

STUDY OF ELODEA CANADENSIS ELIMINATION OF SODIUM DODECYL SULPHATE AND NH_4Cl

Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3},
Chaneva G.⁴

¹ Irkutsk State University

² Irkutsk National Research Technical University

³ Baikal Museum of Irkutsk Scientific Center

⁴ Sofia University "St. Kliment Ohridski"

STUDY OF ELODEA CANADENSIS ELIMINATION OF SODIUM DODECYL SULPHATE AND NH_4Cl Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3}, Chaneva G.⁴¹ Irkutsk State University, ² Irkutsk National Research Technical University, ³ Baikal Museum of Irkutsk Scientific Center, ⁴ Sofia University "St. Kliment Ohridski"*Keywords: phytoremediation, aquatic plants, biogens, water pollution, surfactants, Elodea canadensis*

One of the most pressing problems, both for the drainage basin of Lake Baikal and for the natural waters of the entire country, is pollution with biogenic elements (urea, ammonium, nitrates, phosphates, etc.), surfactants (surfactants) and often containing detergents. An increase in the concentration of nutrients, surfactants and detergents can initiate the eutrophication of water bodies. The subsequent dying off of the phytomass, followed by rotting and a sharp decrease in oxygen, has a negative effect on biota organisms.

In recent years, a very high hyperproduction of filamentous algae has been observed on Lake Baikal. This process, according to a number of researchers, is associated with the intensive development of the tourism business on the shores of Lake Baikal and, accordingly, an increase in anthropogenic pressure on the ecosystem of Lake Baikal. Every year Baikal is visited by about 1.5-2 million tourists, as a result of which about 780 thousand tons of waste are generated.

STUDY OF *ELODEA CANADENSIS* ELIMINATION OF SODIUM DODECYL SULPHATE AND NH_4Cl Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3}, Chaneva G.⁴¹ Irkutsk State University, ² Irkutsk National Research Technical University, ³ Baikal Museum of Irkutsk Scientific Center, ⁴ Sofia University "St. Kliment Ohridski"*Keywords: phytoremediation, aquatic plants, biogens, water pollution, surfactants, Elodea canadensis***Research Objective:**

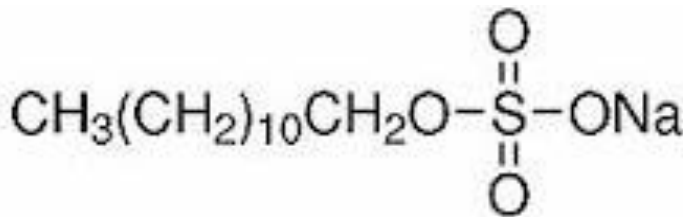
Elodea canadensis was collected in the Angara River (Irkutsk) in the spring-autumn period of 2020. Before the experiments, elodea was incubated in laboratory conditions for three days at a temperature of 8°C under intense illumination.



Elodea canadensis
A source: ru.wikipedia.org

STUDY OF ELODEA CANADENSIS ELIMINATION OF SODIUM DODECYL SULPHATE AND NH₄ClSergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3}, Chaneva G.⁴¹ Irkutsk State University, ² Irkutsk National Research Technical University, ³ Baikal Museum of Irkutsk Scientific Center, ⁴ Sofia University "St. Kliment Ohridski"*Keywords: phytoremediation, aquatic plants, biogens, water pollution, surfactants, Elodea canadensis***Research Objective:**

In the experiments, a 20 g / l sample of *E. canadensis* was incubated in the tested solutions of biogenic elements (2-4 mg / l NH₄⁺) and surfactants (1 10⁻⁵ M, 1 10⁻⁴ M, 2 10⁻⁵ M, 5 10⁻⁵ M Sodium Dodecyl Sulfate (SDS)) for 3 days. The change in the concentration of these substances under the influence of macrophytes was assessed by a photometric method.



