Summary of the Ph.D. thesis

The role of mitochondrial carbohydrate and ascorbic acid metabolism in oxidative and osmotic stress adaptation

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Drought, salinity and temperature extremes pose danger for many plants, and cause significant crop losses. Consequently, it is important to study the ability of plants to resist such stresses.

Our group main research topics are focusing on mitochondrial function, redox regulation and their function in stress adaptation.

Mitochondria are known as the principal energy producing organelle in animal and heterotrophic plant cells. In the last decade, it became clear that mitochondria can accomplish other crucial functions in plant cells, including adaptation to abiotic stress.

The mitochondrion has a central role in ascorbate metabolism, plant mitochondria are responsible not only for the synthesis of ascorbate; but also for the regeneration of ascorbate from its oxidized forms.

The role of mitochondria in osmolyte biosynthesis was also emerged recently.

On one hand we investigated the connections between mitochondrial antioxidant homeostasis and the respiratory chain in the complex III mutant, ppr40-1 Arabidopsis thaliana, and on the other hand we focused on osmolyte (sorbitol) biosynthesis in plant mitochondria, under osmotic stress.

Publications
Publications related to the dissertation

1) Bálint Tomasskovics, Viola Horváth, József Balla, Ferenc Örsi, András Szarka: Determination of sorbitol in the presence of high amount of mannitol from biological samples; Periodica Polytechnica, 2013, In press; IF: 0.27
2) András Szarka, Bálint Tomasskovics, Gábor Bánhegyi: The role of the ascorbate-glutathione-a-tocopherol triad in abiotic stress response; International Journal of Molecular Sciences 13 (4), 4458-4483 (2012); IF: 2.464, I: 16
3) Bálint Tomasskovics, András Szarka: Comparison of mannitol and xylitol as osmolytes in preparation of mitochondria; International Federation for Medical and Biological Engineering Proceedings 37, 1362-1365 (2011); IF: 1.791
4) Zsigmond Laura, Bálint Tomasskovics, Veronika Deák, Gábor Rigó, László Szabados, Gábor Bánhegyi, András Szarka: Enhanced activity of galactono-1,4-lactone dehydrogenase and ascorbate-glutathione cycle in mitochondria from complex III deficient Arabidopsis; Plant Physiology and Biochemistry 49, 815-822 (2011); IF: 2.838, I: 6

Other publication