0.01\%$, respectively. The organic matter level of the pre-concentrates decreased slightly (column 2, table below). When stored pre-concentrates were centrifuged, the centrifugation yield decreased slightly during storage (column 3, table below).

Storage time (days)	Organic matter retained (% t_0 level)	Relative centrifugation yield (% t_0 yield)	O ₂ (mg/L)
0	100.9 ± 1.2%	100.0% ± 1.5%	0.15 ± 0.07
2	95.6 ± 1.7%	100.7% ± 2.7%	0.15 ± 0.07
7	91.3 ± 0.7%	95.7% ± 2.0%	3.9 ± 0.35
10	91.1 ± 1.5%	93.0% ± 1.8%	7 ± 0.28



The lipids levels of the obtained centrifugation pellets remained rather constant (cfr. Figure to the left).

Conclusions

Membrane filtration of algae followed by cooled storage is a promising approach for temporary algae storage. Algae volumes that require cooling and centrifugation are minimal. Organic matter losses are limited and lipid levels remain stable during storage.

