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THE ROLE OF THE *ARABIDOPSIS THALIANA* ATYPICAL KINASES ABC1K2 AND ABC1K9 IN STRESS RESPONSES

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The ABC1K protein kinases (activity of bc1 complex kinases) are a large family of proteins with multiple roles in the regulation of respiration and oxidative stress tolerance. In plants they regulate diverse physiological processes in the chloroplasts and mitochondria, but their precise functions are poorly defined. In this work the functional characterization of the chloroplast *Arabidopsis thaliana* ABC1K2 and ABC1K9 proteins is carried out. To characterize the function of the two proteins, *A. thaliana* knock-out mutant lines that lack ABC1K2 or ABC1K9 proteins are considered. Under standard growth conditions, *abc1k2* and *abc1k9* mutant plants do not show morphological or developmental abnormalities if compared to wild type. Pigment analysis reveals a reduced total chlorophyll content and Chla/b ratio in *abc1k2* and *abc1k9* old leaves. Analysis of ultrathin sections of leaves with transmission electron microscopy does not show any significant difference in the chloroplast ultrastructure between wild type and mutant plants. Interestingly, in *abc1k2* and *abc1k9* plants plastoglobules with a reduced diameter are associated with thylakoids. Analysis of the photosynthetic performance demonstrates no differences in the major photosynthetic parameters between wild type and mutant plants. Since other ABC1K proteins are involved in plant response to oxidative stress, the effect of oxidative stress on *abc1k2* and *abc1k9* mutant plants is considered. When plants were grown in the presence of hydrogen peroxide, both *abc1k2* and *abc1k9* mutants show an increased root length in comparison to wild type. Transcription levels of SOD genes and APX1 are down-regulated in *abc1k2* mutant, while they result up-regulated in *abc1k9*. The level of superoxide anion radical staining is more evident in wild type plants than in *abc1k2* and *abc1k9* mutants. Because reactive oxygen species take part in ABA-mediated processes, the functions of ABC1K2 and ABC1K9 during germination are investigated. Germination is more severely affected by ABA, osmotic stress and salt stress in *abc1k2* and *abc1k9* mutants. These results suggest that ABC1K2 and ABC1K9 might be involved in the cross-talk between ABA and ROS signalling.