**ОДЕСЬКА НАЦІОНАЛЬНА АКАДЕМІЯ ХАРЧОВИХ ТЕХНОЛОГІЙ**

# ЗБІРНИК НАУКОВИХ ПРАЦЬ

## *МОЛОДИХ УЧЕНИХ, АСПІРАНТІВ ТА СТУДЕНТІВ*



**ОДЕСА**
**2017**

ББК 36.81 + 36.82
УДК 663 / 664



**Одеська національна академія харчових технологій**
Збірник наукових праць молодих учених, аспірантів та студентів
Міністерство освіти і науки України. – Одеса: 2017. – 357 с.

Збірник опубліковано за рішенням вченої ради від 04.07.2017 р., протокол № 17
За достовірність інформації відповідає автор публікації

РОЗДІЛ 6

# СОЦІАЛЬНІ ТА ЕКОЛОГІЧНІ АСПЕКТИ СУЧАСНОЇ ЖИТТЄДІЯЛЬНОСТІ

# BIOLOGICAL METHODS OF CLEANING THE GROUND

**Arnaut E.I., 3rd year student of Faculty of Applied Ecology,**
**Energetics and Oil and Gas Technologies**
**Odessa National Academy of Food Technologies, Odessa**

As a result of soil pollution, the agricultural importance of the land is lost. In this regard, it is necessary to develop new and use environmentally friendly and economically sound methods aimed at intensifying soil purification processes.

At present, physical, chemical and biological methods for cleaning contaminated soils are widely used. Let us turn our attention to the biological.

The method of cleaning contaminated soils of phytoextracts is to grow plants on contaminated soils. This method is most effective for cleaning the soils from nickel, zinc and copper. Pollutants are accumulated in the root system and in the aerial parts of plants. To achieve hygienic standards for concentrations of harmful substances in the soil, several crop growth cycles are necessary. After it is burnt, the ash is stored on the landfill of hazardous waste, but the ash volume is much less than the volume of contaminated soil.

Some plants can accumulate significant quantities of metals in the root system and terrestrial mass: more than 1000 milligrams per kilogram of cobalt, copper, chlorine, lead, nickel or 10,000 mg/kg of manganese and zinc in dry matter, so they can be used as ore to produce Metals.

The biological method of soil purification is effective, which consists in directed activation of the soil microflora, the introduction of microbial preparations that decompose oil, as well as phytoremediation, to reduce soil pollution based on stimulation of the natural soil community of oil-oxidizing microorganisms as a result of their close interaction with oil tolerant plants .

Phytoremediation allows actively recultivate large areas with relatively low cost of works, in comparison with other technologies, with low negative impact on the environment. The time of restoration of land is reduced by 3-4 times.

Biopreparations stimulate local soil biocenosis and create favorable conditions for the transition of petroleum hydrocarbons to a difficult-oxidizing state. Organic humus-like compounds that positively affect soil fertility are formed. A number of biological products have been developed on the basis of actively decomposing microorganisms of bacteria of the genera Rhodococcus, Bacillus, Arthrobacter, Acinetobacter, Azotobacter, Alkaligenes, Streptomyces filament actinomycetes, Aspergillus and Penicillum fungi, etc.

The decomposition of oil in the soil is caused not only by the direct action of living microorganisms included in the composition of biological preparations, but also by the ability of the latter to influence the indigenous microbial community of the soil, increasing its ability to utilize oil. Such preparations include Albit containing natural natural microbial polymer polybieta-hydroxybutyric acid from soil bacteria Bacillus megaterium and Pseudomonas aureofaciens, a set of macro and microelements, pine extract and other components. It stimulates local soil biocenosis and creates favorable conditions for the transition of petroleum hydrocarbons to a difficult-oxidizing state. Organic compounds of a humus-like character are formed that positively influence the fertility of soils.

Albit biopreparation can significantly reduce oil pollution of soils. The rate of decomposition of oil under the action of Albit increases on average by 1.67 – 3.15 times. In production experiments it was demonstrated that Albit together with sowing oil tolerant herbs in one vegetative season reduces oil pollution of soil in 1,5 – 10,0 times.

Supervisor – assistant professor Bondar S.N.

**Literature**

1. Zlotnikov A.K. Albit biopreparation for crop improvement and crop protection – Podolsk, PFOP, 2006.
2. Nazarov A.V., Hilarionov S.A. Potential for using microbial-vegetative interaction for bioremediation // Biotechnology. – 2005, – No. 5.

## TESTING OF CO-VERMICOMPOSTING OF A FAT-CONTAINING SEWAGE SLUDGE AND WASTE ACTIVE SLUDGE

**Chernyshova O.O., PhD student of the Faculty AEEnOGT**
**Odessa National Academy of Food Technologies, Odessa**

In conditions of maintaining at the appropriate level environmental safety of the country, a special problem is the utilization of sediment, sewage and sludge from municipal wastewater treatment and industrial purification facilities. Sediments are classified according to the place of their accumulation. The primary sediment is formed in the primary settler; it mainly consists of solid fractions settled by gravity. The primary untreated sediment has an unstable component composition and a sharp unpleasant odor. Secondary sediment is formed as a result of the purification operation. In most cases, secondary sediment is a waste activated sludge from aerobic reactors and biofilters. The secondary sediment, in contrast to the primary one, has a less severe odor, but there is also instability component composition. The third type of sewage sludge mainly consists of inorganic substances such as clay, lime; organic constituent of the sediment is insignificant and unstable. The latest one is a sediment from an anaerobic bioreactor; it is a flocculated biomass, which composed of bacteria and various protozoa. In Ukraine, the main way to eliminate sewage sludge is to burial in the ground. However, due to sediment composition, this method becomes inexpedient because of the risk of further contamination of the environment with a variety of organic substances, heavy metal ions and pathogenic microorganisms.

The aim of this work is to study the efficiency of utilization of waste active sludge from an anaerobic reactor and a fat-containing sewage sludge of a meat processing plant by the vermicomposting.

During the first stage of the study, the wastewater was digested with a periodic UASB reactor (Upflow Anaerobic Sludge Blanket reactor) with a total volume of 50 $dm^3$. The operation of the reactor was carried out with compliance with a thermophilic temperature regime (35–39 °C); the period of anaerobic fermentation of wastewater was 22 days. In the second stage of the study, the sludge from the primary wastewater treatment from the settler and waste sludge from the laboratory UASB reactor was mixed with the addition of cellulosic filler. The purpose of adding cellulosic filler is improving the structure of the substrate and step up removal the gases, which formed from the decomposition of organic substances (ammonia, hydrogen sulphide, methane).

**Table 1 - Population parameters after exposure**

| Parameter | Unit | Weight ratio of sewage sludge and waste active sludge | | | Control |
|---|---|---|---|---|---|
| | | 1:1 | 2:1 | 1:2 | |
| Density of population | animal unit/$cm^3$ | 7 | 8 | 8 | 8 |
| Total biomass | g/$dm^3$ | 25.9 | 27.31 | 30.22 | 23.97 |
| Total number of cocoons | units/$dm^3$ | 39 | 59 | 47 | 64 |
| Specific weight of the worm | g | 0.3 | 0.27 | 0.23 | 0.25 |

Наукове видання

# Збірник наукових праць молодих учених, аспірантів та студентів

Головний редактор акад. Б.В. Єгоров
Заст. головного редактора, канд. техн. наук Н.М. Поварова
Відповідальний редактор акад. Г.М. Станкевич
Технічний редактор Т.Л. Дьяченко