NUTRITIOUS AND SAFE KELP INGREDIENTS TO THE FOOD INDUSTRY

INSIGHTS FROM THE SUSKELPFOOD PROJECT

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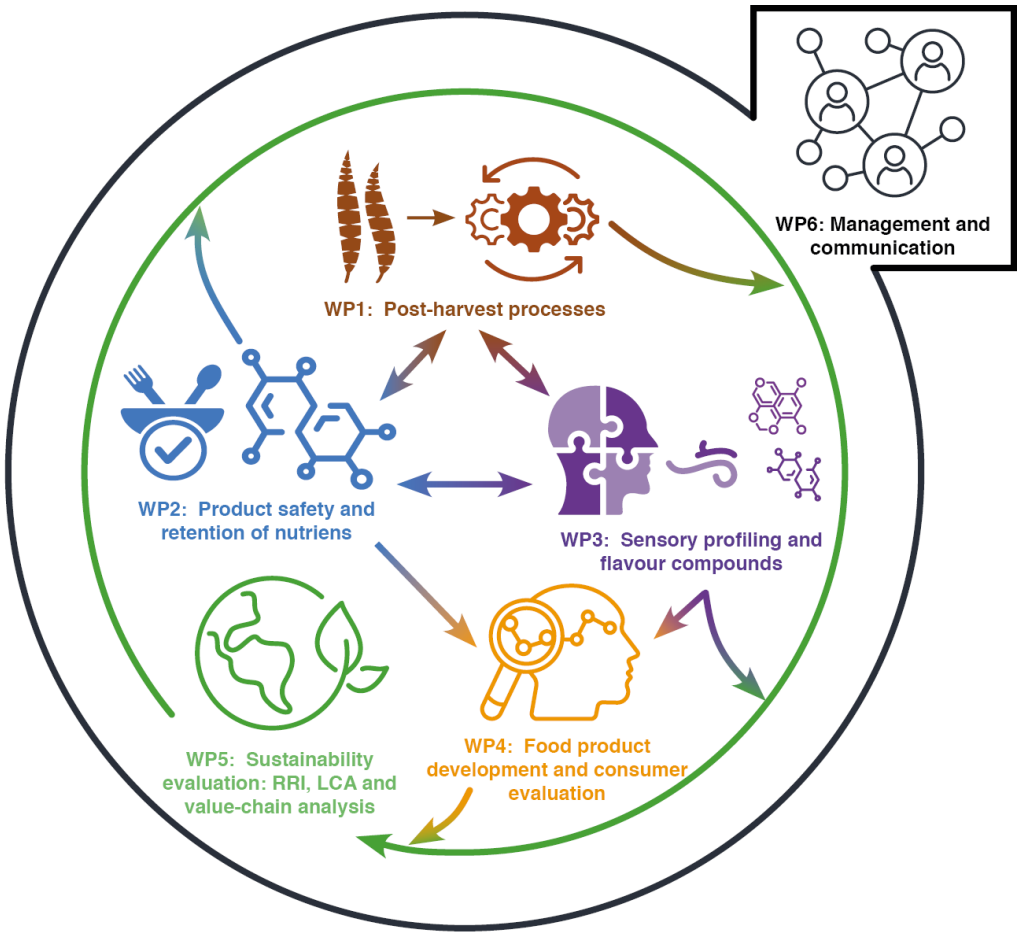
The SusKelpFood project

"**The SusKelpFood project** seeks to enable innovative solutions for the sustainable production of **safe, nutritious, and flavourful ingredients** from cultivated kelps for the Nordic/European food industry"

Website: www.suskelpfood.com



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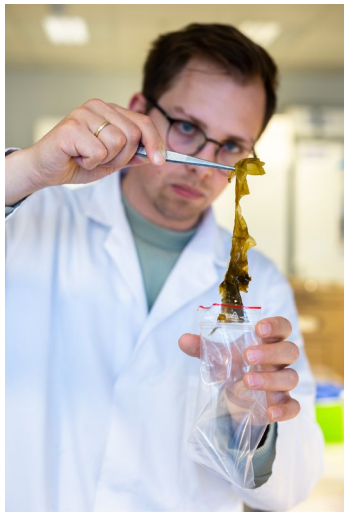

