



Toxins evaluation for the investigation of fish kill in the Kapchagai reservoir, Kazakhstan: case study

Pósters

Toxins & Other Microalgal Metabolites

Galina Nugumanova ^{1, 2}, Adina Zhumakhanova ², Aiyim Duisen ^{1, 2}, Natalie Barteneva ².

(1) Nazarbayev University, NURA, 53 Kabanbay batyr Ave., Astana, Kazakhstan.

(2) Nazarbayev University, Department of Biology, 53 Kabanbay batyr Ave., Astana, Kazakhstan.

galina.nugumanova@nu.edu.kz

Nowadays, harmful algal blooms (HABs) have become an urgent environmental management problem in many regions, including Kazakhstan. In the present study, we report for the first time the possibility that the toxic *Microcystis* spp. bloom in Kapchagai reservoir, Kazakhstan, may have contributed to a large fish kill in November 2022, affecting several fish species. Kapchagai is a major reservoir in southeastern Kazakhstan near Almaty. It was created in the 1960s by damming the Ili River, and is used for irrigation, fish farming, and recreation. Water samples were analyzed using UltiMate 3000 (Thermo Scientific, USA) liquid chromatography system (UHPLC-DAD). Microcystin-LR (MC-LR) was detected in a water sample collected near the «Ermin» recreation area with a concentration of 2.4 µg/l. Flowcam VS-4 (Yokogawa Fluid Imaging Technologies, USA) instrument detected *Microcystis* spp. colonies, which is correlated with the UHPLC-DAD results. Detection of toxins was also performed using an Impact II VIP (Bruker, Germany) ultra high performance liquid chromatography quadrupole time of flight mass spectrometry (UHPLC-QTOF-MS) system. The results of the UHPLC-MS analysis confirmed the presence of MC-LR in a water sample from the Kapchagai Reservoir collected near the «Ermin» recreation base and its absence in the samples collected in the Fall of 2024. These findings support the possibility that cyanobacterial toxins contributed to fish mortalities in Kapchagai. We hope that our findings will contribute to the development of analytical methods for the timely detection of toxins and ecological monitoring in Kazakhstan,

thereby significantly reducing risks to human health and the environment.

Palabras Clave

(1) cyanotoxins, (2) microcystin-LR, (3) UHPLC-MS.

Financiamiento:

This research received funding from MES Kazakhstan grant AP23489214 to G.S.N. and Nazarbayev University FDCRGP grant #SSH2024005, and MES Kazakhstan grant AP14872028 to N.S.B.

Agradecimientos:

We are thankful to the Core Facilities of Nazarbayev University for access to instrumentation, to Aleksey Rusanov for help with field expeditions to Kapchagai Reservoir.