WATER HYACINTH IS A NATURAL WATER PURIFIER

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Due to the increasing anthropogenic load on the supply of natural water, special attention is paid to its methods of purification. Known technical methods of cleaning do not cope with this task. In addition, they themselves sometimes make additional pollution. These issues are of concern to the regions rich in natural water resources. Recently, much attention is paid to the natural possibilities of water purification, in particular, various plants that can perform the role of natural cleaners. One of the types of Eichhornia – water hyacinth (Eichhorniacrassipes) is acknowledged, as one of the most promising natural cleaners.

The aim of this work is to assess the possibility of using Eichornia as a wastewater treatment plant and to study the dynamics of this process.

The result of the study of eichornia natural abilities for water purification determined the evolution of the most common organic pollutants concentration such as oil, washing powder, and also acetone, phenol and formaldehyde.

The presented results are in good agreement with the known scientific data and clarify the features of the purification process in different conditions.

Based on the results of these studies, the ability of water hyacinth to perform cleaning even at impurity concentrations of 50 mg/dm^3 was reseaved, which significantly exceeds the concentrations proposed by other authors. The change in mass fraction of impurities in the purification process depends significantly on the type of impurities was shown.

The obtained results can be used for this process introduction in the works on the natural water reserves purification from man-made effects.

Key words: natural waters, pollution by organic substances, cleaning by natural water purifiers, eichornia (water hyacinth), chromatographic analysis.

REFERENCES

1. Chachina, S. B. (2011). The using of higher water plants: eyhornii, duckweed and eel spiral for purification of waste water of OJSC "Gazpromneft–ONPZ". *Vestnik OmGTU [Omsk Scientific Bulletin]*, 1(104), 36-41 [in Russian].

2. Kalaida, M. L., & Khamitova, M. F. (2013). *Gidrobiologiya [Hydrobiology]*. St. Petersburg: Prospekt nauki Publ., 192 p. [in Russian].

3. Environmental protection in Russia. (n. d.). Access from the section "Official statistics" on the official Internet portal of Rosstat. Retrieved from http://www.gks.ru [in Russian].

4. Isidorov, V. (2001). *Environmental chemistry [Ehkologicheskaya himiya]*. St. Petersburg: Khimizdat Publ., 304 p. [in Russian].

5. Kalaida, M. L. (2012). Create a bio plateau on the Middle Kaban lake as a biological method of water purification. *Ehkologiya Tatarstana [Ecology of Tatarstan]*, 4, 26–30 [in Russian].

6. Kalaida, M. L., Borisova, S. D., Khamitov, M. F., & Petrov, A. V. (2013). Registration certificate of electronic resource 2013616359. Computer program for simulation of water treatment

plant with the use of higher aquatic vegetation "Bio plateau", the date of the license 04.07.2013 [in Russian].

7. Dzhakupov, I. B., Sultangazieva, G. S., & Bazhanov, A. J. (2014). Biological method of wastewater treatment of the XXI century: the results of the past and the problems of the present. *XXI vek: itogi proshlogo i problemy nastoyashchego [XXI Century: Resumes of the Past and Challenges of the Present Plus]*, 1(17), 113–117 [in Russian].

8. Petrash, E. P. (n. d.). Biological wastewater treatment using aquatic vegetation. Retrieved from http://ieek.timacad.ru/science/1/sb-08/sb-08_1_89.pdf [in Russian].

9. Raymbekov, K. T. (n. d.). Biological treatment of sewage of cattle-breeding complexes with the use of higher water plants. *Himiya i biologiya [Chemistry and Biology]*. Retrieved from http: //7universum.cjv/ru/nature/archive/item/4456 [in Russian].

