园艺学报 » 2014, Vol. 41 » Issue (2) :285-292 DOI:

蔬菜

紫皮大蒜鳞茎外皮花青苷生物合成影响因素和相关酶的研究

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Studies on the Relationship Between Anthocyanin Biosynthesis and Environment Condition and Related Enzymes in the Outer Scales of Purple Garlic

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摘要 以紫皮大蒜品种‘G075’为试材，研究了鳞茎发育过程中鳞茎外皮花青苷的积累规律及与其生物合成相关的苯丙氨酸解氨酶（PAL）、查儿酮异构酶（CHI）和二氢黄酮醇还原酶（DFR）活性的关系，分析了不同设施栽培方式、基质pH值、基质氮素水平和磷素水平对花青苷生物合成的影响。研究结果表明：随着大蒜鳞茎的发育，鳞茎外皮花青苷含量逐步提高，CHI活性与鳞茎外皮花青苷积累关系密切，其活性变化与花青苷积累趋势吻合；露地栽培温度相对较低的紫皮大蒜花青苷积累高于保护地温度相对较高的栽培大蒜，基质pH 6.5和1/2氮素水平（7.5 mmol · L^{-1}）时对花青苷合成有利，花青苷积累随磷素水平提高呈现先升后降的变化趋势。

关键词： 紫皮大蒜 鳞茎 外皮 花青苷 相关酶活性 环境条件

Abstract: Anthocyanin, a water soluble compound is thought to be responsible for the coloration of outer scales of purple garlic. The changes in anthocyanin content in relation to enzymatic activities of phenylalanine ammonia-lyase（PAL）, chalcone isomerase（CHI）, and dihydroflavonol reductase（DFR）were studied in the outer scales of purple garlic ‘G075’. The relationships between anthocyanin biosynthesis and environmental conditions（temperature, pH of substrate, supplement of nitrogen and phosphorus）were established. The results show that among these enzymes, the activity of CHI is positively correlated to anthocyanin content in significant level and further postulated as key limiting factor to regulate anthocyanin synthesis in the outer scales of purple garlic. The fluctuation of the CHI activity and anthocyanin content is consistent with that of the environmental conditions. These results obviously demonstrate the environmental conditions play a major role in regulating the enzyme activities of anthocyanin biosynthesis. Cool temperature in open field, acidic medium（pH 6.5）, low nitrogen level（1/2 N: 7.5 mmol · L^{-1}）and optimum phosphorus levels（P: 1 mmol · L^{-1}）are favorable for anthocyanin synthesis in the outer scales of purple garlic.

Keywords: purple garlic, outer scales, anthocyanin, activities of related enzymes, environment condition

收稿日期: 2013-09-05; 出版日期: 2013-12-13

引用本文:

闫伟明, 孟焕文, 钟杨权威等 .紫皮大蒜鳞茎外皮花青苷生物合成影响因素和相关酶的研究[J] 园艺学报, 2014,V41(2): 285-292

YAN Wei-Ming, MENG Huan-Wen, ZHONG Yang-Quan-Wei etc .Studies on the Relationship Between Anthocyanin Biosynthesis and Environment Condition and Related Enzymes in the Outer Scales of Purple Garlic[J] ACTA HORTICULTURAE SINICA, 2014,V41(2): 285-292

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[1] 刘 芳1,2，王家艳1，王晓丽3，周蕴薇1,*.细叶百合鳞茎在低温解除休眠过程中茎尖细胞超微结构的变化[J]. 园艺学报, 2013,40(6): 1110-

[2] 张泽煌, 陈义勇, 钟秋珍, 王玲霞, 林旗华, 林永祥, 龚慧文, 陈伟.红果肉与白果肉杨梅花青苷和糖代谢途径的差异蛋白研究[J]. 园艺学报, 2013,40(12): 2391-2400

[3] 刘晓芬, 李 方, 殷学仁, 徐昌杰, 陈昆松.花青苷生物合成转录调控研究进展[J]. 园艺学报, 2013,40(11): 2295-2306

[4] 孙红梅*, 周兰娟, 王文娟, 袁思施, 王春夏.百合鳞茎淀粉磷酸化酶分离纯化及酶学性质研究[J]. 园艺学报, 2012,39(8): 1521-

[5] 刘 金, 魏景立, 刘美艳, 宋 杨, 冯守千, 王传增, 陈学森.早熟苹果花青苷积累与其相关酶活性及乙烯生成之间的关系[J]. 园艺学报, 2012,39(7): 1235-
[6] 钟培星, 王亮生, 李珊珊, 徐彦军, 朱满兰.芍药开花过程中花色和色素的变化[J]. 园艺学报, 2012,39(11): 2271-2282
[7] 孙红梅;何 玲;王微微;王春夏;李天来 .兰州百合鳞茎可溶性酸性转化酶活性检测体系的建立 [J]. 园艺学报, 2011,38(6): 1197-1204
[8] 张 洁;王亮生;高锦明;李圣波;徐彦军;李崇晖;杨瑞珍;.贴梗海棠花青苷组成及其与花色的关系 [J]. 园艺学报, 2011,38(3): 527-535
[9] 陈 昆;刘世琦;张自坤;张 涛;孟凡鲁 .钾素对水培大蒜生理和品质的影响 [J]. 园艺学报, 2011,38(3): 556-562
[10] 田 佶;沈红香;张 杰;姚允聪;宋婷婷;耿 慧.苹果属观赏海棠McANS基因克隆与不同叶色品种间表达差异分析[J]. 园艺学报, 2010,37(6): 939-948
[11] 袁 明;万兴智;杜 蕾;袁 澍;林宏辉;.红花檵木叶色变化机理的初步研究[J]. 园艺学报, 2010,37(6): 949-956
[12] 张延龙;;张启翔;薛晓娜.光周期对野生卷丹试管苗鳞茎形成及糖代谢的影响[J]. 园艺学报, 2010,37(6): 957-962
[13] 刘中良;刘世琦;张自坤;杨 茹;陈 坤.硫对设施水培大蒜光合特性和鳞茎品质的影响[J]. 园艺学报, 2010,37(4): 581-588
[14] 赵海涛;刘 春;明 军;穆 鼎.ABA对‘西伯利亚’百合试管鳞茎发育及休眠的影响[J]. 园艺学报, 2010,37(3): 428-434
[15] 乔永旭;张永平;陈 超;王桂兰;底伟伟.东方百合‘索邦’诱导小鳞茎发生过程中的细胞学观察[J]. 园艺学报, 2009,36(7): 1031-1036

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