

茉莉酸甲酯处理对葡萄果实NO和H₂O₂水平及植保素合成的影响

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Effects of Methyl Jasmonate Treatment on Levels of Nitric Oxide and Hydrogen Peroxide and Phytoalexin Synthesis in Postharvest Grape Berries

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摘要 以10 μmol · L⁻¹ 茉莉酸甲酯 (Methyl jasmonate, MeJA) 熏蒸处理‘巨峰’葡萄果实6 h, 随后转入1 °C下贮藏28 d。结果表明, MeJA 处理显著抑制了葡萄果实在贮藏期间腐烂率和失重率的上升, 促进内源NO释放量和H₂O₂ 含量在贮藏前期的上升, 同时诱导植保素合成相关酶苯丙氨酸解氨酶 (PAL)、肉桂酸-4-羟化酶 (C4H)、对香豆酰-CoA 连接酶 (4-CL) 和白藜芦醇合成酶 (RS) 活性以及植保素白藜芦醇和白藜芦醇脱氢二聚体含量的上升。由此推测, MeJA 在葡萄果实细胞内发挥了信号传导作用, 通过调控下游信号分子H₂O₂ 和NO 的水平来提高植保素合成相关酶活性, 从而促进了植保素的积累, 提高果实的抗病性, 降低了其腐烂率。

关键词: 葡萄 茉莉酸甲酯 一氧化氮 过氧化氢 植保素

Abstract: In order to reveal the mechanisms of methyl jasmonate (MeJA) inhibiting postharvest decay in grape berries, ‘Kyoho’ grape berries were pretreated with 10 μmol · L⁻¹ MeJA vapor for 6 h and then stored at 1 °C for 28 days. The fruit decay incidence, weight loss rate, levels of endogenous signaling molecules nitric oxide (NO) and hydrogen peroxide (H₂O₂), activities of phytoalexin synthesis related enzymes and individual phytoalexin compounds contents were determined at 7-day intervals during the storage. The results exhibited that the MeJA treatment could significantly inhibit the increase in decay incidence and weight loss rate, promote endogenous NO release and H₂O₂ content during the early stage of the storage, and simultaneously induce the increase in activities of phenylalanine-ammonia-lyase (PAL), cinnamate 4-hydroxylase (C4H), 4-coumarate coenzyme A ligase (4-CL) and resveratrol synthase (RS) associated with phytoalexin synthesis and the contents of phytoalexins including resveratrol and viniferin in grape berries during the storage. Therefore, we speculate that MeJA might play an important role in signal transduction in grape cells, which regulated the downstream signaling molecules NO and H₂O₂ levels to enhance activities of enzymes related to phytoalexin synthesis, resulting in promoting phytoalexin accumulation and furthermore improving disease resistance in grape berries.

Keywords: grape, methyl jasmonate, nitric oxide, hydrogen peroxide, phytoalexin

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