

Morphological and physiological changes in roots of various wheat genotypes as related to cytoskeleton disruption

Khokhlova L., Olinevich O., Makarova M., Bochkareva M.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

A depolymerizing effect of anti-microtubule drug oryzalin on the roots of three winter wheat (*Triticum aestivum* L.) cultivars contrasting in their frost-resistance was studied. The influence of plant cold acclimation (3°C, 7 days) and ABA treatment (30 µM) on oryzalin action was evaluated. Plant growing in the presence of 10 µM oryzalin under optimum temperature of 23°C resulted in the root-length decrease by 19-24% and root-apex swelling. All cells, especially in the root cortex, changed their radial dimensions. The cells acquired a rounded or irregular shape and increased in size. This indicates the loss of correct cell growth polarity. Most pronounced changes in the root apex diameter and most severe linear growth suppression were observed in the cultivar of moderate frost-resistance. The roots of this cultivar contained the highest amounts of actin and tubulins, as was evident from the immunoblot analysis. The effect of oryzalin on root growth and apex swelling was correlated with the content of actin in the roots of different wheat cultivars. Cold acclimation and exogenous ABA reduced (or prevented) oryzalin action on roots in a cultivar-specific manner. The conclusion was made that the bulk of the cytoskeletal net determined the efficiency of the cytoskeletal control of plant growth and morphogenesis. During autumn and winter periods, this is important for a better adaptation to temperature fluctuations of moderately frost-resistant plants, which are characterized by a high ecological plasticity. © MAIK "Nauka/Interperiodica", 2006.

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Keywords

ABA, Cold acclimation, Cytoskeleton, Growth, Morphogenesis, *Triticum aestivum*