

Rapid profiling of IAA and SA in tomato fruit during ripening using low-cost paper-based electroanalytical devices

Xiao-Lei Huo, Chen-Chen Zhu, Hui Jiang, Qing Yuan, Jiao-Jiao Wang, Jin-Yu Wang, Zhong-Qin Pan, Cui-Li Chen, Zeng-Qiang Wu and Ning Bao

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Abstract

Fruit ripening is a process involving many physiological changes regulated by various plant hormones such as indole-3-acetic acid (IAA) and salicylic acid (SA). The levels of these hormones in fruit with the spatial-temporal resolution can provide detailed information for the study and evaluation of the fruit ripening. Herein paper-based analytical devices and the microsampling technique were coupled for the analysis of IAA and SA in different locations of the tomato fruit during ripening. Because of its excellent electric conductivity, the ITO glass was used as the substrate of the disposable working electrodes and modified with conductive carbon cement. The ITO modified electrodes in the paper-based analytical devices were utilized for analysis of IAA and SA in tiny tomato samples obtained with the technique of microsampling. Our results showed that the amounts of IAA and SA in the locular tissue of tomato fruit decreased via time in the process of ripening. More importantly, the spatial profiling of IAA and SA in immature and mature tomatoes could be directly differentiated at the molecular level. This study suggested that low-cost paper-based electroanalytical devices could become an effective platform for rapid evaluation of the fruit ripening.