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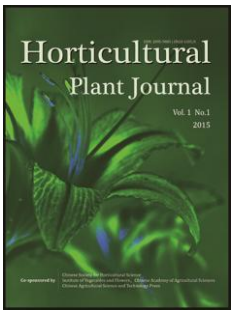

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A Banana PHD-Type Transcription Factor MaPHD1 Represses a Cell Wall-Degradation Gene *MaXTH6* During Fruit Ripening

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Abstract

Plant homeobox domain (PHD)-type transcription factors (TFs) are involved in a variety of biological processes. However, its involvement in commercially important fruit ripening process remains largely unclear. In the present work, the characterization of a PHD-type TF termed MaPHD1 from banana fruit is reported. Multiple alignments of the deduced amino acid sequence revealed that MaPHD1 showed a high homology with *Arabidopsis thaliana* Alfin1-like proteins belonging to plant-specific sub-family of PHD finger proteins. MaPHD1 was found localized in the nucleus and exhibited trans-repression ability. It was down-regulated by ethylene and ripening. Electrophoretic Mobility Shift Assay (EMSA) and transient expression analysis demonstrated that MaPHD1 directly bound to the G-rich motifs in the promoter of *MaXTH6*, which is associated with cell wall degradation, and subsequently repressed its expression. These findings suggest that MaPHD1 may be negatively associated with banana fruit ripening, at least in part, by the direct suppression of *MaXTH6*. Taken together, these findings provide new insights into the transcriptional regulatory networks of banana fruit ripening.

Keywords: banana fruit; ripening; PHD-type transcription factor; cell wall degradation; transcriptional regulation

1. Introduction

Banana is the world's most important fruit crop and one of the top 10 crops by production (Paul et al., 2017). It is also one of the major international agricultural trading commodities that are widely distributed throughout the world (Kuan et al., 2015). However, as a typical climacteric fruit that ripening is tightly controlled by ethylene, banana fruit ripens rapidly after harvest, resulting in a short shelf-life of 1–3 days at ambient temperature and become more susceptible to diseases (Ahmed and Palta, 2016; Fan et al., 2016; Han et al., 2016). Numerous post-harvest preservation technologies including cold storage, thermal processing, chemical spray, chemical coating and gamma irradiation are used to delay banana fruit ripening, yet serious post-harvest losses still occur (Bapat et al., 2010; Kuan et al., 2015). Thus, a better understanding the molecular controls of banana fruit ripening will help develop more