C. Bay Wirenfeldt

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OCEAN FOREST

Lofoten Blue Harvest

Norwegian Seaweed Biorefinery Platform

Mattilsynet

NORWEGIAN SEAWEED ASSOCIATION

Warm seawater rinsing of farmed kelps

- The iodine content of kelps is **limiting their use in the food industry**

- Blanching in freshwater
  - (+) efficient iodine reduction (- 90 % @ 45°C for 2min, Nielsen et al. 2020)
  - (-) reduces the levels of other minerals and flavour-active compounds

- Can **warm seawater treatment** improve nutrient (and flavour) retention while providing safe kelp ingredients for food?

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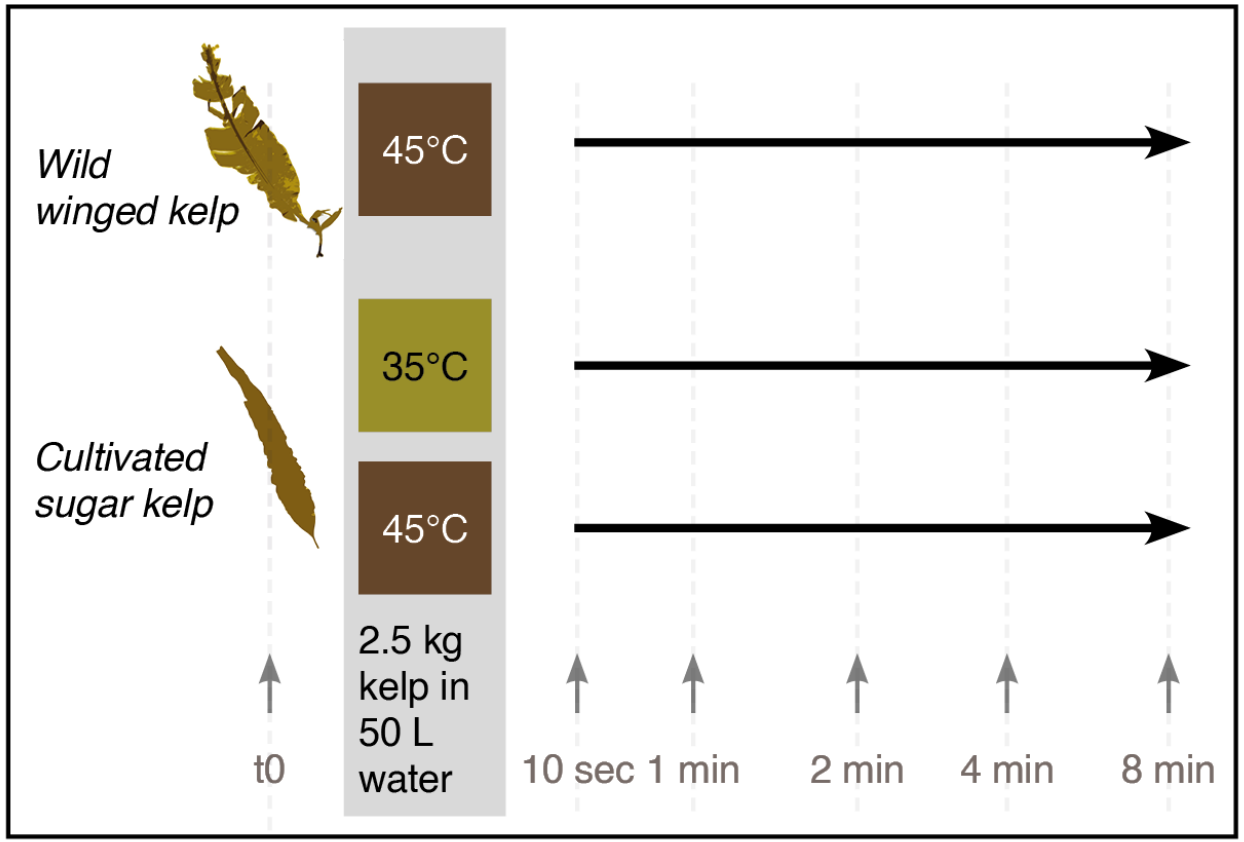
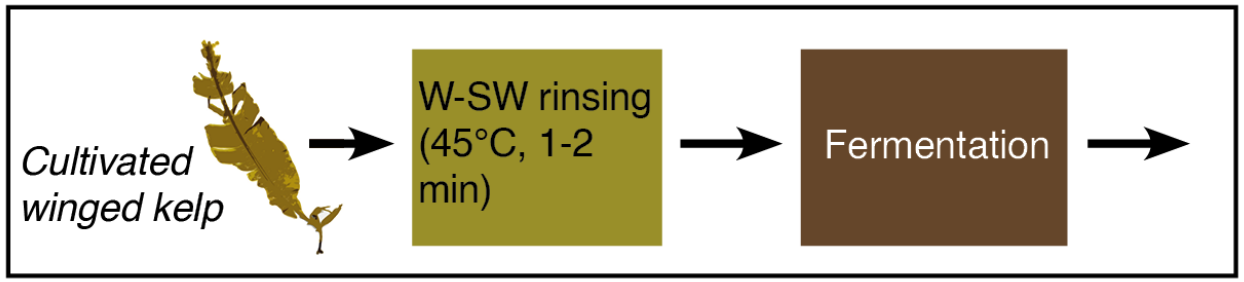


