

IMPACT OF GROWTH MEDIUM ON THE NUTRITIONAL QUALITY OF SEAWEEDS

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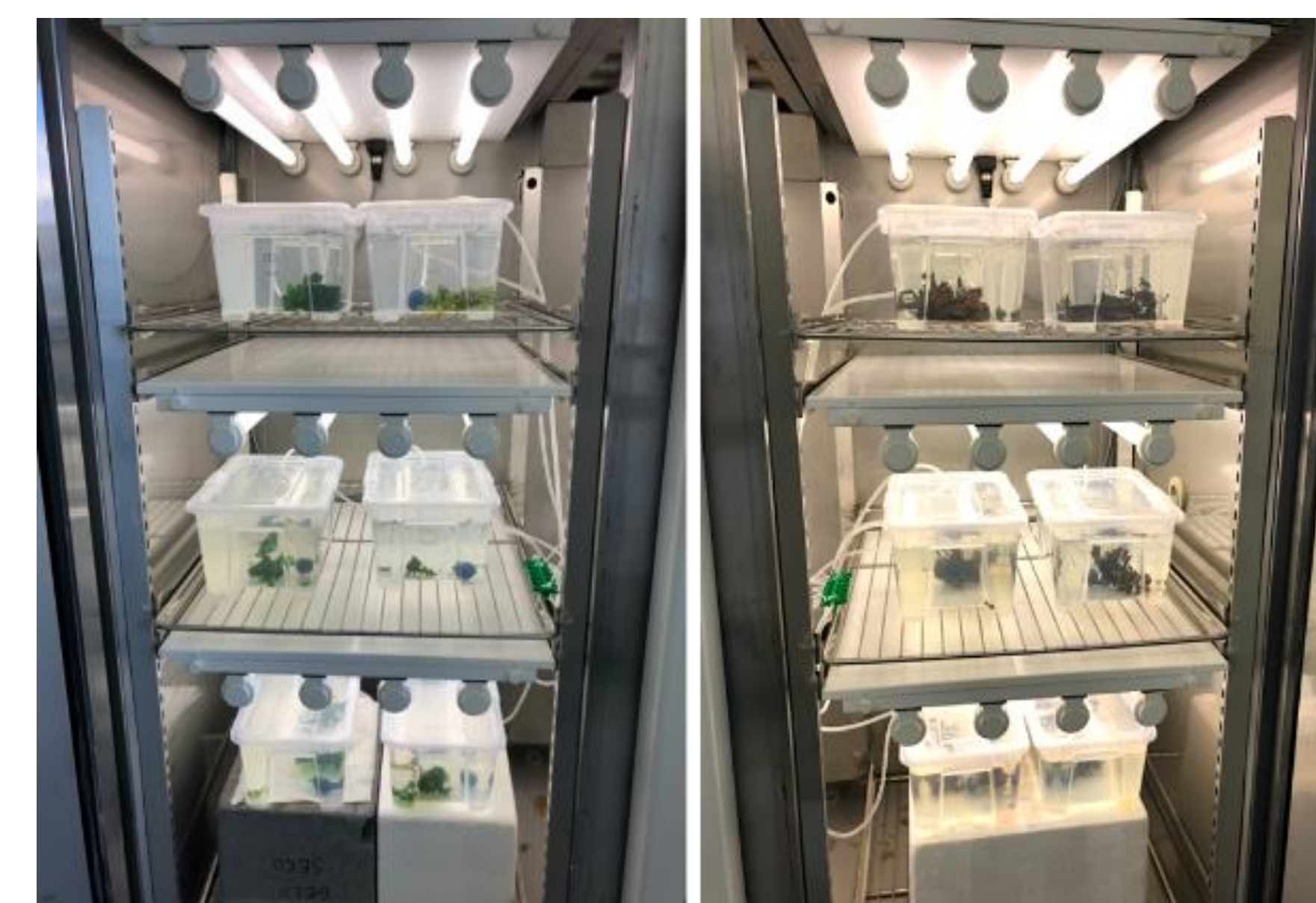


Nowadays the growth of seaweeds in aquaculture has emerged as a factor of great environmental interest, but also due to its nutritional and bioactive compound composition. The optimization of growing conditions is therefore important and the growth medium is one of the abiotic factors that influences both the productivity of seaweed and also their biochemical composition. In this sense, a previous study was carried out to evaluate the behaviour of *Fucus sp.* and *Ulva Sp.* under Land-Based Seaweed Cultivation conditions.

