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采后菠萝果实黑心病发病过程中乙醇代谢的变化

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摘 要:【目的】探究采后'巴厘'菠萝果实黑心病发生过程中乙醇代谢途径的变化。**【方法】**对六成熟(6 M)和八成熟(8 M)果实进行黑心病发病情况观察,并检测常温贮藏时,黑心病发病过程中果实乙醇代谢相关产物、代谢关键酶活性以及基因表达变化。**【结果】**随着贮藏时间的延长,菠萝黑心病病情指数逐渐提高,其中6 M果的病情指数显著高于8 M果($P<0.05$)。在贮藏前4 d,6 M果丙酮酸含量显著高于8 M果($P<0.05$)并呈下降趋势,而8 M果呈上升趋势;6 M果的乙醛含量为先上升后下降,第6天出现峰值,而8 M果为逐渐下降趋势。6 M果和8 M果乙醇含量变化趋势一致。丙酮酸脱羧化酶(pyruvate decarboxylase,PDC)和乙醇脱氢酶(alcohol dehydrogenase,ADH)活性变化呈先升后降趋势,且8 M果ADH活性显著高于6 M果,PDC和ADH基因表达与酶活性变化趋势一致。**【结论】**菠萝的采收成熟度与黑心病的发病率密切相关,成熟度高的8 M果贮藏过程中菠萝黑心病的发生率明显低于6 M果;伴随黑心病的发生,6 M果和8 M果的乙醇代谢相关产物、代谢关键酶活性存在差异,乙醇代谢可能与黑心病发生密切相关。

关键词: 菠萝;黑心病;乙醇代谢

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The changes of ethanol metabolism in the pulp of pineapples during the postharvest incidence of blackheart disease

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Abstract:【Objective】Fermentation metabolism exists constantly in the pulp of pineapples, and the contents of metabolites (pyruvic acid, acetaldehyde and ethonol) and enzyme activities including pyruvate decarboxylase (PDC) and alcohol dehydrogenase (ADH) are important indexes for evaluating the level of fermentation metabolism. Blackheart disease in pineapples [*Ananas comosus* (L.) Merr. 'Comte de Paris'] is a physiological disorder that may be induced by exposure to low temperature, either in the field or in postharvest storage and results in severe internal browning of pineapple fruit, However, the biochemical pathway of blackheart disease has not been clearly documented. In order to study the variation of fermentation metabolism in the process of pineapple blackheart disease, the pulp of pineapples from 6 mature (6 M) and 8 mature (8 M) fruits were investigated during storage at room temperature (25 ℃), respectively.【Methods】The severity of pineapple blackheart disease was evaluated by assessing the ratio of the brown area in longitudinal transaction fruits. The content of pyruvic acid and the enzyme activities of PDC and ADH were determined using conventional physical and chemical analysis methods. The content of acetaldehyde and ethanol were measured by using a gas chromatograph, and the changes of gene expression of PDC and ADH were detected by real-time fluorescent quantitative RT-PCR.【Results】The blackheart index increased gradually in the 6 M fruit and in the 8 M fruit during storage at 25 ℃, and the blackheart index in the 6 M fruit was significantly higher in the 8 M at 4 d of storage. The pyruvic acid content de-

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