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Taraxacum officinale AS A BIOINDICATOR FOR ASSESSING ANTHROPOGENIC POLLUTION

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Rapid urbanization and the continuous increase in road traffic have intensified anthropogenic pressure on urban ecosystems. The accumulation of zinc, copper, lead and other toxic elements in vegetation may disrupt physiological and biochemical processes, reduce biodiversity, and deteriorate the ecological status of urban ecosystems. Therefore, the use of bioindicator plants has become an effective approach for assessing anthropogenic pollution. *Taraxacum officinale* F.H. Wigg. is one of the most promising bioindicator species owing to its wide distribution, high ecological plasticity, and ability to accumulate heavy metals. However, information on heavy metal accumulation in different organs of this species under traffic-related pollution in the urban ecosystems of Transcarpathia, particularly Uzhhorod, remains limited.

The aim of the study was to evaluate the influence of road traffic on heavy metal accumulation in different organs of *T. officinale* in the urban ecosystem of Uzhhorod and to assess its suitability as a bioindicator of traffic-related pollution.

The study was carried out at six sampling sites differing in traffic intensity: Svobody Avenue, Mynaiska Street, Mytna Street, Zankovetskoi Street, Sobranetska Street, and the Botanical Garden (control). Zn, Cu, Pb, and Mn were determined by electrothermal atomic absorption spectrometry using a Shimadzu AA-7000 spectrometer ($n = 6$; $P = 0.95$). A clear relationship was found between heavy metal accumulation and traffic intensity. The highest Zn and Cu concentrations were recorded

in plants collected from Mytna Street, where leaf concentrations reached 48.1 ± 4.6 and 19.8 ± 1.7 mg kg^{-1} dry weight, approximately 3.0 and 2.2 times higher than those at the control site. The maximum Pb concentration (12.9 ± 1.2 mg kg^{-1}) was detected in roots from the same location, while the highest Mn concentration (1.93 ± 0.17 mg kg^{-1}) was also observed in the root system. Plants collected from Sobranetska Street, Svobody Avenue, and Zankovetskoi Street showed intermediate metal concentrations, whereas the lowest levels were recorded in the Botanical Garden. Zinc and copper predominantly accumulated in leaves, whereas lead and manganese were mainly retained in roots, indicating organ-specific uptake, transport, and sequestration under anthropogenic pressure.

The results demonstrate that *T. officinale* is a highly sensitive bioindicator of traffic-related pollution in urban environments. Significant increases in Zn, Cu, Pb, and Mn concentrations were observed in plants growing near roads with intensive traffic. Zinc and copper accumulated mainly in leaves, whereas lead and manganese were concentrated primarily in roots. The use of *T. officinale* in biomonitoring programmes can provide an effective tool for assessing anthropogenic pressure and environmental quality in urban ecosystems.

Keywords: heavy metals, road traffic, bioindication, urban ecosystem, environmental monitoring, environmental pollution.