

**IMPACT OF KARABASH COPPER SMELTER EMISSIONS  
ON LEAF SIZE AND FLUCTUATING ASYMMETRY  
OF *BETULA PENDULA* (BETULACEAE) UNDERGROWTH**

© *D. V. Veselkin*,<sup>1,\*</sup> *N. B. Kuyantseva*,<sup>\*\*</sup>,<sup>\*\*\*</sup>

*O. E. Chashchina*,<sup>\*\*</sup> *E. V. Koroteeva*<sup>\*\*</sup>

\*Institute of Plant and Animal Ecology, Ekaterinburg, Russia

\*\*Ilmen State Nature Reserve, Chelyabinsk region

\*\*\*South-Ural Federal University, Chelyabinsk

<sup>1</sup>E-mail: denis\_v@ipae.uran.ru

**SUMMARY**

Information value of morphological characteristics of *Betula pendula* Roth leaf for indication of the change of habitats under impact of the Karabash Copper Smelter emissions (the South Urals) was estimated. Leaves of large undergrowth collected on 11 study sites located from 2 to 53 km from smelter were investigated. We have found that the changes of two groups of leaf parameters, the morphological traits and fluctuating asymmetry, were inconsistent in impact gradient of emissions. The leaf width and length of the second lateral leaf vein significantly decreased with an increase of the levels of heavy metals pollution in leaves. Fluctuating asymmetry of silver birch leaf undergrowth in control, buffer, and impact zones varies at the same high level (0.054–0.064 conventional units) and is not associated with the degree of technogenic impact.

**Key words:** biological monitoring, leaf blade, fluctuating asymmetry, heavy metals, *Betula pendula*, the South Urals, Karabash Copper Smelter.