

‘金冠’苹果与其无锈芽变的果皮性状比较和防锈技术研究

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Comparison of Peel Characteristics Between ‘Golden Delicious’ and Its Non-russet Sport ‘Fengshuai’ Apples to Explore a Method to Prevent Fruit Russetting

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摘要 为了阐明‘金冠’苹果果锈形成的时间与原因, 探索防止果锈形成的方法, 以‘金冠’及其无锈芽变品种‘丰帅’为试材, 利用体视显微镜和扫描电镜观察了果面果锈形成过程, 测定了果皮色素和次生代谢产物组分和含量。结果表明, 花后4周‘金冠’苹果果面尚无肉眼可见的果锈时, 表皮细胞蜡质层已经开裂、脱落; 花后5周表皮细胞角质层大量开裂, 细胞壁木栓化; 花后6周, 大量果锈出现在果实表面。据此推断, 花后4~6周是‘金冠’苹果果锈形成的关键时期。另一方面, ‘丰帅’果皮叶绿素和类胡萝卜素含量显著低于‘金冠’, 而总黄酮和绿原酸含量显著高于‘金冠’, 特别是在花后4~6周。花后4周利用0.05~5 mmol·L⁻¹外源绿原酸处理, 可以显著降低‘金冠’果皮果锈指数, 且对果实品质没有不良影响。因而, 适当浓度外源绿原酸可望用于苹果防锈实践。

关键词: 苹果 无锈系芽变 果皮性状 果锈 绿原酸 防锈效应

Abstract: In order to explore a method to prevent fruit russet formation, the peel characteristics of ‘Golden Delicious’ apple and its non-russet sport variety ‘Fengshuai’ were compared by a stereo microscope and a scanning electron microscope in the work. The results showed that the wax layers of the epidemical cells of ‘Golden Delicious’ apple began to crack and abort at 4 weeks after bloom (WAB) although no macroscopic russet could be observed. At 5 WAB, the cuticles of the epidemical cells cracked in large areas, and the cell walls were suberificated because cork cambium was activated. And at 6 WAB, a lot of russet occurred in the surface of apple fruits. Therefore, the time from 4 to 6 WAB was crucial for russet formation of ‘Golden Delicious’ apple. Physiochemical analysis showed that the chlorophylls and carotenoids in ‘Fengshuai’ peels were significantly lower than that of ‘Golden Delicious’, but its total flavonoids and chlorgenic acid were much higher than the latter. The differences were especially dramatic from 4 to 6 WAB. When exogenous chlorogenic acid of 0.05 - 5 mmol · L⁻¹ solutions was sprayed at 4 WAB to ‘Golden Delicious’ apples, the fruit russet formation was significantly inhibited without obvious adverse effect on internal quality of fruits. Therefore, exogenous chlorogenic acid in suitable concentrations is suggested to prevent russetting in apple production.

Keywords: apple, non-russet sport, peel characteristics, russet, chlorogenic acid, russetting prevention

基金资助:

江苏省农业科技自主创新基金项目[CX10(111)]

引用本文:

李健花, 高晶晶, 冯新新等. ‘金冠’苹果与其无锈芽变的果皮性状比较和防锈技术研究[J] 园艺学报, 2014, V41(1): 35-43

LI Jian-Hua, GAO Jing-Jing, FENG Xin-Xin etc. Comparison of Peel Characteristics Between ‘Golden Delicious’ and Its Non-russet Sport ‘Fengshuai’ Apples to Explore a Method to Prevent Fruit Russetting[J] ACTA HORTICULTURAE SINICA, 2014, V41(1): 35-43

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