

CORRELATION DEPENDENCIES IN CAROTENOID ACCUMULATION TROUGHOUT LIFE CYCLE OF GREEN ALGA *HAEMATOCOCCUS PLUVIALIS*

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In this study, there has been determined correlation between ABTS values and content of carotenoids, as major components in the ethanolic extracts from green alga *Haematococcus pluvialis* biomass collected throughout life cycle.

Life cycle of microalga include green motile stage with biflagellate cells, the encystment stage with brown immature cyst cells and red stage with aplanospores. Green motile stage involves a high biosynthetic activity and intensification of all adaptation mechanisms to environmental conditions. Biomass accumulation was accompanied by enhanced biosynthesis of constituents. In case of aplanospore inoculum, their transformation into green vegetative cells and cell wall modifications were observed within the first 4 days. During this stage, structural changes of carotenoids occurred with decreasing their content into red cyst cells and antioxidant activity, respectively (Fig. 1). Then, biosynthetic changes relevant to the process of stimulation of carotene synthesis were produced. The maximum carotene accumulation was observed on 8th day. The antioxidant activity of ethanolic extracts from *Haematococcus pluvialis* showed various values in accordance with carotene content into biomass during this stage. A strong correlation ($R^2=0.99$) was found between carotene content and TEAC assay values. Hence, TEAC values of the ethanolic extract from green vegetative cells are largely determined by the content of carotenoids into the extract.

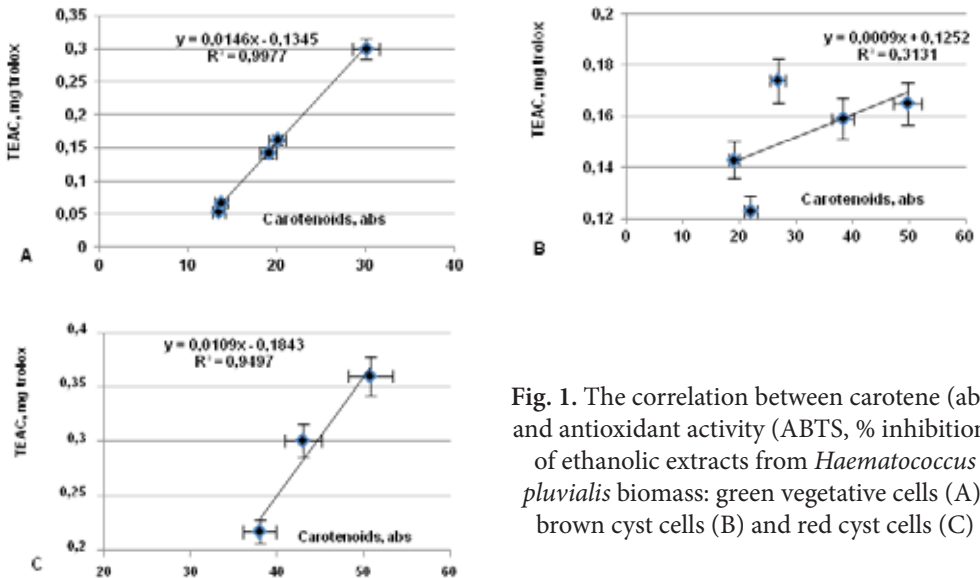


Fig. 1. The correlation between carotene (abs) and antioxidant activity (ABTS, % inhibition) of ethanolic extracts from *Haematococcus pluvialis* biomass: green vegetative cells (A), brown cyst cells (B) and red cyst cells (C)

Conversion of carotene to astaxanthin is characteristic for brown cyst cells. There was no correlation $R^2=0.3$ between the TEAC assay values and carotene content during this stage (Fig.1B).

The resting stage of the life cycle results with the formation of astaxanthin-containing red cyst cells. The content of astaxanthin, extracted into the ethanol, correlates with TEAC assay ($R^2=0.95$). Therefore, the antioxidant activity of ethanolic extracts from *Haematococcus pluvialis* was determined by carotene content into biomass during green motile stage and red aplanospore stage.