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ОЧИЩЕННЯ ВОДНИХ ОБ'ЄКТІВ ВІД ¹³⁷Cs ЗА ДОПОМОГОЮ БІОПЛАТО

Розроблено мобільну конструкцію біоплато для очищення водних об'єктів від іонів ¹³⁷Cs. Проведено порівняльне дослідження ефективності очищення водного середовища від іонів радіоцезію різними видами рослин-гіперакумуляторів. Досліджено розподіл ¹³⁷Cs по структурних компонентах біоплато. Побудовано модель накопичення радіоцезію в системі «експериментальна водойма – рослини (біоплато)».

Ключові слова: фітореMediaція, біоплато, наземні рослини, радіонукліди, ¹³⁷Cs.

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ОЧИСТКА ВОДНЫХ ОБЪЕКТОВ ОТ ¹³⁷Cs С ПОМОЩЬЮ БИОПЛАТО

Разработана мобильная конструкция биоплато для очистки водных объектов от ионов ¹³⁷Cs. Проведено сравнительное исследование эффективности очистки водной среды от ионов радиоцезия различными видами растений-гиперакумуляторов. Исследовано распределение ¹³⁷Cs по структурным компонентам биоплато. Построена модель накопления радиоцезия в системе «экспериментальный водоем – растения (биоплато)».

Ключевые слова: фитореMediaция, биоплато, наземные растения, радионуклиды, ¹³⁷Cs.

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DECONTAMINATION OF WATER OBJECTS FROM ¹³⁷Cs BY MEANS OF BIOPATEAU

Mobile bioplateau design has been developed for water bodies treatment from ions ¹³⁷Cs. Comparative study of the cleaning efficiency of different species of plants-hyperaccumulators of the aqueous medium from radiocaesium ions has been carried out. The distribution of ¹³⁷Cs by structural components of bioplateau has been investigated. The model of accumulation of radioactivity in the “experimental reservoir – plants (bioplateau)” system was created.

Keywords: phytoremediation, bioplateau, land plants, radionuclides, ¹³⁷Cs.

REFERENCES

1. P.A. Yakimchuk. Cytogenetic consequences of radionuclide contamination of the 30-km zone after 25 years after the Chernobyl accident. *Fiziologiya i Biokhimiya Kul'turnykh Rasteniy* 45 (2013) 260. (Ukr)
2. O.M. Volkova et al. Radionuclide distribution parameters in reservoirs of different trophic status. *Pryroda Zakhidnoho Polissya ta Prylehlykh Terytoriy* 11 (2014) 127. (Ukr)
3. N.Yu. Mirzoeva et al.. Migration flows and deposition of ⁹⁰Sr and ¹³⁷Cs post-accident radionuclides in different parts of the Black Sea (elements of biogeochemical cycles). *Naukovi Pratsi Chornomors'koho Derzhavnoho Universytetu Imeni Petra Mohyly. Ser.: Tekhnohenna bezpeka* 210 (2013) 45. (Ukr)
4. V.D. Romanenko et al. Hydroecological safety of nuclear power of Ukraine. *Visnyk NAN Ukrayiny* 6 (2012) 41. (Ukr)
5. V.D. Romanenko. Strategic directions of water-ecological policy in Ukraine. *Naukovi Zapysky Ternopil's'koho Natsional'noho Pedahohichnoho Universytetu Imeni V. Hnatyuka. Spetsial'nyy vypusk: Hidroekolohiya* 16 (2011) 222. (Ukr)
6. V.S. Dikarevsky et al. *Diversion and Treatment of Surface Wastewater* (Leningrad: Stroyizdat, 2000) 224 p. (Rus)
7. L.I. Bekh, S.K. Khodakivsky. *Biological Sewage Treatment, Justification of Methods* (Kharkiv: KhNU, 2001) 290 p. (Ukr)
8. A.E. Vasyukov. Accumulation of metals by macrophytes in reservoirs of the Zaporizhzhya NPP zone. *Gidrobiologicheskyy Zhurnal* 39(3) (2003) 94. (Rus)
9. Yu.G. Krot. Higher plants in biotechnology for surface and wastewater treatment. *Gidrobiologicheskyy Zhurnal*

