

RNA-Seq reveals the effect of ethylene on the volatile organic components (VOCs) of Cavendish banana at different post-harvesting stages

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Abstract

Aroma serves as one of the decisive factors influencing the value of banana commodities. Most of characteristic volatile organic components (VOCs) are formed during post-harvesting. However, the changing of VOCs of banana at different post-harvesting stages remain ambiguous. In this study, the VOCs of Cavendish banana for the four typical post-harvesting stages (green stage/half of yellow stage/yellow ripening stage/over ripening stage) are clarified using headspace solid phase micro-extraction (HS-SPME), combined with gas chromatography-mass spectrometry (GC-MS). The results inferred that the relative content of branched-chain esters such as acetate and butyrate, which form the main contributors of aroma in bananas, is higher in the T2 and T3 stages. Further, RNA-Seq technology was employed to clarify the formation mechanism of banana aroma in the post-harvesting stage. The *MaTGL4* gene of the linoleic acid metabolism pathway and the *MaBCAT3* and *MaBCAT5* genes of the valine, leucine and isoleucine degradation pathway in banana suggest the expression is active late in the ripening stage, and the upregulated expression of these genes is analogous to the formation of aroma components such as branched-chain esters and hexenal. The above results not only provide baseline data on the differences in physical and chemical properties of VOCs in various post-harvesting stages of banana production, but also provide theoretical guidance facilitating the subsequent improvement of the commercial value of bananas through genetic improvement.