

IMPACT OF PETROLEUM PRODUCTS ON AGRICULTURAL SOILS WITH DIFFERENT HUMUS CONTENTS UNDER EXPERIMENTAL CONDITIONS

Marzeyev Institute of Public Health, National Academy of Medical Sciences of Ukraine, Kyiv, Ukraine

From a hygienic point of view, agricultural soils are most vulnerable to oil contamination, which has a toxic impact on soil biota, slowing down processes of soil regeneration. The content of humus in the soil determines the capacity of its absorption, plays an important role in the formation of its structure and determines the physical properties and fertility. The ability of soil purification is characterized by enzymatic activity of its microflora, in particular, such an enzyme as dehydrogenase. The effect of hydrocarbon loading on soils of two types of agricultural purpose was investigated experimentally to substantiate the safe normative content of petroleum products (PP).

Laboratory studies were performed on model soil media that reproduced one of the main types of soil: soil No. 1 (serosa) - 20 g / kg soil, soil No. 2 (gray forest) - 50 g / kg soil. In the laboratory, studies were conducted on the effects of two most common light-PP fractions: gasoline and diesel, on soil dehydrogenase activity of soil microflora, which were introduced in quantities of 1.0 g / kg, 5.0 g / kg, 10.0 g / kg, and 20.0 g / kg of sample. The introduction of a gasoline fraction of PP at a concentration of 1.0 g / kg in soil No. 1 showed a stimulating effect on the enzymatic activity of the microflora throughout the experiment (21 days). The concentration of the gasoline fraction of PP 20.0 g / kg in the soil showed a sharp inhibitory effect on the indicator of dehydrogenase activity as compared to lower concentrations of the pollutant and relative to the control. The results of the study on the 21st day of the experiment revealed a sharp inhibition of the enzymatic activity of soil microflora No. 1 under the influence of the gasoline fraction PP in comparison with the control: 1.92-2.29 times (at a concentration of 1.0 and 5.0 g / kg), 4.86 times (at a concentration of 10.0 g / kg), 5.3 times (at a concentration of 20.0 g / kg).

Diesel fraction of light petroleum products when added to soil No. 1, regardless of the concentration for the 10th day of the experiment had a stimulating effect on the indicator of dehydrogenase activity, which was higher than the control

value of 1.57-1.86 times. The dynamics of dehydrogenase activity at the end of the study (21 days) remained virtually unchanged compared to the 10 days of the experiment, but lower by 1.71-2.09 times relative to control. According to the results of the study of dehydrogenase activity at loading with gasoline fraction of soil No. 2 with humus content of 50.0 g / kg, a slight stimulating effect of hydrocarbons on soil microflora was revealed at concentrations of NP 1.0-5.0 g / kg relative to control values for 10 and 21 days experiment, respectively: 1.11-1.22 times 10 days and 1.43-17.1 times 21 days.

Despite the higher content of humus in soil No. 2, the enzymatic activity of soil microflora remained almost at the level of control values throughout the study period and practically did not depend on PP concentrations (gasoline fraction). Therefore, the higher content of humus provides greater resistance to microflora to the toxic effects of the gasoline fraction of PPs, which is manifested in the indicator of dehydrogenase activity.

The PP load (gasoline and diesel fractions) at a concentration of 1.0 g / kg showed positive dynamics throughout the experiment, regardless of soil type and type of PP. Experimental studies have shown that the gasoline fraction of petroleum products has a more inhibitory effect on the dehydrogenase activity of soil microflora compared to the diesel fraction, which is clearly observed on soil No. 1 with less humus content (20.0 g / kg).

Low concentrations of petroleum products, in particular the diesel fraction, with a lower humus content in the soil medium, have a stimulating effect on soil dehydrogenase activity, especially in the later phases of the experiment. Therefore, for agricultural soils by the indicator of the dehydrogenase activity, which was studied in the experiment, a normative indicator of PP content (gasoline and diesel fraction) at the level of 1.0 g / kg of soil is proposed.