Title:

Production of Se-enriched *Chlorella* biomass grown in heterotrophic and phototrophic regimes

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Selenium (Se) is an essential micro-nutrient that is heterogeneously distributed in nature [1, 2]. In areas with low environmental levels of Se, nutritional supplementation of this trace element can prevent its deficiency and improve specific physical and physiological conditions in humans and domestic animals [2, 3].
Microalgal biomass enriched with organically bound Se in feedstuffs, represents a better source of this element for humans and animals relative to potentially toxic, inorganic Se-salts [2, 3].
In this work, the relationship between physiological changes and selenoaminoacid accumulation were studied in *Chlorella* cultures grown in the presence of Se in heterotrophic (strain G-120) or phototrophic (strain R-117; CCALA 1107) regimes. LC-ICP-MS was used to quantify selenomethionine, selenocysteine and methylselenocysteine, while ICP-MS was used to assess Se content. It was found that cultivation medium containing Se with a concentration of 25 mg L^{-1} did not have any deleterious effect on microalgae growth, but it induced a high level of selenoaminoacid accumulation. Based on these results we developed the chemostat-based process for continuous production of Se-enriched *Chlorella* biomass in a fermentor (heterotrophic regime). Obtained kinetic data can be used to efficiently upscale the cultivation for industrial needs. The chemostat-based process was also compared with the large-scale production of Se-enriched biomass in outdoor, thin-layer cascades (phototrophic regime). In conclusion, the results reveal the potential use of this technology for the production of Se-enriched biomass as a food and feed supplement.

References

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