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Conference Paper: Light and temperature of ripening tomato fruits interact to regulate ascorbate synthesis, oxidation and recycling

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Abstract

To understand how light and temperature may affect fruit ascorbate (AsA) content, tomato fruit harvested at breaker stage were placed under different temperatures (12, 23 and 31EC) and irradiance regimes (darkness or 150 $\mu\text{mol m}^{-2} \text{s}^{-1}$). After 56h, fruit were cut and pericarps were frozen and ground in liquid nitrogen. Changes in AsA metabolism were characterized from ascorbate and glutathione content, enzymic activities related to oxidative stress and AsA/glutathione cycle (MDHAR, DHAR, APX, CAT, GR) and the expression of genes coding for the 5 last enzymes of AsA biosynthesis pathway (GME, GDP, GPP, GalDH, GLDH). It confirms the important role of fruit micro-climate to regulate fruit AsA content and reveals interaction between light and temperature: Indeed light increased AsA content in fruit pericarp up to 67% at 12EC, but had no effect on AsA content at 31EC. At any temperature tested, light enhanced the expression of genes coding for AsA biosynthesis, but at 12EC, light upregulated a higher amount of genes compared to 23EC or 31EC. At 31EC, reductase activities (MDHAR and GR) were significantly reduced under light indicating that enzymes of the ascorbate/glutathione cycle may be limiting to recycle AsA.