Methodology

The seaweeds were collected freshly from Peniche coast (Portugal) (control), conditioned in water of their habitat with ice blocks and transported to the laboratory. In the laboratory, each macroalgae was sorted according to its appearance, and those containing traces of other organisms were rejected in order to avoid contamination in their cultivation, using a healthy sample for production.

Then seaweeds were maintained in controlled temperature, photoperiod, radiation and aeration conditions in PES and F/2 nutrient solutions using sterilised seawater (Figure 2). After 42 days the samples was collected and freeze dried in order to quantify chemical elements by ICP-OES, antioxidant activity by spectrophotometric DPPH method, total phenol content and antioxidant enzymes like CAT (catalase), APX (ascorbate peroxidase) and GPOD (guaiacol peroxidase) also by spectrophotometric methods.



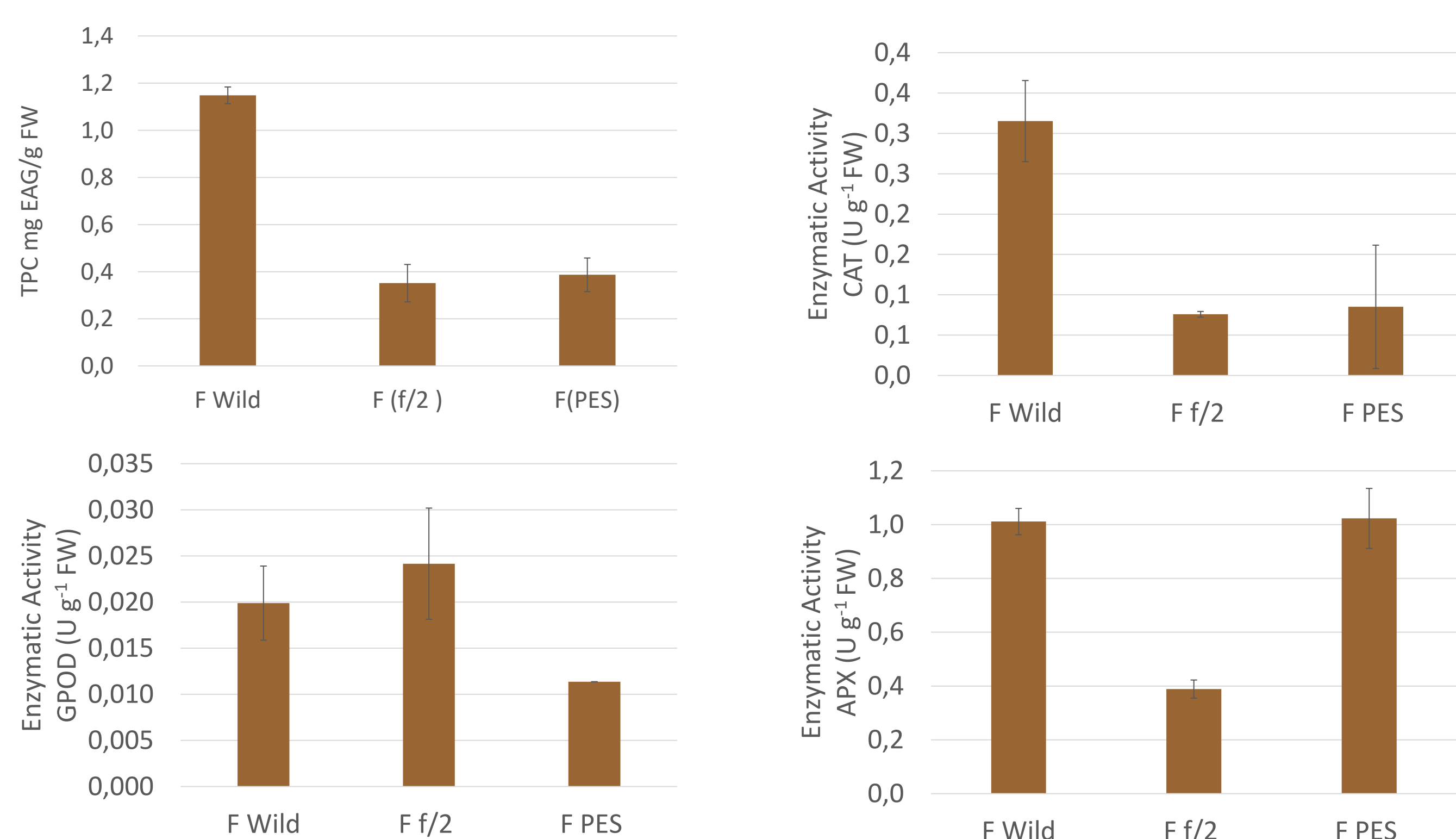
Elements Concentration (mg/kg DW)

