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Influence of ascorbate-recycling, light and temperature during tomato fruit ripening on ascorbate pool and ascorbate-degradation

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Abstract

Ascorbate is a powerful antioxidant in plants. Ascorbate concentration depends on its biosynthesis, recycling and degradation; these are under genetic control and closely related to environmental conditions. Ascorbate recycling, controlled by the enzymes monodehydroascorbate reductase (MDHAR) and dehydroascorbate reductase (DHAR), ensures a high-rate turnover of the ascorbate pool. Transgenic lines silenced for an MDHAR gene in a cherry tomato cultivar have been generated. The objective of this study was to determine whether limiting turnover of the ascorbate pool may affect levels of its reduced form and its degradation products. Degradation occurs via DHA to assayed candidate compounds: oxalate, tartrate and threonate. In order to investigate the impact of the reduction in MDHAR activity under different conditions of light and temperature on ascorbate concentration and ascorbate-degradation products, we used off-vine tomato fruits. Mature green fruits were harvested and placed in environmental chambers at 12EC, 23EC or 32EC, in darkness or light. Results are discussed and shed light on the stability of the ascorbate pool in fruits under different environmental conditions.