

BIOREMEDIATION: BIOLOGICAL BASIS AND PROSPECTS OF ENVIRONMENTAL CLEANING USING MICROORGANISMS

Ravshanova Justice Ravshan kizi

Jizzakh state pedagogy University , Biology department

big teacher bffd .(PhD)

Tojibaeva Nozima Sadulla kizi

Jizzakh State Pedagogical University Natural sciences faculty

Biology department student

Anvarova Guloro Babur kizi

Jizzakh State Pedagogy University Natural sciences faculty

Biology department student

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Abstract: This in the article ecological problems solution in the process of biological methods , in particular , bioremediation technology role analysis The research is being conducted main target - contaminated soil and water basins in cleaning microorganisms (bacteria and fungi) destructive activity study and this of the process mechanisms from lighting consists of . The article oil hydrocarbons and heavy metals with polluted regions again in recovery Pseudomonas , Bacillus and Aspergillus generation representatives efficiency seeing Also , in - situ and ex situ methods comparative analysis and the process accelerator biostimulation and bioaugmentation factors statement done.

Key words : Bioremediation, microorganisms , biodestruction , soil pollution, oil hydrocarbons, biostimulation, ecological biotechnology.

Annotatsiya: Ushbu maqolada ekologik muammolarni hal etishda biologik usullarning, xususan, bioremediatsiya texnologiyasining roli tahlil qilinadi. Tadqiqotning asosiy maqsadi - ifloslangan tuproq va suv havzalarini tozalashda mikroorganizmlarning (bakteriya va zamburug'lar) destruktiv faolligini o'rganish va ushbu jarayonning mexanizmlarini yoritishdan iborat. Maqolada neft uglevodorodlari va og'ir metallar bilan ifloslangan hududlarni qayta tiklashda Pseudomonas, Bacillus va Aspergillus avlodi vakillarining samaradorligi ko'rib chiqilgan. Shuningdek, in-situ va ex-situ usullarining qiyosiy tahlili hamda jarayonni tezlashtiruvchi biostimulyatsiya va bioaugmentatsiya omillari bayon etilgan.

Kalit so'zlar: Bioremediatsiya, mikroorganizmlar, biodestruktsiya, tuproq ifloslanishi, neft uglevodorodlari, biostimulyatsiya, ekologik biotexnologiya.

Аннотация: В данной статье анализируется роль биологических методов, в частности технологии биоремедиации, в решении экологических проблем. Основная цель исследования - изучение деструктивной активности микроорганизмов (бактерий и грибов) при очистке загрязненных почв и водоемов, а также освещение механизмов этого процесса. В работе рассмотрена эффективность представителей родов Pseudomonas, Bacillus и Aspergillus в восстановлении территорий, загрязненных нефтяными углеводородами и тяжелыми металлами. Также представлен сравнительный анализ

методов in-situ и ex-situ, описаны факторы биостимуляции и биоаугментации, ускоряющие процесс очистки.

Ключевые слова: Биоремедиация, микроорганизмы, биодеструкция, загрязнение почвы, нефтяные углеводороды, биостимуляция, экологическая биотехнология.

Current on the day industrialization and urbanization processes acceleration as a result of the environment pollution global from problems to one around Soil , water and atmosphere to the composition various kind poisonous substances , including oil products , heavy metals and pesticides fall ecological balance broken , alive organisms to life negative impact showing . This therefore , the environment effective and ecological safe methods using cleaning issue current importance profession will reach .

Bioremediation is of nature oneself cleaning ability technological to the level This is a lift . of the process essence is that we protect the environment chemical substances with further pollute instead , our microscopic " helpers " - bacteria , fungi and from plants We use bioremediation . main mechanisms Microorganisms (bacteria , fungi) are pollutants substances food source or energy source as This process uses two kind in a way past possible :

Aerobic bioremediation : Oxygen in the presence of organic pollutants carbonate anhydride (CO₂) and decomposition to water (H₂O) .

Anaerobic bioremediation : Oxygen not been in the environment complicated of compounds decomposition .

Bioremediation methods application to the place according to two to the group divided into :

Method type	Definition	Examples
In situ	Pollution of the place in itself cleaning .	Biostimulation , bioventing .
Ex situ	Contaminated soil or water other to the place copy cleaning .	Bioreactors , composting .

Microorganisms inside Pseudomonas bacteria oil hydrocarbons I will break it. to take feature with separated They are organic substances oxidize them simple to compounds This process enzymes using step by step done increases and as a result complicated hydrocarbons carbonate anhydride and to the water Therefore , Pseudomonas bacteria oil with polluted soil and the waters in cleaning wide is used .

Bacillus to the generation belonging bacteria and mainly heavy metals with related pollution in reduction important role They play . metal ions own cell to the surface tied to take (biosorption) , cell inside collect (bioaccumulation) or them insoluble to form transfer (bioprecipitation) through neutralizes . As a result lead , cadmium such as poisonous elements ecological in terms of less dangerous to the situation will pass .

Fungi between (Phanerochaete chrysosporium) the most strong from biodegraders one It is white . rotting fungal lignin such as very complicated polymers I will break it. It takes lignin peroxidase , manganese peroxidase and lacquerware such as enzymes working releases , this enzymes and not only lignin , maybe many poisonous organic to break down substances capable . Research this shows that this mushroom aromatic and toxic carbonate compounds anhydride and to the water turn That 's why it's an industry . waste , paints and phenol such as substances in cleaning wide is used .

Environment waste bioremediation is ecological cleaning in the process microorganisms , especially bacteria and fungi, important role plays . This process organic and inorganic pollutant substances natural accordingly disintegrating and neutralizing method as Bacteria , such as Pseudomonas and Bacillus, are organic waste metabolization to do and them less toxic to

substances in rotation effective Fungi role is mainly polluted in environments organic of substances in the decomposition manifestation will be. Bioremediation process the environment cleaning and waste in reduction effective solution as , humanity ecological problems solution in doing big importance has . This research as a result microorganisms using waste management new methods and prospects to be determined possible . In the future bioremediation process improvement through the environment protection to do and clean resources storage opportunities further expands. Also, microorganisms in the bioremediation process abilities and efficiency study ecological and economic in terms of important importance has environment protection in doing new opportunities creates .

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