Sodium Dodecyl Sulfate Formula

The determination of the mass concentration of ammonia and ammonium ions (with Nessler's reagent) was carried out according to GD 52.24.486-2009. The concentration of surfactants in aqueous media was determined according to 14.1:2:3:4.10-04. The experimental results were compared with the kinetics of the content of the studied compounds in the absence in plants, which could change, in particular, in the natural processes of oxidation by air oxygen or biodegradation under the influence of microorganisms.

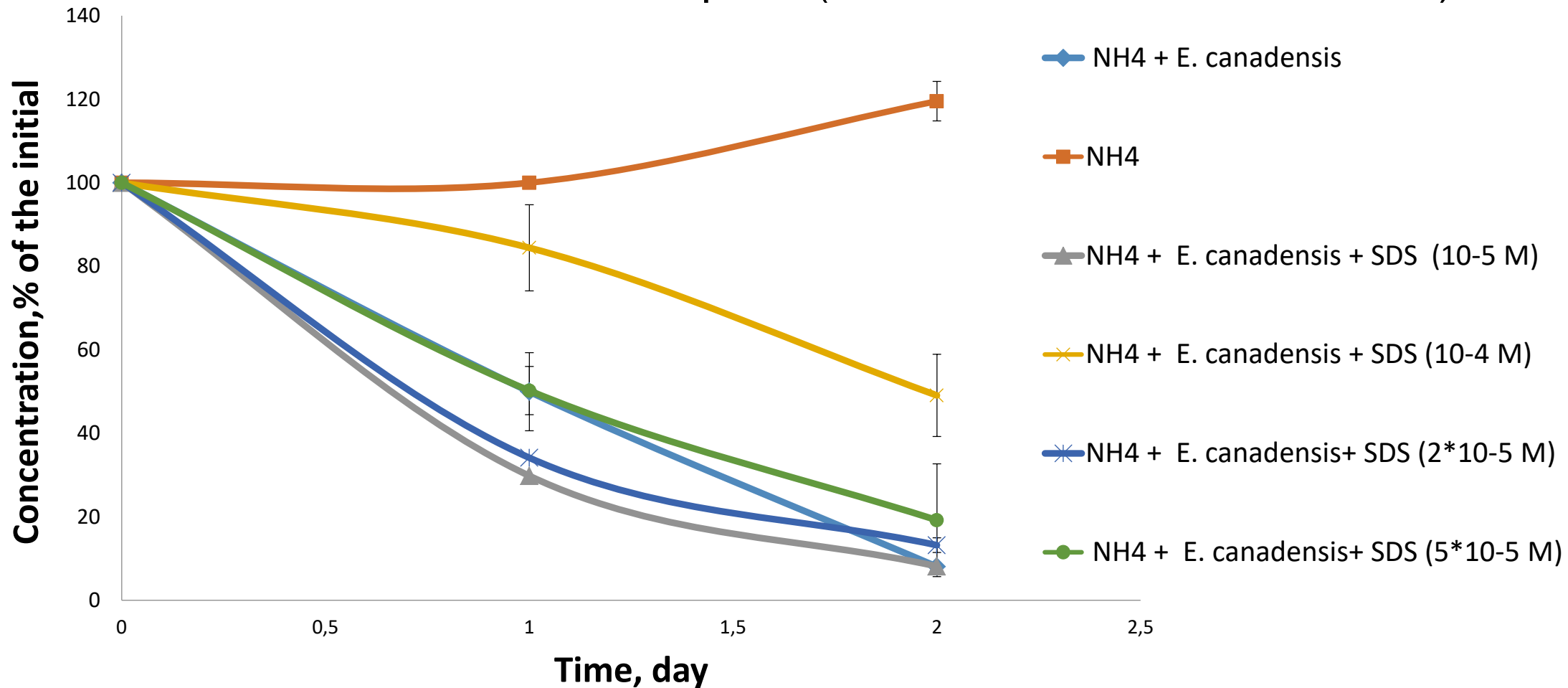
STUDY OF ELODEA CANADENSIS ELIMINATION OF SODIUM DODECYL SULPHATE AND NH₄Cl

 Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3}, Chaneva G.⁴
¹ Irkutsk State University, ² Irkutsk National Research Technical University, ³ Baikal Museum of Irkutsk Scientific Center, ⁴ Sofia University "St. Kliment Ohridski"

