CONGO RED BIOREMOVAL BY *SYNECHOCYSTIS SP.*

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Introduction. Azo compounds constitute the largest and the most diverse group of synthetic dyes, which are widely used in a number of industries such as textile, food, cosmetics and paper. The inappropriate dyes disposal can disturb the aquatic ecosystem and constitutes an environmental problem due to their toxicity and carcinogenicity (1). For this reason dye bioremoval, especially from textile effluents azo dyes, has been a major challenge from the past decades.
The aim of this study was to investigate the potential of *Synechocystis* sp. to bioremove azo dye Congo red.

Methods. Erlenmeyer conical flasks were inoculated with 20 ml exponential growing cultures, then were added 5, 10, 15, 20 and 25 mg L^{-1} of dye Congo red and BG11 medium(2). The cultures were grown for 96 h with an irradiance of 200 μmoles/m^2/s, 12 h light/12 h dark cycle, and 800 ml/min airflow.
Cell growth of *Synechocystis* sp. was determined by cell number per milliliter using a flow cytometer (Becton Dickinson CK). The dye concentration was determined at 0 and 96 h by measuring the absorbance of the cell-free supernatant of the sample at the maximal absorption wavelength (494 nm), using an UV-Vis spectrophotometer (Genesis 10uv Thermo Electron Corporation ®).

Results and discussion. Growth of *Synechocystis* sp. was followed in terms of number of cells per milliliter (Fig. 1). It is noted that the Congo red dye did not affect significantly the growth of the cyanobacteria. This could be because *Synechocystis* sp. has three different types of membranes: the inner and outer membrane and cytoplasmic thylakoidal membranes besides the presence of mucilage (3,4) which gives the selective permeability to the cell and protection against the dye.
The absorption spectrum of Congo red in the visible region showed a maximum peak at 494 nm (Fig. 2), which completely disappeared after 96 h at concentrations of 5, 10 and 15 mg L^{-1}, this indicates that the dye was totally bioremoved by the cyanobacteria, while the peak at 96 h at concentrations of 20 and 25 mg L^{-1} decreased by 96 % compared with the peak of initial concentration.

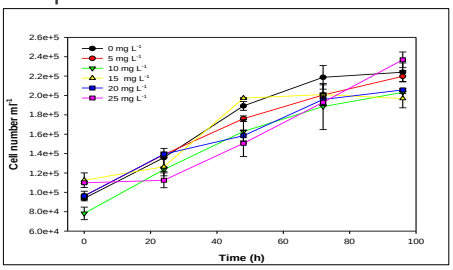

Fig.1 Effect of Congo Red on growth (cell number per ml) in *Synechocystis* sp. following dye exposure during 96 h.

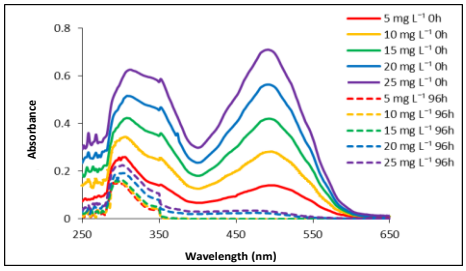

Fig.2 Absorption spectra of Congo red dye at the beginning (0 h) and the end (96 h) bioremoval kinetic of *Synechocystis* sp.

Conclusions. The cyanobacteria *Synechocystis* sp. has potential to bioremove dye Congo red in the range of 5-25 mg L^{-1} from aqueous solutions up to 96% without inhibiting the cyanobacteria growth.

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