

“Biological and physico-chemical variability in seasonal intensification of growth of macroalgal biomass in inland waters from different biogeographical zones”

Algae (in Greek phykos) are unicellular (microalgae) or multicellular (macroalgae) organisms that live and reproduce in marine and fresh water in all climatic zones. Microalgae form freely floating phytoplankton clusters of a few millimeters, while macroalgae resemble grass blades or leaves and reach the size of up to a few meters, grow over rocks on the bottom of the oceans.

Algae biomass is a natural source of a variety of biologically active compounds hence it has been successfully used in many branches of industry. Literature on chemical composition of freshwater algae is scarce, which means that little is known about it. In the lakes in Poland and in the rivers in Lithuania very popular are the charophytes that occur in great masses, in particular *Cladophora glomerata*. From late spring to early autumn it is possible to observe mass blooming of algae clustered in the form of mats, easily noted in Polish water bodies.

The examples are presented in the figure below showing the mass algae occurrence in Lake Oporzyńskie (A) and in the river Nielba (B).



The presence of large algae mats on the surfaces of water bodies is an obstacle for sunlight penetration into deeper layers of water, which restricts development of submerged vegetation and zoobenthos, but also destroys the touristic attractiveness and natural value of the water basins. According to reported observations, although Poland and Lithuania are neighboring countries localized in the same climatic zone and characterized by the same natural conditions, there is a significant difference in formation of algae mats in water bodies in these two countries. Algae mats appear mainly on the surface of Polish lakes and Lithuanian rivers.

The objectives of the studies planned within the project are as follows.

- Determination of the effect of natural environment conditions on the chemical composition of freshwater macroalgae.
- Checking the effect of the contents of polysaccharides, phenols and other chemical compounds contained in the algae cell walls on formation of large mats on the surfaces of lakes and rivers.

These studies will include determination of physicochemical parameters of water and morphological and taxonomic analysis of the algae. In order to isolate the bioactive compounds from the algae biomass, the material collected will be dried and subjected to extraction. The isolated active compounds will be quantitatively analyzed using chromatographic and spectrometric methods.

The novelty of the project lies in the fact that it will be the first ever attempt at explanation of the differences in mass appearances of algae mats in Polish and Lithuanian water bodies and the first attempt at checking the effect of chemical substances contained in macroalgae on the process of mat formation.

The research conception is related to the ecological dominance of selected algae species and identification of environmental, structural and allelopathic factors involved in the process of mat formation. The project will be realized on the basis of research potential and experience of a group of hydrobiologists and chemists from Poland and with cooperation of Lithuanian specialist.