

‘砀山酥梨’褐皮芽变木质素含量及相关酶活性与CCoAOMT表达量分析

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Analysis of Enzyme Activity and Lignin Content and Expression of CCoAOMT Gene in the Pericarp of ‘Dangshan Suli’ and Its Russet Mutant

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- 摘要
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摘要 为了探讨‘砀山酥梨’芽变品系‘锈酥’果皮褐色形成机理,采用分光光度法测定盛花后25、50、75、100、125、150和175 d果皮中木质素含量和相关酶活性变化;从构建的‘锈酥’正向SSH-cDNA文库中筛选出与木质素生物合成密切相关的CCoAOMT-EST,通过实时荧光定量PCR测定了‘砀山酥梨’和‘锈酥’果皮中CCoAOMT的相对表达量。结果表明:‘锈酥’果皮发育前期木质素增量较大,且木质素增量累计比‘砀山酥梨’高12.2%;‘砀山酥梨’和‘锈酥’果皮中PAL、4CL、CAD酶活性均在花后75 d达到最大值,而POD酶活性则在花后125 d出现高峰;二者果皮中4种酶活性变化趋势基本一致,但‘锈酥’果皮中均相对较高;‘锈酥’果皮中的PAL和4CL酶活性与木质素增量变化均呈显著正相关,而‘砀山酥梨’则未呈现出此规律;在果实生长发育各个时期,‘锈酥’果皮中CCoAOMT相对表达量均高于‘砀山酥梨’。因此推测,‘锈酥’果皮褐色形成与果皮中木质素积累及相关酶活性提高有关,果皮中CCoAOMT的增量表达是‘锈酥’果实褐皮形成的重要原因之一。

关键词: 梨 果皮颜色 木质素 酶活性 CCoAOMT 荧光定量PCR

Abstract: To investigate the mechanism of russet skin formation in ‘Xiusu’ pear, the sport of Chinese pear ‘Dangshan Suli’ (*Pyrus bretschneideri* Rehd.), the lignin content and activities of Phenylalanine ammonia-lyase (PAL), 4-hydroxycinnamate Co-A ligase (4CL), Cinnamyl alcohol dehydrogenase (CAD) and Peroxidase (POD) related to lignin biosynthesis, in pericarp of ‘Dangshan Suli’ and ‘Xiusu’ pear at 25, 50, 75, 100, 125, 150 and 175 days after full bloom were tested by spectrophotometry, respectively. From the positive SSH-cDNA library of ‘Xiusu’ pear, CCoAOMT-EST was screened out and the relative quantity of its expression was analysed by Real-time PCR. The results showed that there were three peaks of lignin increment in the pericarp of ‘Dangshan Suli’ pear, and lignin accumulation was 12.2% higher in ‘Xiusu’ than that in ‘Dangshan Suli’ pear when the fruit matured. The activities of PAL, 4CL, CAD in pericarps of ‘Xiusu’ and ‘Dangshan Suli’ pear all reached to the maximum at 75 days after full bloom, which of POD attained the maximum at 125 days after full bloom. Although the trends of the four enzymes dynamic change in ‘Xiusu’ were similar as those in ‘Dangshan Suli’ pear, their activities in the former were higher than in the later. There was positive significant correlation between PAL or 4CL activities and lignin increment in ‘Xiusu’ but not in ‘Dangshan Suli’ pear. As the fruit developed, the relative quantity of CCoAOMT expression at each stage in the pericarp of ‘Xiusu’ was evidently higher than that of ‘Dangshan Suli’ pear. It was postulated that the mechanism of russet skin formation in ‘Xiusu’ pear was related to lignin accumulation and the relevant enzyme activity enhancement, and the expression increment of CCoAOMT gene may be a key factor contributed to the russet skin formation of ‘Xiusu’ pear.

Keywords: pear, fruit skin color, lignin, enzyme activity, CCoAOMT gene, Real-time PCR

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