

MacroFuels WP2: Conditioning, pre-treatment and storage

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Tasks

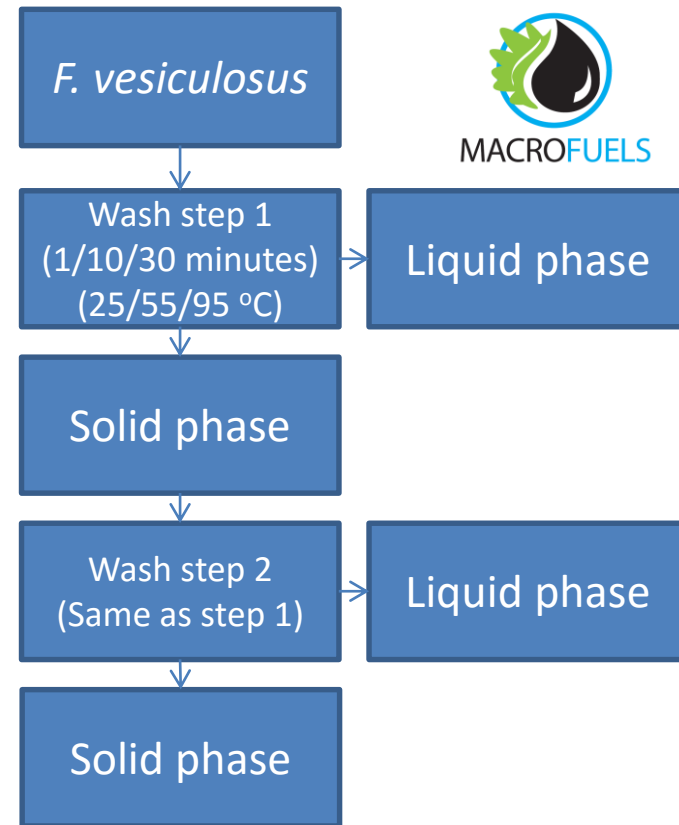
- WP 2: Conditioning, pre-treatment and storage
 - Task 2.3: Enzymatic degradation of macro-algal polysaccharides (M3-36)
 - Task 2.4: Fractionation and mild chemical treatment (M3-36)
 - Task 2.5: Purification and concentration of algal sugar syrups (M12-24)
- WP 5: Fuel suitability and by-product application tests
 - Task 5.2: Assessment of the minerals (M20-40)
 - Task 5.3: Assessment of the protein rich fraction (M20-40)

Task 2.5

- Task 2.5: Purification and concentration of algal sugar syrups (M12-24)
 - Remove fermentation inhibitors for ABE
 - Salts
 - Other compounds?
 - Concentrate (> 60 g/L)
 - Before/after sugar release
 - Filtration, ion exchange
 - Washing

Task 2.5: Salt removal

- Wash *F. vesiculosus* with demiwater
 - 1:7 matter:liquid ratio
 - 1, 10 or 30 minutes
 - 25, 55 or 95 °C
 - 2 washing steps
- Analyse with HPLC, ash and dry weight



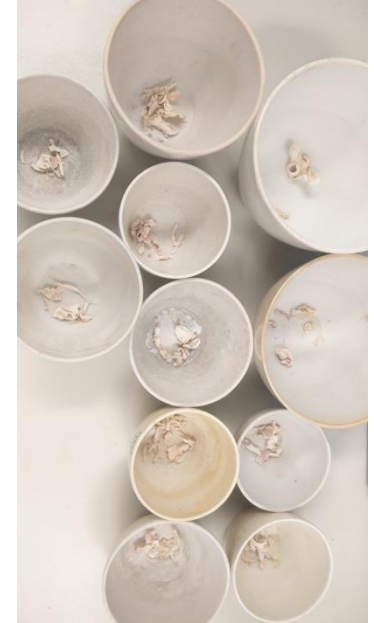
Species	Dry weight	Ash	Protein	Carbohydrates	Sulfate	Gap
	% of ww	% of dw	% of dw	% of dw	% of dw	Calculated
F. vesiculosus	59.6%	20.4%	6.6%	24.3%	7.8%	41%

