

**5-Aminolevulinic Acid Increased Productivity and Photosynthetic Pigment Content in *Hematococcus pluvialis***

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**Aim of the study:** 5-Aminolevulinic acid (ALA) as a plant growth regulator is used widely in plant cultivation. However, there are only few reports about its application in algae cultivation. The goal of the study was focused on the effects of 5-aminolevulinic acid on unicellular algae *Hematococcus pluvialis* productivity: dry cell weight accumulation during cultivation, cell number and size, protein and photosynthetic pigment content.

**Material and methods:** *Hematococcus pluvialis* algae cells (Strain IBCE H-17) were grown in Rudic's medium (control) for 12 days supplemented with ALA 0.5; 5; 10; 20 and 30 mg/L ("ALA"-variants) under constant temperature ( $23 \pm 2$  °C), light provided by white Philips TD-36/765 fluorescent tubes, illumination 2000 lux with 14-h photoperiod and air blowing.

**Results:** Cultivation of algae cells in the presence of exogenous ALA (0.5; 5; 10; 20 and 30 mg/L) resulted in increasing dry cell weight compared to the control. For two days of an incubation of algae with ALA (10 mg/L) dry cell weight increased in relation to control by 17%. A dose-dependent increase in the content of *Hematococcus* cells on average by 26% and a decrease in their diameter by 15% were observed in ALA-variants compared to those in the control culture. In 7-day culture, a significant increase of the photosynthetic pigment content (per g of dry matter) was observed under ALA action – levels of chlorophylls *a*, *b* and  $\beta$ -carotene were higher than control values by of 37, 37 and 58% for all ALA concentrations used and in the case of xanthophylls - neoxanthin, violaxanthin and lutein - by 31, 30 and 47% respectively. ALA also contributed to an increase in protein content when calculated per g of dry matter (from 20 to 73%) after 7 days of algae cultivation. With the subsequent cultivation of algae up to 12 days, the effectiveness of ALA action decreased while maintaining the tendency noted above. The results are discussed from the position of using exogenous ALA in activation of the synthesis of endogenous cytokinins that stimulated the growth and development of algal cells, as well as the formation of the pigmentary apparatus of photosynthesis.

**Keywords:** *Hematococcus pluvialis*, 5-aminolevulinic acid, dry weight, cell number and size, protein, photosynthetic pigments