

ANTIOXIDANT-PROOXIDANT BALANCE IN MACROPHYTES AS A BIOINDICATOR IN ASSESSING THE QUALITY OF WATER ECOSYSTEMS (ON THE WATER BODIES OF MINSK)

Yuliya V. Zhyltsova

International Sakharov Environmental University, Minsk, Republic of Belarus

It is very important today to monitor the conditions of ecosystems, to expose the source and the ways of the inflow of the polluting substances in time, and to find new highly sensitive methods of the assessment the quality of the plant raw. One of the highly sensitive approaches is to use the plant reaction to different pollutants. This reaction is arose as a result of activation the processes of the system antioxidative protection.

The *purpose* of the work is to estimate the prospects of using the antioxidant-prooxidant balance in macrophytes as a bioindicator of water ecosystems pollution of heavy metals.

The plants of 6 species (*Ceratophyllum demersum* L., *Spirodela polyrrhiza* L. *Schleid.*, *Lemna Minor* L., *Elodea canadensis* Michx., *Acorus calamus* L., *Phragmites australis* Cav. *Trin. ex Steud.*), sediments and water were taken at the water bodies of Minsk (Svisloch river below Zaslavl; Tsnjansky reservoir; Komsomolskoe lake; Chizhovskoe reservoir; Svisloch river near village Korolischevichi - 10,0 km below of Minsk) from May till October 2010. The chemical elements and antioxidative capacity were detected. The antioxidative capacity, the antioxidant-prooxidant balance, and the processes of accumulation of metals' ions (Cu^{2+} , Zn^{2+}) by *Spirodela polyrrhiza* L. in the microcosms have been explored.

Conclusions:

Data analysis showed that, overall, the concentrations of heavy metals in the sediments and macrophytes are increased in the studied water bodies downstream Svisloch. The exceeds of the maximum allowable concentrations of some metals in the sediments and the average republic background concentrations of some metals in the plants have been detected.

The positive correlation between indices of antioxidant activity of water-and fat-soluble substances of plant extracts for all types of plants has been established. The values were the following: 0,78 for *Spirodela polyrrhiza* L. *Schleid.*, 0,76 for *Phragmites australis* Cav. *Trin. ex Steud.*, 0,50 for *Lemna minor* L., and 0,61 for *Acorus calamus* L. The close linear relationship between these measures was found for *Spirodela polyrrhiza* L. in the laboratory experiments.

A negative correlation between the index of total pollution of plants and antioxidant-prooxidant balance was found for *Lemna minor* L. (-0,64) and for *Spirodela polyrrhiza* L. (-0,79). These dependences were well described by logarithmic approximate curves with coefficients of determination 0,77 for *Spirodela polyrrhiza* L. and 0,53 for *Lemna minor* L.

It's offered to consider the index antioxidant-prooxidant balance of plants *Spirodela polyrrhiza* L. and *Lemna Minor* L. as a biochemical marker for early diagnosis of the adverse effects of heavy metals on the ecosystem.