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Reorganization of the tubulin and actin cytoskeleton under acclimation and abscisic acid treatment of Triticum aestivum L. plants | Reorganizatsiia tubulinovogo i aktinovogo tsitoskeleta pri zakalivanii rastenii Triticum aestivum L. k kholodu i deistvii abstsizovoi kisloty.

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Abstract

Only scanty and contradictory data are available concerning effects of low temperatures and ABA on the structural organization of microtubules (MTs) and microfilaments (MFs), and no information exists on the interaction of these parameters at cold acclimation of plants. Therefore, in cold acclimate and ABA-treated winter wheat plants, a comparative study was made of the state (localization, orientation, structure) and stability of actin and tubulin cytoskeleton in root cells taken from different zones, using indirect immunofluorescent microscope. The plant cold acclimation caused MT aggregation, the rise of MT and MF fluorescence, and the increase of their stability (a decrease of oryzalin effect) mainly in the root differentiation zone, that may testify to the strengthening of contacts between MTs and MFs. Like the cold acclimation, ABA induced the formation of MT bunches only in meristem and elongation zone cells. However in the zone of differentiation, the hormone stimulated the increase of tubulin structure stability, well correlating with a decrease in MT content, aggregation degree, and immunofluorescence, and, in addition with a complete depolymerization of MFs. Low temperatures removed the hormone effect on the structural organization of tubulin and actin cytoskeleton in the zone of differentiation. It is suggested that MT destruction, the decrease of instable MT populations, and the increase of stable MT populations may slow down growth processes in ABA-treated plants, similarly as in seedlings being on the initial stages of cold acclimation. By the end of this process, the induction of plant growth is determined evidently by the increase in the number of instable, highly labile MT populations, and in the status of MF polymerization.