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Water self-diffusion in the roots of the plant effected by stress factor under long-continued NMR-experiment

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Abstract

The water self-diffusion in the root segments of winter wheat plantlet after their cutting off from the intact plants during continued "adaptive aging" was investigated by PGSE technique. The diffusion decay of the stimulated echo relative amplitude under the diffusion times 10 ms, 155 ms, 350 ms may be described by the sum of three exponents. Strongly marked correlated dependences of diffusion coefficients and population of the diffusion decay components on the sample lifetime have been revealed. These dependences may be caused by the change of diffusion direction of water molecules running through the tonoplast aquaporin channels in the different cell compartments. This change of direction seems to be the important mechanism of the cell water homeostasis maintenance and it is considered as the part of the general stress roots reaction.

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Keywords

cytoplasm, membranes, NMR, roots, self-diffusion of water molecules, vacuole