Cymodocea nodosa performance under stress from fish-farming in the Aegean

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Seagrasses are highly important species in coastal ecosystems, providing a raft of services which include carbon storage, sediment stabilisation and habitat creation for other organisms. This work investigates the sometimes fragile relationship between marine environmental health, and commercial scale aquaculture. Fish farming is an important industry in Greece, where fish are produced both for export and local consumption. However, nutrient enrichment from fish farms has been associated with deteriorating environmental conditions.

This research set out to determine the nutrient enrichment effects from fish farm effluents on the growth dynamics and metabolism of the seagrass *Cymodocea nodosa*. As part of the TAPAS Horizon 2020 EU funded project, our sampling location was in the Argolikos bay, Eastern-Peloponnese. We sampled patches of *C. nodosa* close and far from a fish farm, and carried out seasonal sampling in June 2017 (summer) and March 2018 (winter). Samples were collected by scuba diving, where at each seasonal campaign we collected above and below ground seagrass biomass. Later in the lab we applied reconstruction techniques to determine growth dynamics over time. Water column, pore water and sediment samples were also collected and filtered in the field for nutrient analyses. Finally, we also immediately processed the youngest *C. nodosa* leaves, rhizomes and roots (frozen in $N_{2\ (liq)}$ and later freeze dried) for analysis on nutrients and key metabolites.

We measured the structural variables of *C. nodosa* patches (density, growth dynamics), the physiological characteristics of *C. nodosa* (nutrient content, metabolites) and finally biogeochemical variables of the water column and sediment. Metabolomics analyses allowed us to detect if *C. nodosa* patches were stressed by fish farm effuents and allowed us to determine the level of strain on the immediate environment. Analysis of growth enabled us to see if *C. nodosa* growth was deteriorated close to the farm, or alternatively whether it proliferated due to high availability of nutrients.

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