DESCRIPTION FOR THE GENERAL PUBLIC

Climate changes and progressive eutrophication of water bodies commonly caused by human activities creates favorable conditions for abundant growth of bloom-forming cyanobacteria. Certain species of cyanobacteria produce toxic compounds called cyanotoxins. Some of them like microcystins or anatoxins are well recognized and described. On the other hand, some cyanotoxins like cylindrospermopsin (CYN) are still insufficient recognized. To date, the ability to synthesize CYN has been demonstrated in several freshwater species of cyanobacteria all over the world. CYN is a very stable molecule, resistant to the impact of physiochemical factors commonly using during water treatment technology. CYN causes pathogenic changes in many organs such as liver, kidneys, and thymus. It causes *i.a.* inhibition of protein synthesis and DNA damage.

The aim of this project is to investigate the accumulation and degradation of CYN – common cyanotoxin – by macrophyte *Lemna trisulca*, which area of occurrence is similar to cyanobacterial species able to synthetize toxin, and to research impact of CYN on plant physiology.

Expected results:

- determination of the kinetics of CYN accumulation and its degradation in plant tissues over time,
- determination of the proteins or chemical compounds involved in CYN degradation process and proposition of its degradation pathways based on the obtained results,
- analysis of the influence of various CYN concentrations on the plant physiological processes,
- determination of the influence of *L. trisulca* on growth, development and CYN synthesis by *Cylindrospermopsis raciborskii* during co-cultivation experiments.

In this project I would like to perform extensive experiments to understand and describe the effect of various CYN concentrations on plant physiological processes (accumulation of biomass, changes in the content of photosynthetic pigments, intensity of photosynthesis and respiration processes, changes in the electrical conductivity of cell membrane and characteristics of the stress response).

In my previous research I demonstrated the efficient absorption and degradation of other cyanotoxin – anatoxin-a. Additionally *L. trisulca* absorbed efficiently nitrogen and phosphorus from the media which prevents algal growth and development.

During preliminary research I demonstrated that 24 h cultivation of 100 μg fresh weight of *L. trisulca* in the media supplemented with CYN caused a reduction in the initial concentration of the toxin by 20%. These results indicate a very fast and efficient uptake of CYN (at the concentration much higher than ever recorded in nature) by this macrophyte. At the lower concentrations the uptake of the toxin was even more efficient.

Such knowledge will be crucial to limit the concentration of this compound in drinking water. The expected consequence of this findings is to create safety and cheap methods to controlled introduction of macrophyte to water reservoirs or design efficient bioreactors to eliminate this toxic compound from water.