- 42(1) (2006) 47. (Rus)
10. D.V. Ulrich, M.N. Bryukhov. The possibility of using phytoremediation facilities in wastewater treatment. In: Science of South Ural State University. Proc. of the 66-th Scientific Conf. (Chelyabinsk, 2014) p. 1050. (Rus)
 11. I.V. Glazunova, A.K. Romashchenko, K.A. Tishina. Bioengineering facilities and reservoirs for local drainage for the most efficient use of river water resources. [Prirodoobustroystvo 2 \(2018\) 46](#). (Rus)
 12. S.S. Timofeeva, D.V. Ulrich, S.S. Timofeev. Phytofilters for wastewater treatment. [Vestnik Tekhnologicheskogo Universiteta 19 \(2016\) 162](#). (Rus)
 13. S.M. Madzhd, A.O. Panchenko, A.M. Bondar. The role of the higher aquatic plants in destruction of pollutants in the bioengineering hydrophytic structures. [Naukoyemni Tekhnolohiyi 1 \(2017\) 89](#). (Ukr)
 14. E.E. Nefed'eva et al. Wastewater treatment using phytoremediation. [Vestnik Tekhnologicheskogo Universiteta 20 \(2017\) 145](#). (Rus)
 15. A.A. Protasov, A.I. Tsybul'sky. Features of the formation of aquatic and near-water vegetation in the cooling pond of the Khmel'nitsky NPP under the conditions of an unstable water level regime. [Yaderna Enerhetyka ta Dovkillya 1 \(2017\) 58](#). (Rus)
 16. V.G. Magmedov. Efficiency of an infiltration bioplateau as a multi-purpose water protection facility. [Vodnyye Resursy 6 \(1986\) 93](#). (Rus)
 17. Yu.N. Sokolov et al. Use of bioplateau to reduce biogenic pollution of water reservoirs and streams. [Visnyk Odes'koho Derzhavnogo Ekolohichnoho Universytetu 7 \(2009\) 20](#). (Ukr)
 18. O.P. Oksiyuk, G.N. Oleynik. Bioplateau and its use on channels. [Gidrotekhnika i Melioratsiya 8 \(1990\) 66](#). (Rus)
 19. S.M. Madzhd. Operating experience of hydrophytic constructions in Ukraine and in the world. [Naukoyemni Tekhnolohiyi 2 \(2016\) 228](#). (Ukr)
 20. S.M. Madzhd. The role of hydrotechnology systems in increasing the degree of return water treatment. In: VI All-Ukrainian Intern. Congr. of Ecologists. Vinnytsia, September 20 - 22, 2017. Book of Abstracts (Vinnytsia, 2017) p. 68. (Ukr)
 21. L. Gu, W. Zhenbin, C. Shuiping. Application of constructed wetlands on wastewater treatment for aquaculture ponds. [Wuhan University Journal of Natural Sciences 12 \(2007\) 1131](#).
 22. A. Healy, M. Cawley. Nutrient processing capacity of a constructed wetland in Western Ireland. [Journal of Environmental Quality 31 \(2002\) 1739](#).
 23. D.A. Yammer. Designing constructed wetlands system to treat agricultural nonpointsource pollution. [Ecol. Eng. 1 \(1992\) 49](#).
 24. J. Vymazal. Constructed Wetlands for Wastewater Treatment. [Water 2 \(2010\) 530](#).
 25. V.D. Romanenko et al. *Natural and Artificial Bioplateau. Fundamental and Applied Aspects* (Kyiv: Naukova Dumka, 2012) 112 p. (Ukr)
 26. V.D. Romanenko, Yu.G. Krot. Biotechnological direction of research at the Institute of Hydrobiology of the NAS of Ukraine. [Gidrobiologicheskyy Zhurnal 51\(2\) \(2015\) 23](#). (Rus)
 27. A.N. Mikheev, O.V. Lapan, S.M. Madzhd. Development of a new method of garment filtering purification of water objects of chrome (VI). [Journal of Water Chemistry and Technology 3 \(2018\) 157](#).
 28. O.V. Lapan, O.M. Mikheev, S.M. Madzhd. Development of a new method of rhizofiltration purification of water objects of Zn(I) and Cd(II). [Journal of Water Chemistry and Technology 41 \(2019\) 52](#).
 29. O.M. Mikhyeyev et al. Use of a new type of bioplateau to purify water from radionuclide and chemical contamination. In: XXIV Annual. Scientific Conf. of the Institute for Nuclear Research NAS of Ukraine. Book of Abstracts (Kyiv, 2017) p. 240. (Ukr)
 30. O.M. Mikhyeyev, O.V. Lapan. Purification of the water objects from heavy metal by means of a bioplateau type hydrophytic construction. In: XII All-Ukrainian Research-Practice Conf. "Biotechnology of the XXI Century" (Kyiv, 2018) p. 114. (Ukr)
 31. Yu.A. Kutlahmedov, V.P. Petrusenko. Analysis of the effectiveness of countermeasures for the protection of ecosystems on slope landscapes by the method of chamber models. [Visnyk Natsional'noho Aviatyynoho Universytetu 4 \(2006\) 163](#). (Ukr)

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