

Synergy between hot water treatment and high temperature ethylene treatment in promoting antioxidants in mature-green tomatoes

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Abstract

Controlled postharvest stresses were used to induce the synthesis of antioxidants in tomato fruit. In this study, a hot-water (HW) treatment of 52 °C for 5 min promoted higher total oxygen radical absorbance capacity (ORAC) compared to fruit immersed in 25 °C water for 5 min. Whereas, ethylene treatment at high temperature, particularly at 35 °C for 24, 48 or 72 h, induced higher content of total phenolics and ferric reducing ability of plasma (FRAP) than fruit treated with ethylene at 20 or 30 °C. In combination, there was synergy between the treatments, and this was most notable by the increase of total phenolics in HW-treated tomatoes exposed to ethylene at 35 °C for 24, 48 or 72 h. There was also a significant increase of total ORAC in HW-treated fruit exposed to ethylene at 30 °C for 72 h or 35 °C for 24, 48 or 72 h. This increase in antioxidant capacity was observed in the hydrophilic fraction of HW-treated fruit exposed to ethylene at 30 °C for 72 h or 35 °C for 24 or 48 h and in the lipophilic fraction of HW-treated tomatoes exposed to ethylene at 35 °C for 24, 48 or 72 h. Moreover, The HW-treatment especially maintained the level of total carotenoids and ascorbic acid when exposed to ethylene at 30 °C for 72 h or 35 °C for 48 or 72 h. Nevertheless, the high temperature ethylene treatment reduced the a^* value of tomato peel regardless of the application of HW treatment. In conclusion, application of a HW treatment of 52 °C for 5 min followed by exposure to ethylene at 35 °C for 48 h was most effective in synergistically improving the antioxidant capacity and composition of tomatoes without severely impairing color development.