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Tradescantia As Test System in the Genetic Monitoring of Environmental Pollution

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ABSTRACT

The study of the level of natural environmental pollution by xenobiotics is an important task of protecting natural ecosystems and preserving biodiversity. In recent years, the use of plant test systems, including *Tradescantia* clones, has become increasingly relevant for assessing the mutagenic effects of pollutants, including pesticides, heavy metals and radionuclides. The advantages of this test system are the availability and high sensitivity to mutagen and toxic substances, which allows even low concentrations of pollutants. In biotesting using *Tradescantia*, the main marker bioassays are used: a test system of stamen hairs of the flower (SH), designed to detect somatic mutations and morphological changes in SH (genoxic effect-Trad-SHM assay), as well as a micronucleus assay for detection of microsporogenesis disorders with formation of micronuclei (MN) in microspores (clastogenic effect-Trad-MCN assay). Both bioassays are included in the International Program on Plant biossays (IPPB), under the auspices of the United Nations Environment Programme (UNEP). Long-term research by our research group (2008–2024) confirmed the possibility and prospects of using the indicator bioassays Trad-SHM and Trad-MCN in the practice of genetic monitoring of water and soil pollution of environments by various types of pollutants. In recent times, with the use of *Tradescantia*, we determined the level of potential mutagenicity of the surface waters of the Lake Sevan basin during the period of "bloom" (eutrification), as well as the waters of the Hrazdan and Akhuryan rivers. In addition, the level of genetic effects of soils was studied both in natural and urban conditions of environmental instability, and near the sources of technogenic pollution (soil of Yerevan city agglomeration and agricultural landscapes near Hrazdan city, as well as the environs of Lake Sevan basin). Along with the radiobiological monitoring, genetic monitoring of the level of soil mutagenicity around the NPP (taking into account the content of ^{137}Cs), as well as the territories of the Aragats Massif, taking into account the content of long-lived natural (^{226}Ra, ^{232}Th, ^{40}K) and technogenic (^{137}Cs) radionuclides was carried out. Based on the obtained results, the feasibility of the *Tradescantia* using in biotesting of the potential mutagenicity level of the environment is demonstrated.

Keywords: *Tradescantia*, genetic monitoring, water and soil pollution

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