Keywords: phytoremediation, aquatic plants, biogens, water pollution, surfactants, Elodea canadensis

Results

Changes in the ammonium concentration under the influence of the E. canadensis plant (concentration in% of the initial).



STUDY OF ELODEA CANADENSIS ELIMINATION OF SODIUM DODECYL SULPHATE AND NH₄Cl

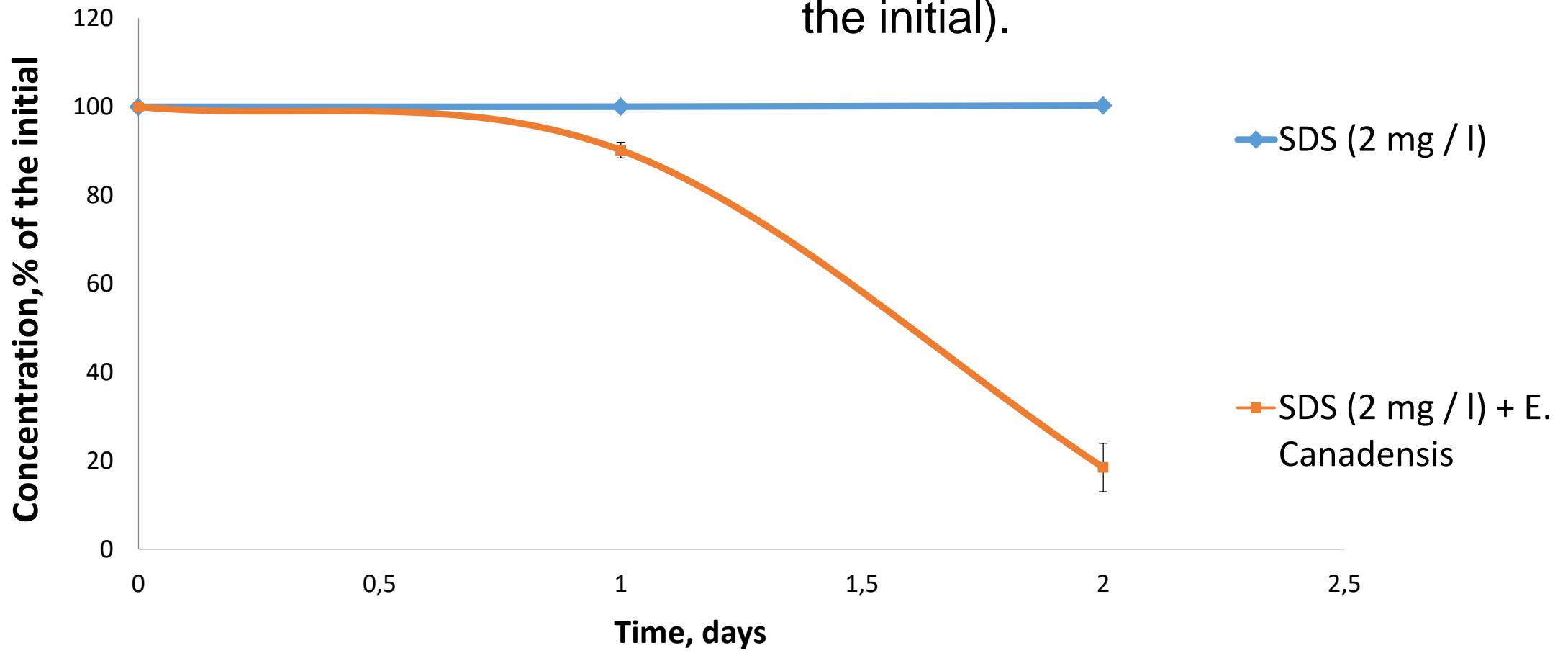
Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3}, Chaneva G.⁴

