

# High MT-sHSP23.6 expression increases antioxidant system in 'Micro-Tom' tomato fruits during post-harvest hypoxia

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## Abstract

The effect of hypoxia on the antioxidant system during the storage of tomato fruits was investigated using plants with different expression levels of the encoding gene for the MT-sHSP23.6 protein. Fruits from two 'Micro-Tom' tomato plant genotypes (wild type and high expression of MT-sHSP23.6) were harvested at the breaker stage and subjected to normoxia (23 °C, dark) and hypoxia (daily nitrogen flow of 0.098 Mpa/10 min, 23 °C, darkness) treatments for 5 and 8 days, respectively. We evaluated the color tone (Hue°) of the fruits, as well as the components of the enzymatic antioxidant system, reactive oxygen species, non-enzymatic antioxidant system components and radical scavenging activity. Fruits from plants with high MT-sHSP23.6 expression had the highest activity for all the antioxidant enzymes under hypoxia conditions (25, 20, 76, and 48% higher than wild type for SOD, CAT, APX, and GPOD, respectively). They also had the lowest concentrations of superoxide anion under both normoxia and hypoxia storage. At the end of the normoxia storage period, the genotype with high MT-sHSP23.6 expression had the highest accumulation of lycopene (13%), whereas at the end of hypoxia storage, the wild type genotype had the highest lycopene accumulation (39%). Higher accumulation of phenolic compounds was observed in the post-hypoxia period for plants subjected to the hypoxia treatment in high MT-sHSP23.6 expression genotype (12% on the fourth day and 9% on the eighth day). In addition, ascorbic acid concentration was considerably higher on the third and fourth storage days (47% and 8%, respectively). During the hypoxia period, the genotype with high MT-sHSP23.6 expression exhibited the highest radical scavenging activity. High MT-sHSP23.6 expression stimulated the enzymatic antioxidant system during the hypoxia period and led to higher accumulation of phenolic compounds and ascorbic acid, evidence that this protein may be related to tolerance mechanisms in plants subjected to post-harvest abiotic stresses.