Octapeptide NOP-1 treatment delays yellowing in broccoli floret during low temperature storage

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Postharvest Biology and Technology, Volume 180, October 2021, 111628

Abstract

During postharvest life, floret yellowing confines broccoli's economic and nutritional worth. This study aimed to investigate the mechanisms activated by octapeptide NOP-1 (LKRYKRRL-NH_2) treatment at 0, 250, 500, 750, or 1000 μM for retarding floret yellowing in broccoli during storage at 4 °C for 28 d. Our results revealed that the 750 μM NOP-1 treatment retarded chlorophyll degradation by suppressing pheophytinase (PPH) and pheophorbide a oxygenase (PaO) genes expression along with inhibiting Mg^{2+} dechelatase (MDC), and PPH enzymes activity. Besides, 750 μM NOP-1 treatment prevented jasmonic acid (JA) biosynthesis by suppressing phospholipase A (PLA), 13-lipoxygenase (13-LOX), allene oxide synthase (AOS), allene oxide cyclase (AOC), and OPDA reductase (OPR3) genes expression. Interestingly, 750 μM NOP-1 treatment maintained the membrane integrity in broccoli floret, evaluated by malondialdehyde (MDA) accumulation, which could be ascribed to the suppressing phosphatidylinositol 3-kinase (PI3K), phospholipase D (PLD), and 9-lipoxygenase (9-LOX) genes expression. Our results demonstrated that NOP-1, as an innovative, safe, and eco-friendly antisenescence octapeptide, significantly advances our technological proficiency to delay floret yellowing in broccoli during low temperature storage.