Can time of deployment affect fouling on cultivated *Saccharina latissima*?

Sanna Matsson[1,2], Silje Forbord[3,4], Hartvig Christie[5], Aleksander Handå[3], Svein Kristiansen[2], Bodil Bluhm[2]

1) Akvaplan-Niva 2) UiT The ARCTIC University of Norway 3) SINTEF Ocean 4) NTNU 5) NIVA

MOTIVATION

Farming seaweed has great potential along the Norwegian coast, including the **Arctic regions**.

A **bottleneck** for the industry is the settlement of fouling organisms, severely reducing the quality and quantity of seaweed biomass.

Time for deployment of seaweed sporelings was therefore tested as a way to **reduce the biofouling.**

QUESTIONS

Deployment date – Can deployment timing ultimately affect the amount of organisms fouling cultivated seaweed?

Internal nitrate – Can a later deployment affect the capacity to store nitrate?

Daily Growth Rate – Will a higher amount of stored nitrate increase the growth rate?

Biofouling – Can a higher growth rate affect the amount of settling organisms on the seaweed surface?

RESULTS

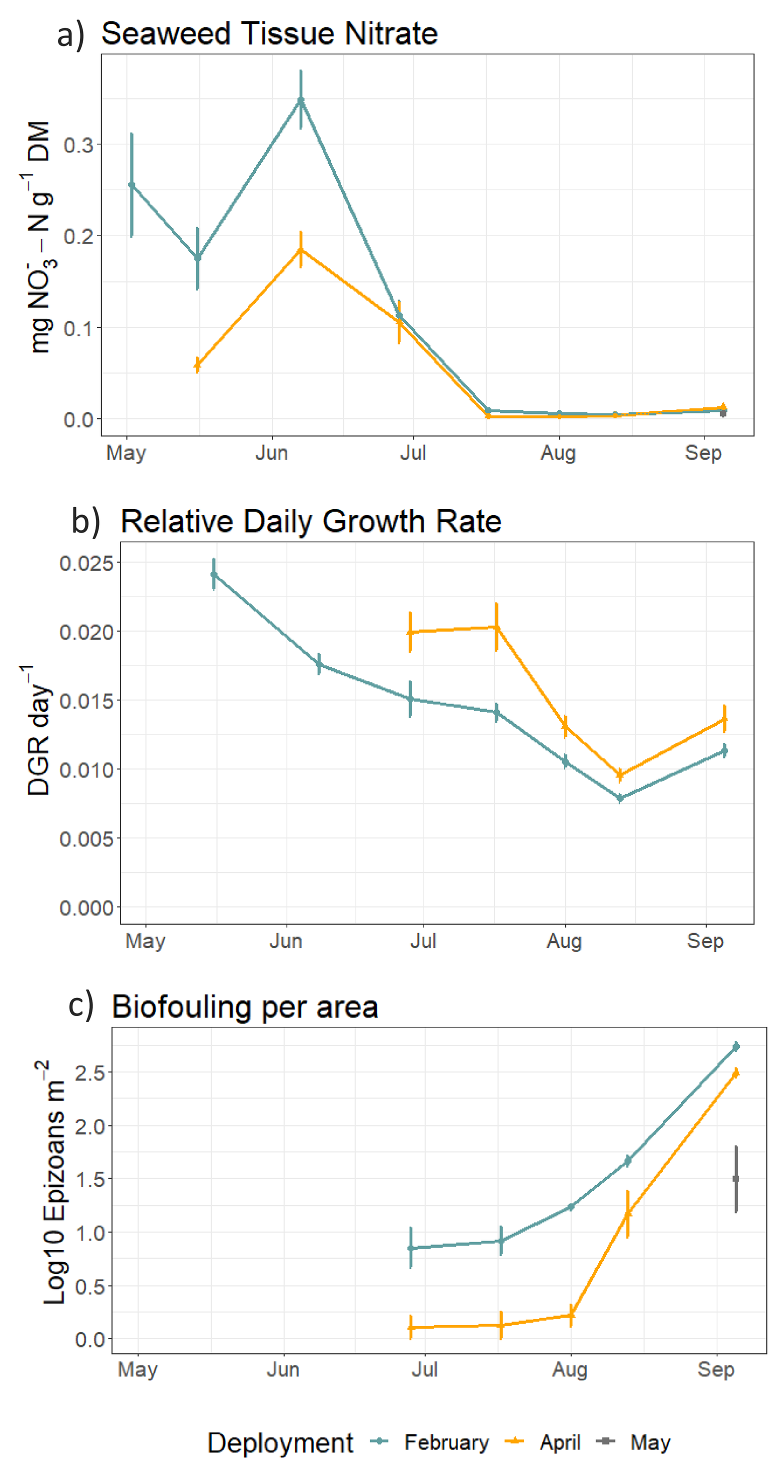

Fig 1 a) Internal nitrate (NO3+NO2) concentration of seaweed tissue. b) Relative Daily Growth Rate (DGR) of seaweed per day. c) Log10 of colonies/individuals fouling seaweed lamina per m^2.
All values are averaged per rope. February deployment as a blue line, April deployment an orange line, and May deployment in grey, ± SE.