Lab-scale experiment



Commercial harvest

Analyses

- iodine
- minerals &PTEs
- vitamins
- sugars
- Free amino acids

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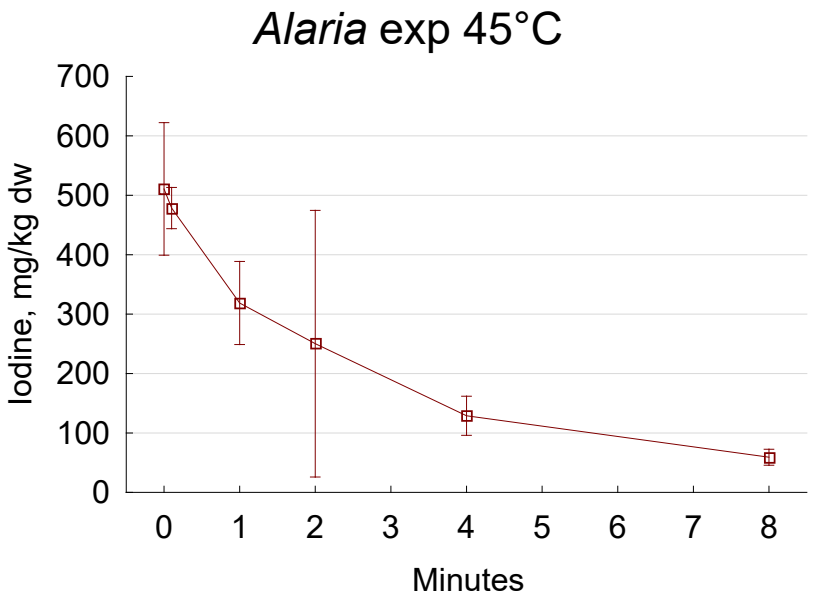
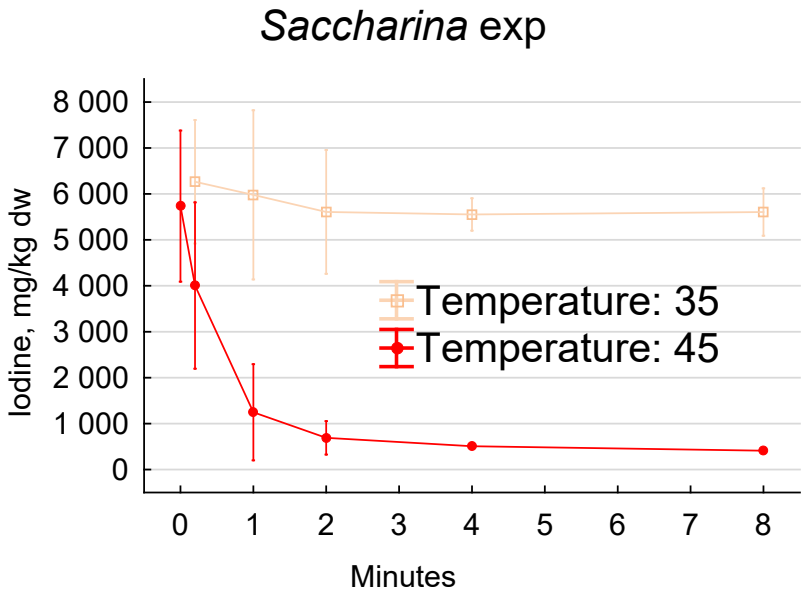
Lab-scale exp.