Species	Glucose	Xylose	Galactose	Fucose	Rhamnose	Glycerol	Mannitol
	% of dw	% of dw	% of dw	% of dw	% of dw	% of dw	% of dw
F. vesiculosus	6%	1%	1%	10%			7%

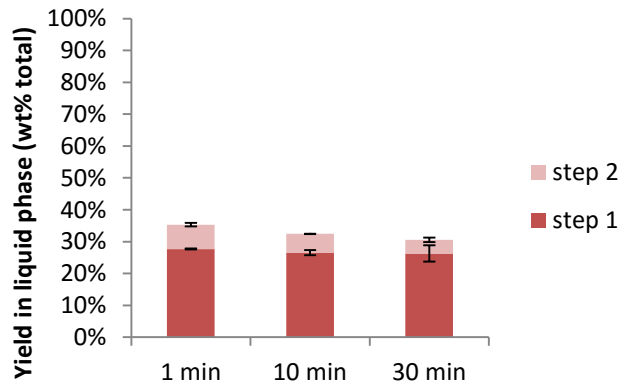


Task 2.5: Washing

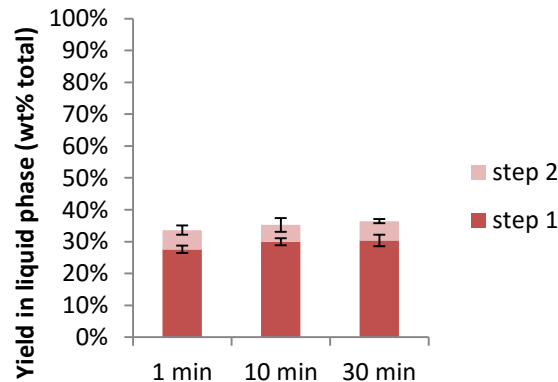
- Decolouration
- Temperature/time no influence on ash extraction
- Highest loss in first washing step
- Max 40% of total ash removed



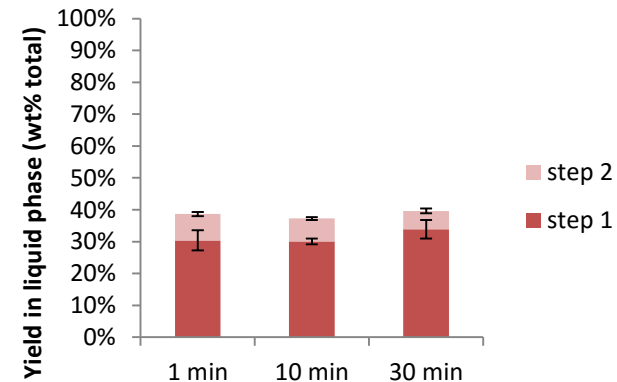
25°C, ash liquid phases



55°C ash liquid phases



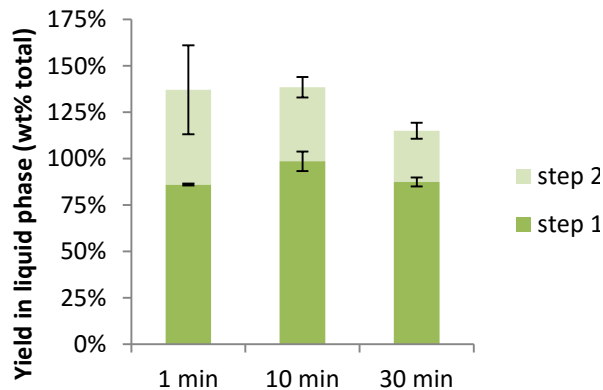
95°C ash liquid phases



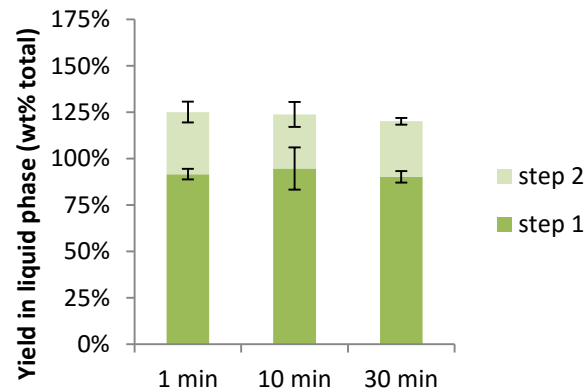
Task 2.5: Washing

- Overestimation mannitol
- Temperature/time no influence on mannitol extraction
- Highest loss in first washing step
- Biological function
- Intercellular/intracellular

