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The use of stable isotopes for studying the effect of environmental factors on aquatic plants from Aries River, Romania

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To investigate the physiological reactions and the modification of the main metabolic pathways of aquatic plants in stress conditions, we have measured the δ^{13}C values of aquatic plants collected from Aries River and from 11 tributaries of Aries River, known as polluted areas. The δ^{13}C values have ranged between -32.6 $\permil$ and -28.6 $\permil$. For these plants, the photosynthesis depends on carbon source, on slow diffusion of CO_2 in water compared to that in air, and on HCO_3^- transport to membrane.

Also, we have measured the stable isotopic composition (^{18}O and D) of water samples taken from Aries River and the 11 tributaries of Aries River between September 2006 and September 2007. The isotopic content has increased from upstream to downstream. The Aries tributaries show a temporal variation of D and ^{18}O isotopes, as a part of seasonal variation. The isotopic values for the water samples collected in September are higher than that from May till June. In the (δ^{18}O, δD) diagram, our experimental data are in the neighborhood of General Meteoric Water Line, proving the meteoric origin of Aries tributaries system.

We have correlated the δ^{13}C values of the plants, and the δ^{18}O, δD values of the water with environmental changes such as temperature, pH, salinity, substrate concentration and with the air and water pollution. A long term consequence of exposure to air pollutants at the leaf level had as effect a decrease in both leaf conductance and photosynthesis with influence on the δ^{13}C values.

References

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