10. Ekhlakov, P. O., & Peremitina, T. O. (2016). Methods and environmental risk assessment in production and transportation oil. In *Sbornik materialov Interekspo GEO-Sibir'-2016: Mezhdunarodnoy nauchnoy konferentsii: T. 2. Distancionnye metody zondirovaniya zemli i fotogrammetriya, monitoring okruzhayushchej sredy, geoehkologiya [Proceedings of Interexpo GEO-Siberia-2016: International Scientific Conference: Vol. 2. Remote Sensing of the Earth and Photogrammetry, Environmental Monitoring, Geoecology]* (pp. 175–178). Novosibirsk: SSUGT Publ. [in Russian].

11. Dmitriev, A. G., Kruchinin, N. A., Sokol, K. A., Nikolaeva, G. M., & Kondrat'ev, V. A. (2005). Patent RF 2259961. IP Russian Federation [in Russian].

12. Sereda, T. G., & Varennikov, V. P. (2002). Biological purification of water reservoirs. *Nauka i zhizn' [Science and Life]*, 7, 16–24 [in Russian].

13. Kalaida, M. L., & Khamitova, M. F. (2015). Possible applications Eyhornii additional cleaning of the waters of pulp and paper mill. Features of the chemical composition of Eichhornia crassipes. *Butlerovskie soobshcheniya [Butlerov Communication]*, *44*(11), 113–121 [in Russian].

14. Minaeva, O. M., Akimova, E. E., & Minaev, K. M. (2009). Absorption of a number of heavy metals from aqueous solutions by plants of aqueous hyacinth. *Vestnik TGU [Tomsk State University Journal]*, 4(8), 106–112 [in Russian].

15. Ryzhenko, B. F. (n. d.). Eyhorniya. Retrieved from http://ecoposelok.narod.ru/eihorn.html [in Russian].

16. Semenov, M. Y. (2007). Biological treatment of surface waste waters from organic contaminants and nitrogen compounds. *Candidate's thesis*. Moscow, 134 p. [in Russian].

17. Flyurik, E. A., Abramovich, O. V., & Zmitrovich, A. (2014). The using of Eichhornia crassipes for wastewater treatment and feed additive production. *Himiya i tekhnologiya organicheskih veshchestv i biotekhnologiya [Chemistry and Technology of Organic Substances and Biotechnology]*, 4, 155–160 [in Russian].

18. Khlebnikova E. P., Simonov D. P. (2013). Investigation the possibility of using high-resolution digital images to determine the reflective characteristics of growth. In *Sbornik materialov Interekspo GEO-Sibir'-2013: Mezhdunarodnoy nauchnoy konferentsii: T. 1. Distancionnye metody zondirovaniya zemli i fotogrammetriya, monitoring okruzhayushchej sredy, geoehkologiya [Proceedings of Interexpo GEO-Siberia-2013: International Scientific Conference: Vol. 1. Remote Sensing of the Earth and Photogrammetry, Environmental Monitoring, Geoecology]* (pp. 64–69). Novosibirsk: SSGA Publ. [in Russian].

19. Eichornia is a miracle plant that purifies waste water (n. d.). Retrieved from https://a-forester.livejournal.com/35721.html.

20. Vorobieva, L. B., Stepanova, S. A. (2008). *Fiziko-himicheskie processy v tekhnosfere [Physical and chemical processes in the technosphere]*. Novosibirsk: SSGA Publ., 114 p. [in Russian].

21. Sadovnikova, L. K. (2006). *Ehkologiya i ohrana okruzhayushchej sredy pri himicheskom zagryaznenii [Ecology and environmental protection in chemical pollution]*. Moscow: Vysshaya shkola Publ., 334 p. [in Russian].

22. Chai, T. T, Ngoi, J. C, & Wong, F. C (2013). Herbicidal potential of Eichhornia crassipes leaf extract against Mimosa pigra and Vigna radiate. *International Journal of Agriculture and Biology*, *15*(5), 835–842.

23. Non-native Invasive Freshwater Plants – Technical Information. (2017). Washington State Department of Ecology. Archived from the original on 2017-11-15. Retrieved from http://plants.ifas.ufl.edu/manage/why-manage-plants.

24. Achenyo Idachaba. (2015). How I turned a deadly plant into a thriving business. *TED*, *May 27–29*. Monterey, California.

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