Title Effect of hot water and molybdenum dips on endogenous polyamines and heat shock proteins in lemon flavedo and their ability to alleviate chilling injury during cold storage

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Abstract

Polyamines (putrescine, spermine and spermidine) are cation which binds to negatively charged cellular compounds such as proteins, DNA and membrane phospholipids. The function of antioxidants, proteins (including heat shock proteins), and membranes is improved when highly conjugated with polyamines. Heat shock proteins (HSPs) are molecular charperones re-direct other damaged protein towards proteolysis and had been shown to have a synergism with polyamines in mitigating plant stress. Furthermore, hot water enhances heat shock protein and previous studies have shown hot water plus molybdenum to reduce chilling injury in citrus fruit. Therefore, the aim of this work was to investigate the potential role of hot water and molybdenum to mitigate chilling injury by enhancing heat shock protein (HSP70) and possible relationship between HSPs and polyamine during cold storage. Fruit from different sources, commonly chilling susceptible or resistant, were pre-conditioned for 2 min with HWD 47 or 53°C in combination with a subsequent soak in 1 or 10 μM Na_2MoO_4 solution for 30 min. Fruit were subsequently stored at -0.5°C for 7, 14, 21 or 28 days, then moved to ambient temperature for a week and evaluated for chilling injury symptoms. Lemon fruit treated with HWD 53°C; 1 μM Mo; 10 μM Mo plus HWD 53°C showed enhanced HSP70 as compared with control or HWD 47°C which correlated with increased soluble-conjugated polyamine and therefore, reduced chilling injury symptoms.