

Title The Mechanism and Its Control of Peel Pitting of Citrus Fruits
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Abstract

Citrus is one of the most important fruit in the world. But the fruit of some varieties is prone to develop peel pitting, which has been described as a severe disorder with characteristics of the extensive collapsed areas of the flavedo and part of the albedo that becomes brown with time. The external quality and consequently the market value of the fruit were decreased by peel pitting. The mechanism of the disorder is still unclear, and there are not effective control techniques.

For understanding the molecular mechanism of this physiological disorder, 'Fengyuan 72-1' navel orange (*Citrus sinensis* Osbeck) was used to isolate and identify some genes involved in the process of peel pitting. A suppression subtractive hybridization (SSH) library was constructed to identify differentially expressed genes in peel pitting of navel orange fruit. Sequence analysis showed that a lot of genes were involved during the process, including the *CsEXP*, *CsNAC*, *CsCAB*, etc. The expression analysis indicated that some of these genes had relationship with the peel pitting. For screening the control techniques, the navel orange fruits were treated with different concentrations of CaCl_2 and $\text{Ca}(\text{NO}_3)_2$ in the orchard and postharvest. The results showed that the treatment of 1% CaCl_2 could effectively decrease the development of peel pitting of fruit either in the field or postharvest. After 110 days storage, the pitting index of navel orange treated with 1% CaCl_2 was significantly lower than that of the control. During the storage, relative electric conductivity, MDA content and average activities of PPO and POD of fruits treated with 1% CaCl_2 were significantly lower compared to the control. Thus, the preharvest or postharvest calcium treatment could be used as an efficient approach to reduce the development of peel pitting of navel orange fruits.