

Choline chloride alleviates the pericarp browning of harvested litchi fruit by inhibiting energy deficiency mediated programmed cell death

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Abstract

The effect of choline chloride (ChCl) on litchi pericarp browning and the potential regulating mechanism was investigated in this study. Results showed that 1 g L^{-1} ChCl significantly inhibited the development of pericarp browning and reduced respiration rate of litchi fruit. Meanwhile, choline chloride treatment delayed the programmed cell death (PCD) indicated by lower DNA laddering, inhibition of programmed cell death-related genes expression and higher soluble protein content. Additionally, ChCl treatment maintained higher ATP content and energy charge due to higher level of glycine betaine and regulation of energy metabolism related genes and ATPase activities by ChCl treatment. Finally, higher ATP status in ChCl treated fruit resulted in lower accumulation of reactive oxygen species via enhancing the activities of superoxide dismutase, catalase and ascorbate peroxidase. Taken together, the results obtained in this study suggested that choline chloride reduced pericarp browning of litchi fruit possibly through inhibiting energy deficiency mediated PCD.