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Effect of Salt Stress on Functional Components of Tomato Fruit: Salt-Induced Changes in Ascorbate Content and Their Interactions to Light and Temperature Conditions

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Summary

In tomato plants, salt stress has been applied to improve the quality of fruit. Salt-induced changes in ASA (vitamin C) content have been examined extensively in leaves and roots, but little is known about fruits. Our previous study, we show that tomato fruits have antioxidant systems such as ascorbate (ASA)-glutathione (GSH) cycle to protect themselves from salt-induced oxidative stress, but the ASA content depended on cultivars and cropping seasons. The aim of this study was to clear the interaction between light intensities and salt stress on ASA content in salt-stressed fruit using *in vitro* grown fruit. Small green fruit were harvested from greenhouse and sterilized. Sterilized fruits were individually placed into jars containing 10 ml Murashige and Skoog medium with 4% sucrose, 0.8% agar, pH 5.5. Fruit were grown in the dark, low light (PPFD 170 ± 10 μmol m^{-1} s^{-1}) and high light (614 ± 13 μmol m^{-1} s^{-1}) conditions in an environmentally controlled chamber (25°C/20°C, 14 h light/10 h dark). Salt stress was applied by adding 100 mM NaCl to the medium. Despite of the different light condition, the growth ratio of fruit was lower in salt-stressed fruit than in control fruit. In green and red-ripe fruit, the ASA content was increased with light intensities, but decreased by salt stress in the low and high light grown fruit. In contrast, GSH content was not influenced by light intensities and the salt stress. ASA peroxidase (APX) that is scavenger of hydrogen peroxide, increased with light intensities, but not effect by salt stress. In addition, ASA recycling enzymes such as dehydroascorbate reductase and monodehydroascorbate reductase were not influenced by both the light intensities and salt stress. These results indicate ASA content interacted between light and salt stress conditions. Furthermore, I suggest that these mechanisms may be resulted from the change in the ASA biosynthesis rather than the changes in recycling enzymes of ASA under salt stress condition.