¹ Irkutsk State University, ² Irkutsk National Research Technical University, ³ Baikal Museum of Irkutsk Scientific Center, ⁴ Sofia University "St. Kliment Ohridski"

Keywords: phytoremediation, aquatic plants, biogens, water pollution, surfactants, Elodea canadensis

Results

Changes in the concentration of sodium dodecyl sulfate (SDS) under the influence of the plant *E. canadensis* (concentration in% of the initial).



STUDY OF ELODEA CANADENSIS ELIMINATION OF SODIUM DODECYL SULPHATE AND NH_4Cl

Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3}, Chaneva G.⁴

¹ Irkutsk State University, ² Irkutsk National Research Technical University, ³ Baikal Museum of Irkutsk Scientific Center, ⁴ Sofia University "St. Kliment Ohridski"

Keywords: *phytoremediation, aquatic plants, biogens, water pollution, surfactants*

Conclusions

The experimental studies carried out are part of an extensive block of work on the study of the processes of interaction of aquatic plants with surfactants and nutrients in their joint presence in aquatic environments. The described preliminary materials demonstrate the promising nature of *E. canadensis* as a possible object for use in phytoremediation technologies for purifying waters with complex pollution - biogenic elements and surfactants.

References

1. Hosaka Y. Enhancing Resilience for Sustainable Development in Lake Baikal and Baikal Basin: Fresh Water Paradise / Y. Hosaka [et al.] // Journal of Climate Change. – 2016. – V. 2. – № 1. – P. 61-67. Korytny L. Around Baikal: on the causes of ecological problems / L.
2. Korytny, O. Gagarinova // E3S Web Conf. IV Vinogradov Conference "Hydrology: from Learning to Worldview" in Memory of Outstanding Russian Hydrologist Yury Vinogradov – 2020. – V. 163. – pp. 6.
3. РД 52.24.486-2009 Массовая концентрация аммиака и ионов аммония в водах. Методика выполнения измерений фотометрическим методом с реактивом Несслера / Ростов-на-Дону, 2009. 21 с.
4. ПНД Ф 14.1:2.15-95 «Методика выполнения измерений массовой концентрации анионных поверхностно-активных веществ в пробах природных и очищенных сточных вод экстракционно-фотометрическим методом» / Москва, 1995. Изд. 2004. – 14 с.

Acknowledgement: *The work was carried out within the framework of the project "Development of an environmentally friendly, cheap, simple, highly effective technology for phytoremediation of aquatic environments in the Baikal region", implemented with the support of a grant competition for environmental projects En + Group. The studies were carried out using the Center for Collective Use of the Baikal Museum of the Irkutsk Scientific Center (<http://ckp-rf.ru/ckp/495988/>).*

STUDY OF ELODEA CANADENSIS ELIMINATION OF SODIUM DODECYL SULPHATE AND NH_4Cl

Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³, Stom D. I.^{1,2,3}, Chaneva G.⁴

¹ Irkutsk State University, ² Irkutsk National Research Technical University, ³ Baikal Museum of Irkutsk Scientific Center, ⁴ Sofia University "St. Kliment Ohridski"

Keywords: *phytoremediation, aquatic plants, biogens, water pollution, surfactants*

Thank you for your attention!

Sergienko S. E.^{1,2}, Timofeeva S. S.², Kupchinsky A. B.³,
Stom D. I.^{1,2,3}, Chaneva G.⁴

¹ Irkutsk State University

² Irkutsk National Research Technical University

³ Baikal Museum of Irkutsk Scientific Center

⁴ Sofia University "St. Kliment Ohridski"