

Water-ion transmembrane transfer under the effect of low-intensity laser radiation

Anisimov A., Vorob'ev V., Silkin N.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Water-ion transmembrane transfer in maize roots under the effect of infrared laser radiation with power 2.4 mwatt was studied by NMR method. It is shown that laser radiation (LR) alters the dynamics of spin-spin relaxation and increases the rate of transmembrane water exchange and ion penetration which do not depend on the type of paramagnetic ions doped into the intercellular space. The radiation results in the increase of the effective self-diffusion coefficient of water, and it correlates with the data on the effect of LR on the velocity of cytoplasm movement. The data on the decrease of the resistance of Nernst layers in the summary membrane permeability due to "blowing off" its outer parts by the intensive cytoplasm current are used to explain the obtained results.

<http://dx.doi.org/10.1117/12.287693>

Keywords

Cytoplasmic movement, Diffusion, Intracellular water, Laser radiation, NMR, Transmembrane transfer