

TOXICITY OF Cu AND Cd NANOPARTICLES TO *Spirulina platensis*

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Copper and cadmium ions are considered toxic to cyanobacterium *Spirulina platensis*. The toxicity of 5 nm Cu and Cd nanoparticles stabilized by polyethylene glycol (PEG) for spirulina culture was revealed.

Spirulina was grown on an optimized mineral medium supplemented with CuNP(PEG) and CdNP(PEG) in a concentration range of 0.025-3.750 μM . The experimental variants were compared to control samples.

The pigment content in spirulina biomass was determined based on the spectrophotometric method with the estimation of the maximum absorption values characteristic of the ethanolic extract of pigments (chlorophyll, carotene), and quantitative calculation using the extinction coefficient.

As a result of the study, it was found that changes in the content of β -carotene and chlorophyll *a* in spirulina biomass depended on the concentrations of nanoparticles introduced into the nutrient medium. The chlorophyll content of biomass grown with the addition of CuNP(PEG) and CdNP(PEG) to culture medium in concentration of 0.25-0.5 μM decreased by 18-24% compared to control variant. Concentrations of 2.5 μM and 3.75 μM reduced the chlorophyll content in biomass by 12-59%, while cadmium nanoparticles were more harmless to spirulina strain. Analysis of β -carotene content in spirulina biomass revealed the lack of the effect of CuNP(PEG) added in concentrations of 0.025-5.0 μM . The use of minimum concentrations of CdNP(PEG) enhanced the pigment content by 20-30% in the experimental variants compared to control values.

In variants with concentrations of 2.5 μM and 3.75 μM CuNP(PEG), the content of β -carotene was reduced by 50-70%, similar to chlorophyll content. The concentration of 1.25 μM CdNP(PEG) stimulated biosynthesis of carotenoids, which was 20% higher than in control samples.

The changes in total chlorophyll and carotenoid contents in spirulina biomass proved the involvement of nanoparticles in the biosynthetic activity of the strain. The decrease in the content of photosynthetic pigments was the evidence of the toxic effect of copper and cadmium nanoparticles stabilized with polyethylene glycol on spirulina culture.