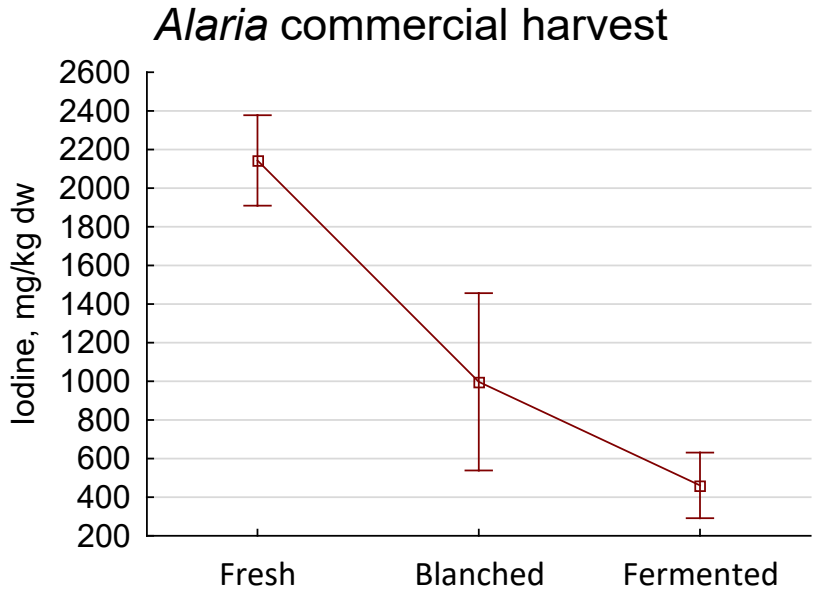
- Rapid decline of iodine content from exposure to **warm SW at 45 °C**
- 50% of initial iodine left in *Alaria* and 10% in *Saccharina* **after 2 min**
- No reduction at 35 °C





Commercial harvest

- Farmed *Alaria* had higher initial iodine content compared to wild-harvested (lab-scale exp.)
- Fermentation further the reduction to comparable levels as lab-scale exp.