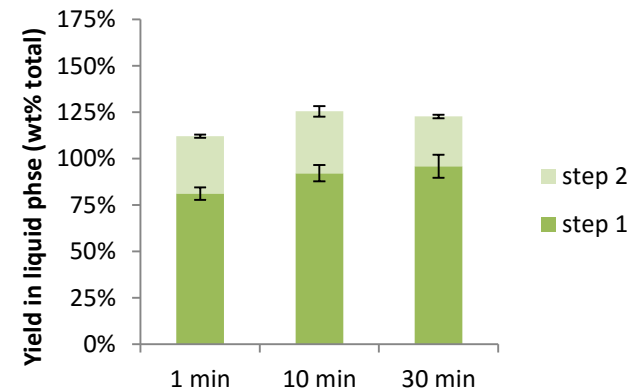
25°C, mannitol liquid phases



55°C, mannitol liquid phases



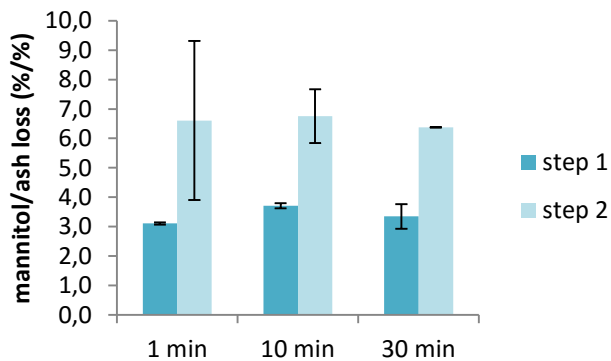
95°C, mannitol liquid phases



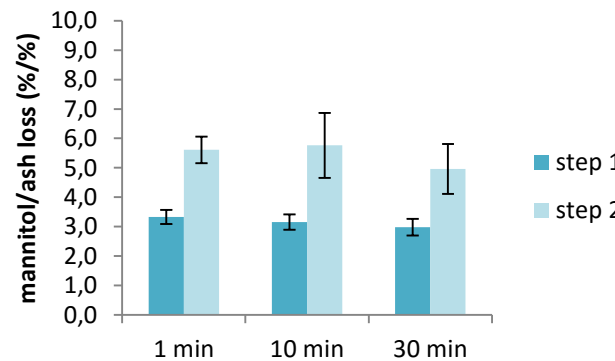
Task 2.5: Washing

- Relative amount of mannitol lost per relative amount of ash removed (%/%)

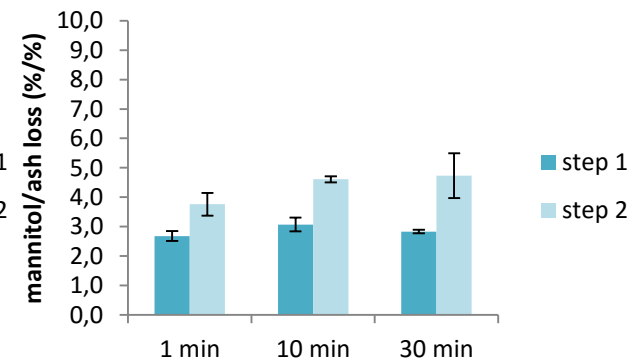
25°C, washing efficiency



55°C, washing efficiency



95°C, washing efficiency



Conclusions and future work

- Mannitol easily released by washing
 - 40% ash removed with short fresh water washing at room temperature
- Mannitol removal through organic solvent extraction (Soxhlet)
- Investigate buffering capacity after washing
- Column technology
 - Salt removal first priority
 - Ion-exchange
 - Combined with simulated moving bed in scale-up
- Filtration options
 - Reverse Osmosis: 10L-scale, ~60% monomeric salts pass; sugars remain
 - Nanofiltration

Acknowledgement



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