

## ROLE OF MICROALGAE IN A LANDBASED MULTI-TROPHIC AQUACULTURE SYSTEM: BIOREMEDIATION, PRODUCTION, BIOCHEMICAL COMPOSITION

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The incorporation of microalgae culture in a land-based multitrophic aquaculture system was investigated during the “IMTA-effect project” (2016-2019). Two experiments were conducted in 2017 and 2018 using a landbased IMTA system combining the production of European sea bass (*Dicentrarchus labrax*) in a recirculating aquaculture system (RAS), natural marine microalgal assemblages in high rate algal ponds (HRAP) and oysters growing in separate open tanks. Our results demonstrated: 1) The efficiency of the microalgae for fish effluent bioremediation with an overall removal efficiency of  $335.8 \pm 0.8$  for  $\text{NO}_3\text{-N}$  and  $22.3 \pm 0.2$  for  $\text{PO}_4\text{-P}$   $\text{mg m}^{-2} \text{d}^{-1}$ ; 2) The rapid shift from green algae to diatoms 15 days after silicate addition (Si:N:P molar ratio of 10:5:1) leading to a dominance of *Phaeodactylum* sp. (Fig 1); 3) A microalgal productivity sufficient to meet oyster food requirement (production peak of  $0.42 \pm 0.03$   $\text{mg chl a L}^{-1}$ , Fig. 2); 4) The incorporation of produced diatoms by oysters using stable isotope signatures.

The results will be discussed together with the changes in environmental conditions, the nature of algal inoculum, the biochemical composition of algae and oysters and the system characteristics. Perspectives for research opportunities and aquaculture producers will be discussed.

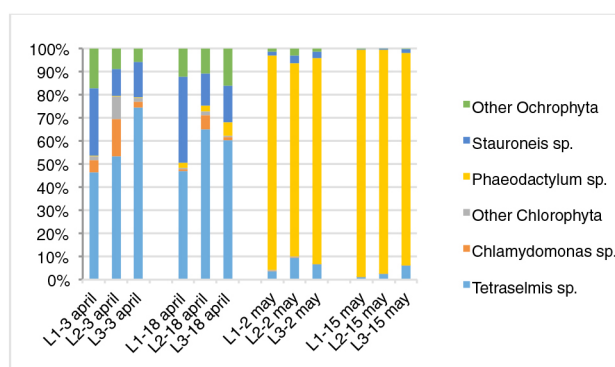


Fig 1. Microalgal community structure composition at genus level. The abundance is defined as the number of sequences affiliated with a genus divided by the total number of sequences obtained per sample. “Lx-Dy” indicates samples taken in Lagoon x on day y

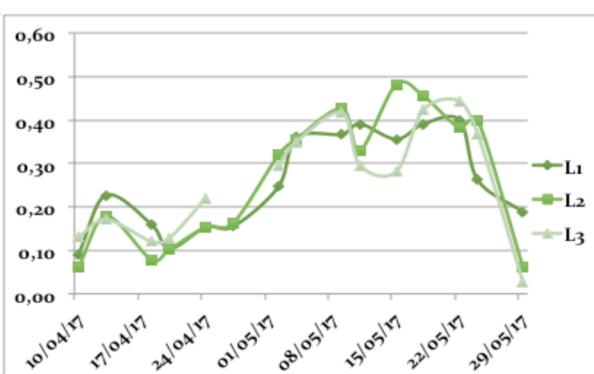


Fig 2. Microalgal biomass concentration expressed in chlorophyll a concentrations over the experimental period, for the 3 raceway lagoons (L1, L2, L3)



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