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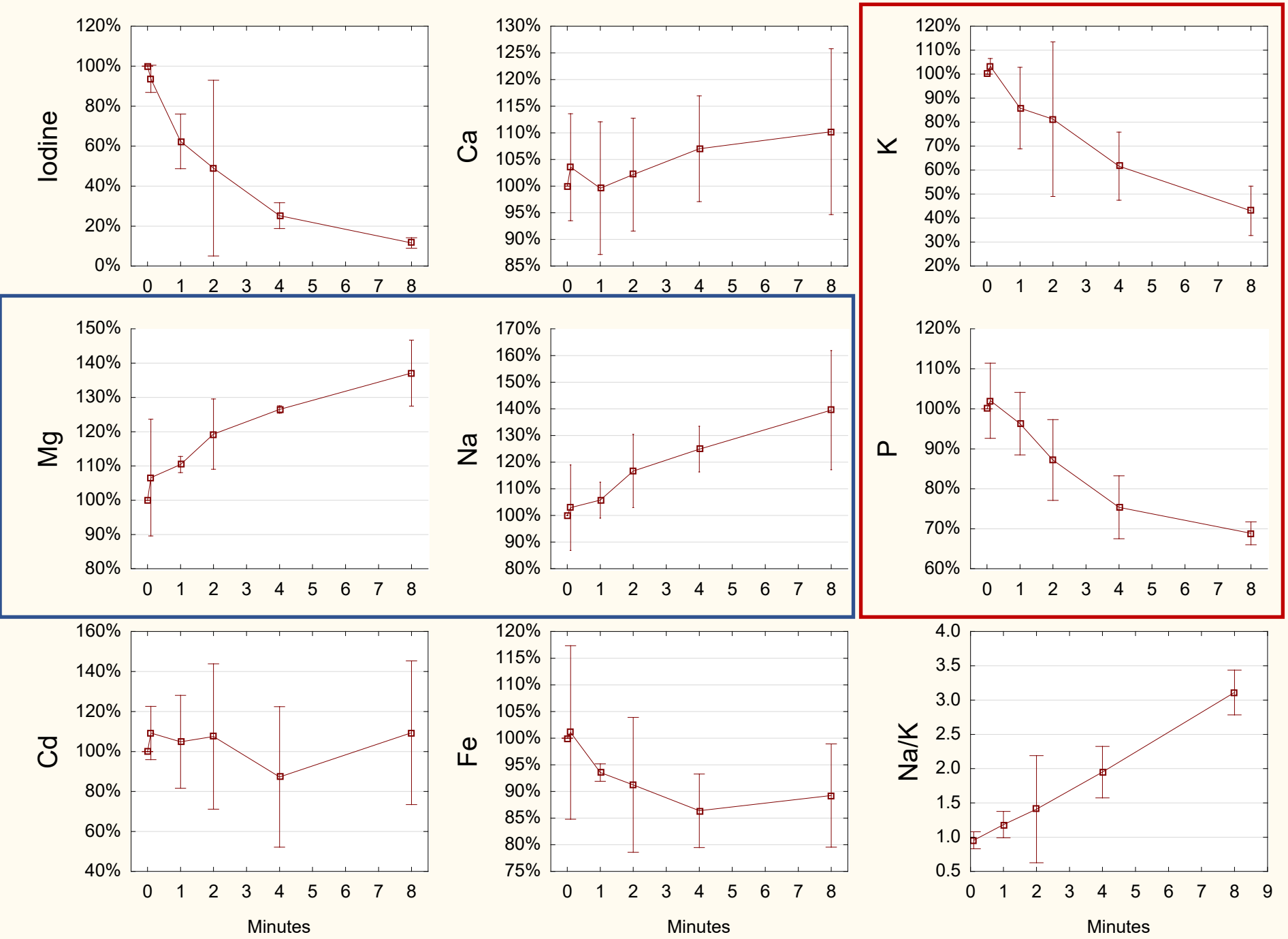

% of initial mineral levels (DW) wild Alaria (lab-scale)

- Decrease in K, P (and As). Lower concentration in SW
- Increase in Mg, Na. Higher concentration in SW

