

Exogenous progesterone alleviates chilling injury by upregulating *IbAOX1* to mediate redox homeostasis and proline accumulation in postharvest sweetpotato tuberous root

Huiyun Chen, Shuqian Zhou, Xia Li and Huqing Yang

Postharvest Biology and Technology, Volume 183, January 2022, 111738

Abstract

This study aimed to elucidate the role of progesterone (PROG) in mitigating chilling injury (CI) in sweetpotato tuberous root and its relation to alternative oxidase (AOX). Root were pretreated by immersing them in 100 mM PROG or PROG-salicylhydroxamic acid (SHAM). The results showed that PROG effectively enhanced the transcription level of *IbAOX1* and the activity of AOX, inhibited the formation of CI, and reduced membrane permeability, malonaldehyde levels, and the production of ROS compared with the control. PROG also enhanced the antioxidant protection system by maintaining higher activities of antioxidant enzymes and levels of ascorbic acid and total phenolics. PROG further induced the upregulation of Δ^1 -pyrroline-5-carboxylate synthetase and ornithine d-aminotransferase and the downregulation of proline dehydrogenase, which advanced the proline level. However, the abovementioned effects resulting from PROG treatment were weakened by SHAM. Therefore, PROG upregulated AOX to mediate the antioxidant system and proline accumulation, thereby alleviating CI in tuberous root. The strategy of PROG treatment combined with cold storage can potentially be used for cold-induced rapid sweetening and enhancing the antioxidant capacity of freshly harvested tuberous roots.