Azoto šalinimas iš drenažo vandens taikant denitrifikacijos bioreaktorius

1. **Keywords:** Drainage, Denitrification, Bioreactors, Nitrate nitrogen, Phosphorus

2. **Area:** Water management

3. **Subarea:** Water quality investigation

4. **Theme:** Nitrogen removal from drainage water using denitrifying bioreactors

5. **Year:** 2020

6. **Summary:** Drainage systems installed in agricultural areas help to regulate the soil moisture regime, improve field cultivation conditions, however, at the same time drainage water washes away unabsorbed plant nutrients (i.e. nitrogen and phosphorus compounds) into surface waters, the entry of which into water bodies causes their eutrophication. Of the drained lands, 80% of the total nitrogen and 53% of the total phosphorus enter the Baltic Sea. Addressing this issue through agronomic or rigid farming limitation measures alone, due to the diversity of natural factors and changing climatic conditions, often does not achieve the expected result. It is obvious that technological transformations are needed in the drainage systems themselves, therefore, their reconstruction, integrating new, environmentally friendly technologies, would be a relevant and important solution for the country's economy.

7. **More detailed version of the summary:** The first attempts to apply biotechnology to remove nitrogen in drainage water began in Canada and the United States. The basis of these biotechnologies is the introduction of bioreactors with organic fillers (e.g. maize cobs, hardwood chips, straw, etc.) in the very drainage system in order to reduce the amount of nitrate nitrogen in the drainage water due to denitrification. The study found that the technology in the drainage system is justified when the volume of water flowed (m3) with the bioreactor volume (0.32 m3) corresponds to the ratio 7: 1. Further technology testing and development work in the field is currently underway. It is predicted that the technology of bioreactors with organic material fillers will be able to be implemented in practice already in 2023. It would significantly contribute to the decomposition (removal) of nitrogen compounds from drainage effluents and help farms to meet agri-environmental requirements. It is expected that the implementation of this system could be financed from the Rural Development Program.

8. **Technology readiness level:** TRL 3 - experimental proof of concept

9. **Effect:** Agro-environmental protection

10. **Argumentation:** The study found that using denitrification bioreactors, the average NO3-N retention efficiency is 63-70%, PO4-P retention efficiency is 36%. Based on the above data, the denitrification bioreactor technology should be applied primarily to intensively used agricultural land.

11. **Project description:** -

12. **Project:** -

13. **Education institution :** -

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15. **URL:** -

16. **Images:**
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17. **YouTube:** -

18. **Documents:** Methodology.pdf