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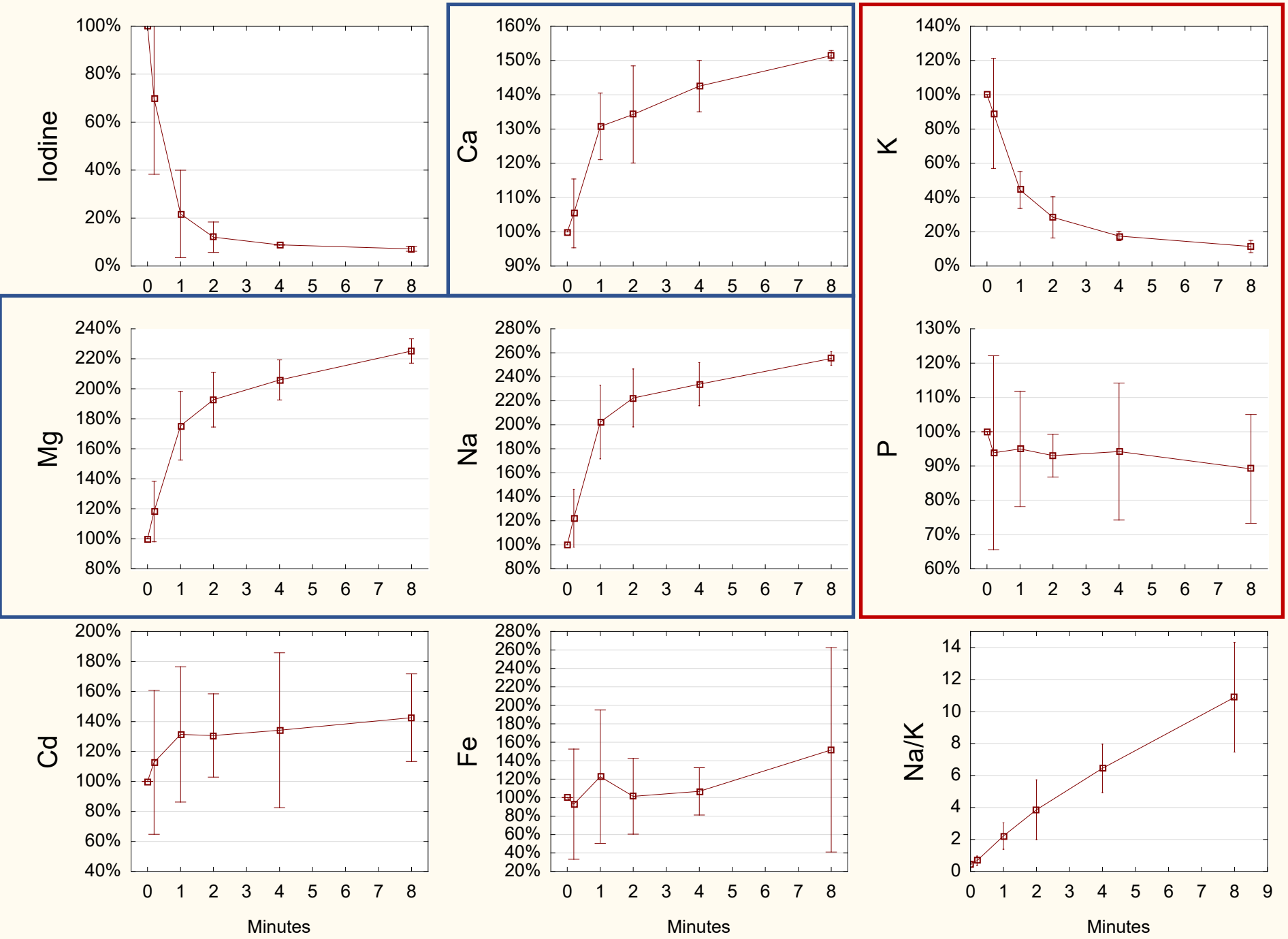

% of initial mineral levels (DW) cultivated Saccharina (lab-scale, 45°C)

- Decrease in K (not observed at 35 °C)
- Increase in Ca, Mg, Na (not observed at 35 °C)
- Greater changes in *Saccharina* than in *Alaria* treated at 45°C)
- Na/K after 2 min
  - *Alaria*: 1.5
  - *Saccharina*: 4

