DOI: 10.46991/JISEES.2025.SI1.173

New Approaches to Assessing the Ecological and Spatial Role of Phytoplankton in Various Water Bodies of the Republic of Armenia

Syuzanna Esoyan[1], Małgorzata Poniewozik[2], Astghik Mkrtchyan[1], Hovhannes Igityan[1], Lusine Hambaryan[*1,3]

[1] Faculty of Biology, Yerevan State University, Yerevan, Armenia
[2] Department of Plant Physiology and Biotechnology, Faculty of Medicine, The John Paul II Catholic University of Lublin, Poland
[3] Scientific Center of Zoology and Hydroecology, Yerevan, Armenia

ABSTRACT

Phytoplankton is the primary link of aquatic ecosystems, which has great ecological significance in the biogeological cycles of carbon for climate change, and the formation of water quality. In the Lake Sevan-Hrazdan River-Yerevanyan Lich aquatic ecosystems of important socio-economic importance in the Republic of Armenia, the features of the development of functional groups of phytoplankton coexistence in water bodies with different hydrological regimes and ecological conditions were studied. Cyanobacteria had the highest quantitative development in Yerevanyan Lich. It was found that out of 21 species of cyanobacteria found, colonial *Aphanothece clathrata, Microcystis aeruginosa* and filamentous *Aphanizomenon flos-aquae*, toxic species were recorded. For the first time, algae with allelopathic effects have been isolated, which cause competition between other species, unpredictable successions of functional groups, and changes in the composition of the entire community. In various aquatic ecosystems, the spatial transition and migration of phytoplankton from lake to river, then reservoir, are determined by changes in water flow, availability of biogenic elements, and other environmental factors. In lakes, the more stable hydrological and stratified conditions provide good conditions for phytoplankton development, while in rivers, the presence of flow can often favor the development of certain groups, such as diatoms and some cyanobacteria. Reservoirs, as hybrid systems, can exhibit characteristics of both lakes and rivers. DNA extraction methods have been optimized for further analysis of the samples to identify genes responsible for cyanotoxins.

Keywords: phytoplankton, water bodies, cyanobacteria, allelopathic effect, DNA extraction

Acknowledgement: The work was supported by Ministry of Education, Science, Culture and Sport of RA as part of the research project «Factors triggering the bloom of cyanobacteria in important water ecosystems of RA. A comprehensive survey of the bloom phenomenon and its causes». Project Code: 24WS-2H024 (2024-2027).

References:

1. Asatryan, V.; Stepanyan, L.; Hovsepyan, A.; Khachikyan, T.; Mamyan, A.; Hambaryan, L. The dynamics of phytoplankton seasonal development and its horizontal distribution in Lake Sevan (Armenia). *Environ. Monit. Assess.* **2022,** *194*, 757. DOI:10.1007/s10661-022-10446-5
2. Yan, G.; Yin, X.; Huang, M.; Wang, X.; Huang, D.; Li, D. Dynamics of phytoplankton functional groups in river-connected lakes and the major influencing factors: A case study of Dongting Lake, China. *Ecol. Indic.* **2023***, 149*, 110177. DOI:10.1016/j.ecolind.2023.110177
3. Reynolds, C.S.; Irish, A.E. Modelling phytoplankton dynamics in lakes and reservoirs: The problem of *in situ* growth rates. *Hydrobiologia* **1997,** *349*, 5–17. DOI:10.1023/A:1003020823129

[*]Corresponding Author:

Lusine Hambaryan, Scientific Center of Zoology and Hydroecology, 7 P. Sevak, 0014, Yerevan, Armenia. Email: lusinehambaryan@ysu.am