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BIOMONITORING AS A METHOD FOR ASSESSING THE TOXICITY OF THE ENVIRONMENT OF URBAN ECOSYSTEMS

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The chronic toxicity of chemicals in the samples of street dust aqueous solutions from the leaves of Carolina poplar trees in different areas of the city, which differed in the proximity of the location of the highway, was determined. In the biotesting, *Daphnia magna* Straus crustaceans, which are highly sensitive to environmental pollution by heavy metal ions, oil products, etc., were used as test objects. The results of studies of dust samples that were taken from leaves directly on the road showed acute lethal toxicity of dust.

Keywords: biotesting, test object, *Daphnia magna* Straus, air quality, toxicity.

The anthropogenic impact on urban ecosystems is becoming increasingly widespread, and toxic substances with a mutagenic effect and entering the environment pose a real threat to the stability of the genomes of living organisms. The development of effective biomonitoring methods allows not only increasing the objectivity of environmental genotoxicity assessment, but also predicting and modeling the development of the situation in urbanized ecosystems.

Among the factors with toxic, carcinogenic and mutagenic properties, the largest and most dangerous part is heavy metals and various organometallic substances. If previously only workers under industrial conditions experienced the negative effect of heavy metals, now, due to the accumulation of heavy metals in the environment, the circle of persons to whom their action applies has expanded significantly. The territories of not only industrially developed countries with a high population density are contaminated. Currently, there are practically no corners on the planet where the population would not be exposed to heavy metals [1, 2].

We used such a component of biomonitoring as biotesting. The chronic toxicity of chemicals in samples of street dust aqueous solutions from the leaves of Carolina poplar trees (*Populus deltoides*) in different areas of the city of Odessa was determined [3]. In the biotesting, *Daphnia magna* Straus crustaceans, which are highly sensitive to environmental pollution by heavy metal ions, oil products, etc., were used as test objects. A study of dust pollution in the surrounding area of ONAFT was carried out at the main building A (directly near the road, about 15 m) and building E (at a distance of about 170 m from the nearest road). The leaves of one type of poplar, common in the city – *Populus deltoides*, were selected at places previously marked on the map from a tripple height of 1,5-2 m (the height of the layer of air that a person inhales). At the same time, poplar leaves that sprouted in a clean area outside the city (control) were selected. The leaves were placed in tracing paper bags and carefully delivered to the laboratory, avoiding dust shaking. Then, in the laboratory, three dust samples were obtained. Based on the calculation of the number of live *Daphnia* in the control and experiment, arithmetic means were determined, which were used to calculate the number of dead daphnia in the experiment relative to the control [3].

According to the method used, water with dust is considered acutely toxic if the death of test organisms in 96 hours is 50 % or more. The results of the studies showed that the samples obtained from case E did not have acute toxicity (43 % – death of test objects). Samples obtained from the main ONAFT building showed the presence of acute dust toxicity compared with the control (87 % – death of test objects). This may be due to the proximity of the road.

BIBLIOGRAPHY

1. *Александрова, В. В.* Биотестирование как современный метод оценки токсичности природных и сточных вод: Монография / В. В. Александрова. – Нижневартовск: Изд-во Нижневарт. гос. ун-та, 2013. – 119 с.
2. *Методичні основи гідробіологічних досліджень водних екосистем: навчальні матеріали.* – К., 2002. – 55 с.
3. ДСТУ 4173:2003 Якість води. Визначення гострої летальної токсичності на *Daphnia magna* Straus та *Ceriodaphnia affinis* Lilljeborg (Cladocera, Crustacea) (ISO 6341:1996, MOD).

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