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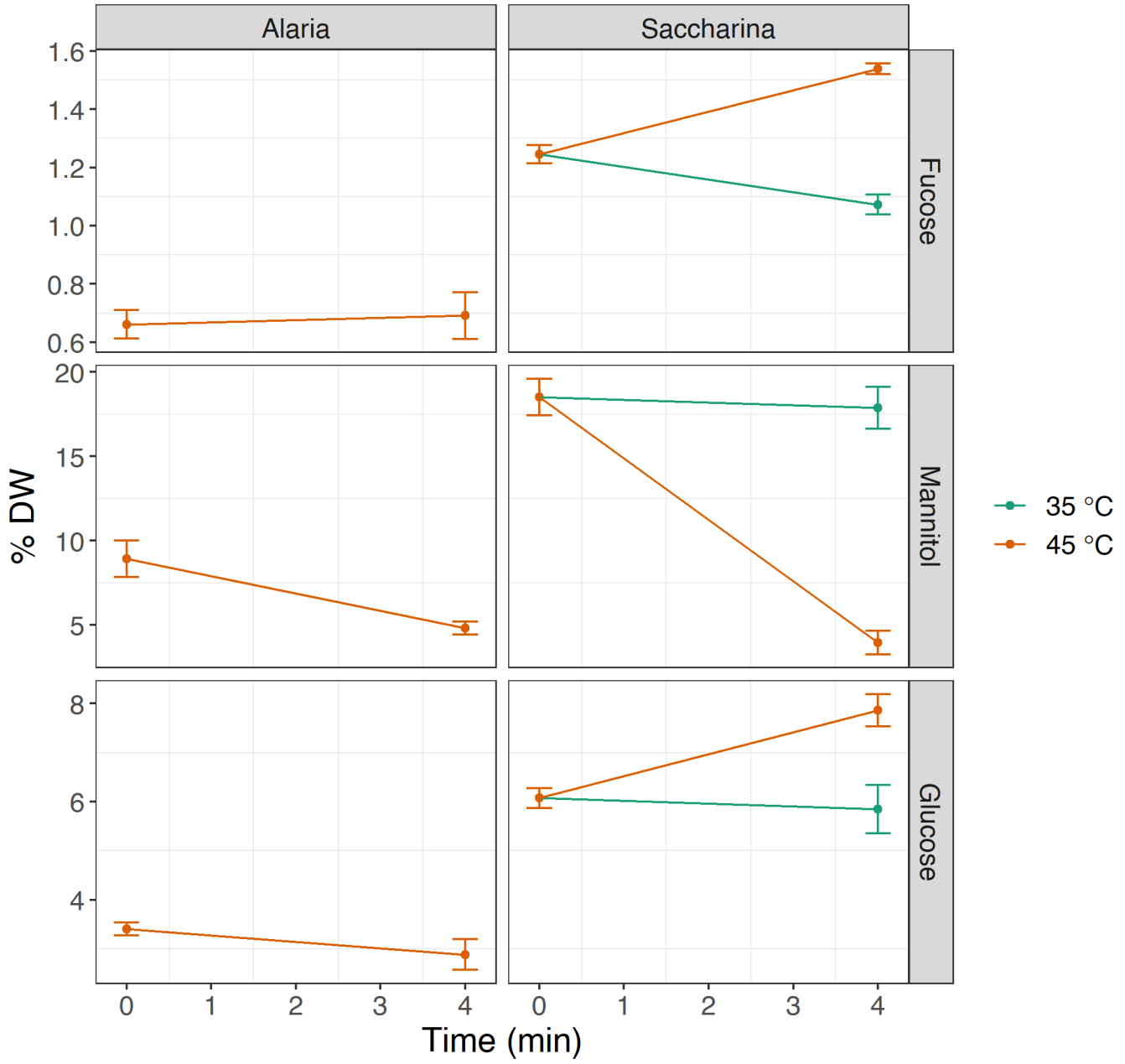
Total carbohydrates (% DW)

- No effects of warm SW rinsing on fucose (fucoidan) and glucose (cellulose, laminaran)
- 80 % loss of mannitol after 4 min in *Saccharina* exposed to 45°C (ca. 40 % loss in *Alaria*).
- Temperature effect in *Saccharina*



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Warm seawater rinsing of farmed kelps

- Rinsing with moderately warm (45°C) seawater **can reduce the iodine content of kelps**

- Comparable iodine levels after treatment (2 min) in *Saccharina* and *Alaria*
  - And comparable mineral per µg iodine in *Saccharina* and *Alaria*
- Main losses from seawater rinsing: I, K, mannitol (analyses of vitamins and free amino acids ongoing)

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Allergen study

- What is the **allergenic risk** from consuming kelp?
- Potential allergens from seaweed can be linked **to associated fauna** i.e. molluscs (tropomyosin), crustacean (tropomyosin) and fish (parvalbumin)
- **Preliminary screening** of allergens in kelps cultivated in Norway using standard methods (**ELISA assays**)
  - Samples from several kelp farms, different locations within farms, and different time (normal vs late harvest)
  - 3 extractions from each samples