	Wild <i>Fucus sp.</i>	<i>Fucus sp.</i> f/2 medium	<i>Fucus sp.</i> PES medium	Wild <i>Ulva sp.</i>	<i>Ulva sp.</i> f/2 medium	<i>Ulva sp.</i> PES medium
Na	29359.7±1291.2	↑ 30949.7±1371.2	↑ 31914.1±898.7	24210.6±1030.6	↑ 29069.1±908.9	↑ 36373.4±1060.7
K	39188.0±1068.0*	↓ 24913.7±456.1	↓ 19277.0±1491.3	19749.9±334.1	↓ 15526.8±795.9	↑ 30511.8±1137.8
Ca	12608.1±313.6	12857.4±920.5	↑ 13167.5±554.3	8380.1±3561.5	↑ 119337.8±3262.7	6457.7±307.0
Mg	11186.8±550.2	11736.6±433.0	↑ 13950.5±956.6	24516.1±1026.6*	↓ 13292.6±1081.4	23932.5±193.0
P	1201.0±37.6	1127.6±79.9	↑ 2198.2±32.9	1900.0±71.6*	↓ 515.1±12.4	↑ 2295.4±100.7
S	30673.5±85.9	↓ 25684.6±805.5	↓ 26319.8±1249.2	40187.2±631.0	↓ 18212.9±1047.4	↓ 25820.1±642.0
Cu	2.7±0.3	↑ 7.8±0.2	↑ 308.7±47.1	5.5±0.8*	↑ 15.0±0.3	↑ 13.4±0.1
Mn	42.7±1.7	↑ 52.9±1.7	↑ 51.5±2.2	144.3±4.3*	↓ 19.1±0.3	↓ 21.0±1.1
Fe	89.5±2.6	↑ 369.1±43.7	↑ 799.9±75.1	1266.8±25.0*	↓ 231.9±13.5	1168.0±97.7
Zn	29.4±2.2*	↑ 46.1±1.6	↑ 592.3±38.8	0.0±0.0	↑ 32.9±0.9	0.1±0.1

