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## RECEIVING OF BIOELECTRICITY FROM POLLUTED AREAS

Every year the demand for electricity grows. The use of traditional energy sources requires significant costs and harms to the environment. Therefore, every year the increasing popularity of alternative energy. Obtain bioelectricity from soil, planted with the help of microorganisms is a modern and innovative direction in alternative energy (Helder, 2012). Currently, the main global attention in this area focuses on the potential of green roofs as an energy source, however, outside the focus are research opportunities abandoned and contaminated urban green and rural areas as a source of electricity.

Our task was to explore of the prospects of obtaining of bioelectricity from contaminated areas and to determine the impact of soil pollution by heavy metals, emissions of cars on the production of bioelectricity *in situ*. The experiment was conducted on the lawns along urban highways with an average load type and on garden and forest sites, near local highways, and without any influence of emissions from cars, where were placed the system of registration of bioelectric potential of soil microorganisms.

In experimental soil samples were analyzed of the content of lead, cadmium, zinc, nickel, copper, chromium, vanadium, manganese and also phosphorus and sulphur by using x-ray fluorescence analyzer. The highest bioelectric data, on average 1120 mV, were recorded in clean lawns and gardens and forests located away from roads, and the lowest, about 925 mV in lawns along city trails and polluted garden plots (table 1).

In soils, in which recorded some of the lowest indicators of bioelectricity level of cadmium exceeded the norm by 43 times, the zinc content of 19.3 times, copper at 49.7 times, while in the other samples was the norm of cadmium, and high concentrations of zinc and copper was less significant. Obviously, since cadmium is extremely toxic substance and as zinc and copper are metals I and II hazard class, a significant excess of their content could not no fail to affect the development of bacteria and plants that determine the level bioelectricity of soils.

In soils where the average level of bioelectricity did not reach above 1V level for lead was exceeded by 2-3 times, while in the other samples in the 1.6-1.7. Besides these samples, in addition to identified contamination with heavy metals, were subjected to intense exposure to organic pollutants – toxic combustion products, which are part of the emissions of cars: benzoate, benzanthracenes the like, which are usually present in high concentrations along the trails.

Was revealed that a large excess concentration of one of heavy metal or lot of heavy metals, but only in minor is not limiting to obtain bioelectricity. In general, bacteria and electroproducting microorganisms in particular, are characterized by high adaptation to various adverse conditions. For example, in samples where the highest values of bioelectric potential, is a significant excess in the concentration of copper and nickel or zinc and nickel, but the total number of adverse impacts is moderate and is not significantly affected on bioelectricity of soils.

At the same time, in soils in which the concentration of several dangerous toxins exceeds the norm registered some of the lowest values of bioelectricity.

Contaminated areas can be used for obtaining of bioelectricity after the assessment of their total pollution by organic and inorganic pollutants.

Table 1. Influence contamination of metals on production of bioelectricity by soil microorganisms *in situ* ($p < 0,05$)

| Soil samples | Bioelectrical potential of soil samples, mV | Content of metals, g/kg | | |
|---|---|---|---|---|
| | | Zn | Pb | Cd |
| 1 | 950 | 0,079 | 0,041 | - |
| 2 | 902 | 0,444 | 0,034 | 0,043 |
| 3 | 1120 | 0,146 | 0,033 | - |
| 4 | 1050 | 0,324 | 0,032 | - |
| MPC | | 0.023 | 0.020 | 0.001 |