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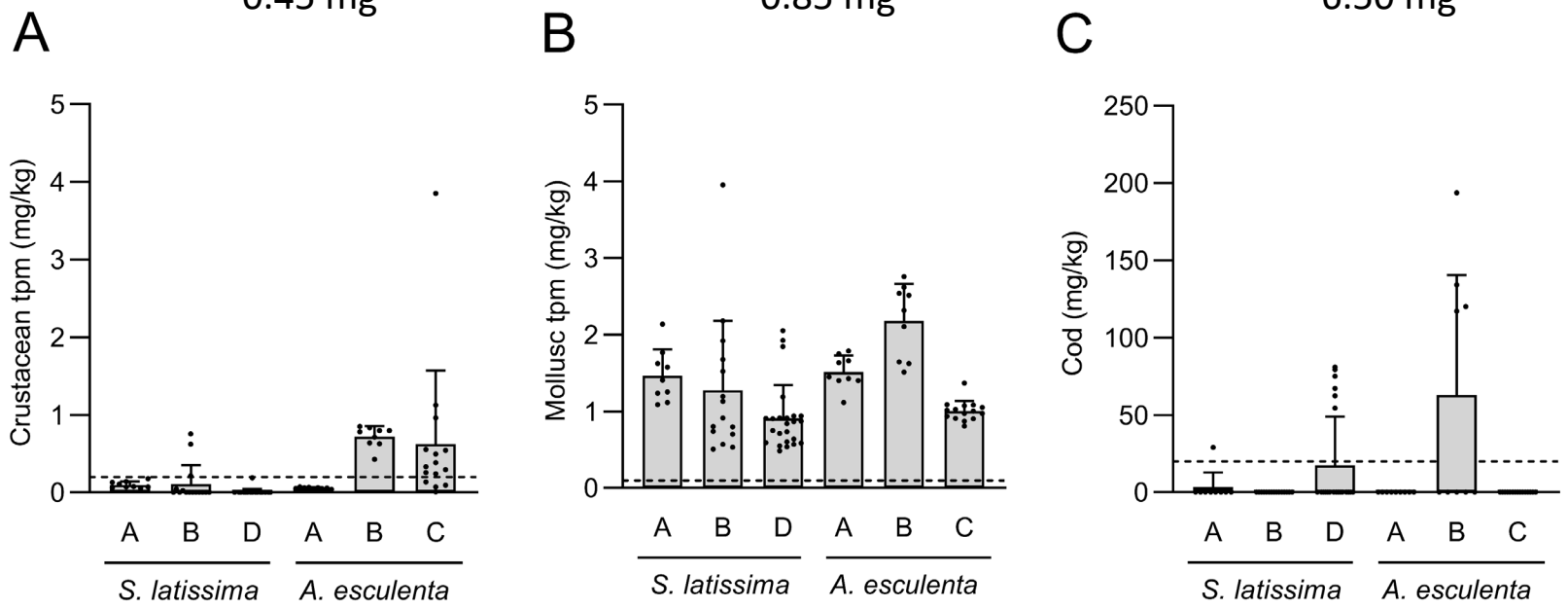
Vital 3.0 thresholds

Crustacean tropomyosin
0.45 mg

Mollusc tropomyosin
0.85 mg

Cod parvalbumin
6.50 mg



Dashed line: limit of quantification, values in mg/kg DW

- All 3 types of marine allergens were detected in at least some of the samples
  - Mollusc tropomyosin was detected in all samples
  - Crustacean tropomyosin close to or below LOQ
  - Fish occasionally detected in some samples
- Preliminary results suggest that large intakes are required to elicit allergic reaction (based on Vital3.0 values)

Allergen study

- Need to collect more data to uncover the variability (locations, interannual, …) in allergens present on cultivated kelp and correlate this data to observed fouling organisms
- Verification of the samples by mass-spectrometry (higher sensitivity)
- Establish risk management advises (sampling regime)

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Thank you for your attention !

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