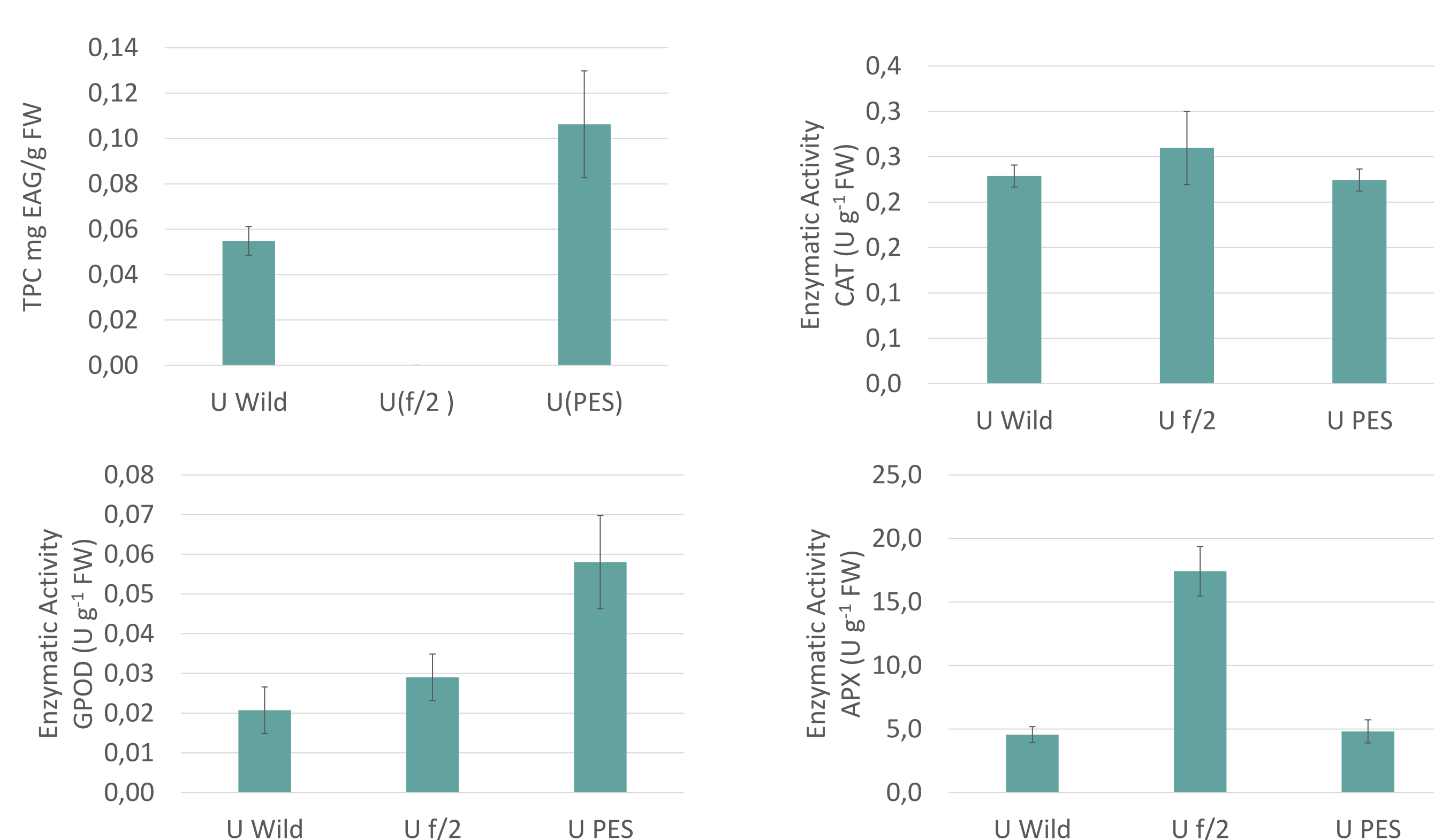
In general, *Fucus sp.* with medium showed higher levels of elements than the wild. Production in controlled culture proved to be an advantage in the absorption of microelements such as Cu, Mn, Fe and Zn. Taking into account the higher concentration of essential elements, the PES medium proved to be more appropriate.

Ulva sp. showed an increase in the elements of the algae tissues with the exception of S and Mn, in the PES medium. However, the f/2 medium was less advantageous in this sense, decreasing the concentrations of K, Mg, P, S, Mn and Fe.

Fucus sp. Results



Ulva sp. Results



Wild *Fucus sp.* showed high TPC and high Cat and APX enzymatic activity, demonstrating that some antioxidant response pathways are active. APX also had high activity in PES medium, which in this case may be related to a non-harmful "excess" of nutrients. This may be the most appropriate medium to obtain biofortified *Fucus sp.* of more favourable nutritional value.

PES medium was notable for having a higher concentration of total phenols (no data for f/2) and higher GPOD activity, besides it was in this medium that alterations in the visual aspect of the seaweed were observed. On the other hand, APX was higher in the f/2 medium.

Conclusions

The biomass and size of the algae were not evaluated, but visually *Fucus sp.* did not show any difference of its original aspect, i.e. no visible damage was detected due to maintenance in new and different growth mediums. On the other hand, *Ulva sp.* maintained in PES medium had a change in appearance from its original appearance, becoming more segmented.

This experiment allowed the selection of the most adequate medium (PES for *Fucus sp.*, and f/2 for *Ulva sp.*) for the production of each algae, taking into account the objectives of the project.

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