

## BEHAVIOUR OF FREE AMINO ACIDS IN *Phaeodactylum tricornutum* CELLS UNDER COPPER STRESS

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**Abstract:** The influence of copper (Cu) on the marine diatom *Phaeodactylum tricornutum* has been widely studied (Levy et al., 2007; Wang and Zheng, 2008). However, its biochemical response under Cu stress conditions is not fully understood. This work is focused on the behaviour of free amino acids in *P. tricornutum* cells under different Cu levels (0.31, 0.79 and 1.57  $\mu\text{M}$ ) and periods of culture (12, 18 and 21 days). The concentration of ten amino acids (arginine, aspartic acid, glutamic acid, histidine, lysine, methionine, proline, valine, isoleucine and phenylalanine) was analysed with Reverse Phase High Performance Liquid Chromatography with a Photodiode Array Detector.

Exposure to high concentrations of Cu strongly affects *P. tricornutum* growth, cell density and organic ligands accumulation (Rico et al., 2013). The amount of free amino acids decreased when the maximum biomass was reached (18 days) in the control cultures and at sublethal Cu level (0.31  $\mu\text{M}$ ). On the contrary, a dramatic increase of amino acid contents with respect to the control cultures was observed under lethal copper doses of 0.79 and 1.57  $\mu\text{M}$ , reaching the maximum amino acids level after 18 and 12 days respectively. Levels of amino acids as histidine and methionine were 12.4 and 65.8 times higher under 0.79 and 1.57  $\mu\text{M}$  of Cu, after 12 days of culture, and 37.4 and 24.5 times higher, respectively, after 18 days of culture. However, amino acid levels decreased dramatically after 18 and 21 days at these copper concentrations suggesting the total consumption of nitrogen.

This study provides a better understanding of the response to *P. tricornutum* cells exposed to Cu related to amino acid production and the vital role of these amino acids in the defense mechanism of the diatom during the different periods of growth.

**Keywords:** Amino acid, diatom, microalgae, copper toxicity, *Phaeodactylum tricornutum*

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