Pictures showing three of the most common epizoans colonising *S. latissima*: *Obelia geniculata, Electra pilosa and Membranipora membranacea*

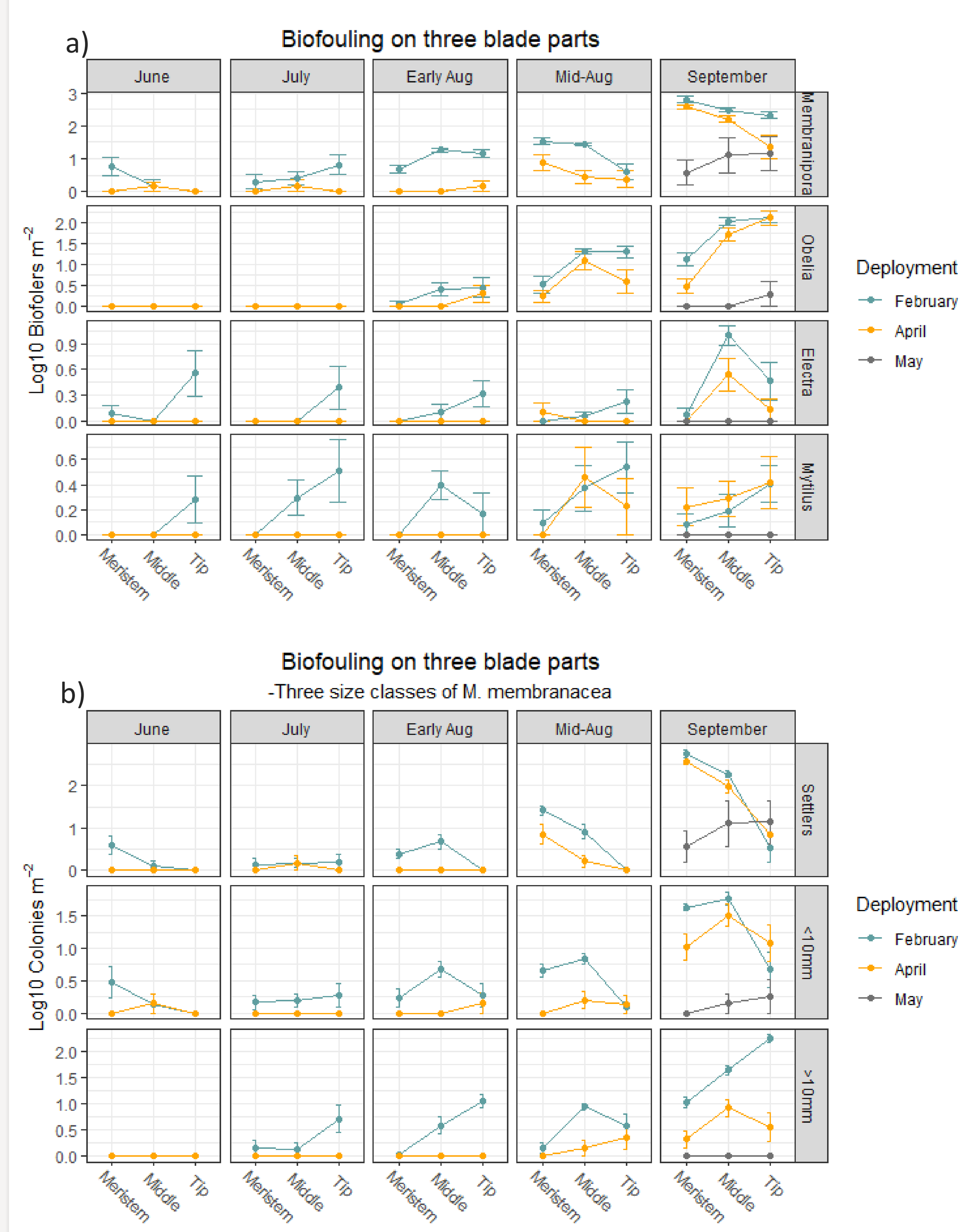

Fig 2 a) Four of the species fouling S.latissima: Membranipora membranacea, Obelia geniculata, Electra pilosa and Mytilus edulis. b) M. membranacea was subdivided into three size classes: ≤ 5 zooids as settlers, ≤ 10 mm as small colonies, and > 10 mm as large colonies. All values are log10 of colonies/individuals per m^2, averaged per rope. The fouling is presented on three different parts of the kelp: Meristem (growth zone), middle, and tip. Y-axis have different scales. February deployment as a blue line, April deployment an orange line, and May deployment in grey, ± SE.

CONCLUSIONS

Deployment date – The amount of organisms colonising the surface of *S. latissima* was significantly **lower when deployed later** (fig 1c).

Internal nitrate – Earlier deployed *S. latissima* initially had higher internal nitrate levels, but as ambient nitrate levels sank, internal nitrate quickly sank to like levels (fig 1a).

Daily Growth Rate (DGR) – The observed **higher DGR** at the later deployment was therefore not due to internal nitrate reserves (fig 1b).

Biofouling – The decreased amount of fouling organisms on younger seaweed was **correlated to higher DGR**. Settlers of *M. membranipora* had a **higher occurrence at the earlier deployment** (fig 2a) and at the **meristematic regions** (fig 2b).

METHOD

S. latissima sporelings grown in the lab were deployed 6 weeks apart outside Kraknes, Tromsø (69 °N) in February, April and in May 2018. They were positioned on a total of 21 vertical lines from 1-2 m depth. Growth was monitored through hole-punching. Internal nitrate concentration was analysed, and biofouling was qualified and quantified until September.

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