Characterization and function of banana *DORN1*s during fruit ripening and cold storage

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Abstract

DORN1 as the first plant receptor gene for extracellular ATP (eATP) regulates a series of biological activities, but the biological roles of eATP and *DORN1* remain unclear in postharvest fruit. In this study, a total of 34 *DORN1*s termed as *MaDORN1*s were identified from banana genome and can be classified into five groups according to the analyses of phylogenetic tree, gene structure and conserved domain. The *cis*-element and microRNA targeting analyses also revealed that *MaDORN1*s might regulate ripening process and cold stress response. Using the molecular docking, the ten highly expressed MaDORN1 proteins exhibited high binding affinities with ATP, indicating the key interaction sites between MaDORN1 proteins and ATP. It was noted particularly that the pretreatment with 1 mM ATP for 5 min significantly promoted fruit ripening and enhanced cold tolerance of postharvest banana during storage. The eATP treatment induced rapidly the early expressions of most *MaDORN1*s in association with accelerated ripening at ambient temperature while inhibited the initial expressions in relation to reduced chilling injury of banana fruit at low temperature, suggesting their early responses in fruit ripening and low temperature storage. This study provides important insights into the roles of eATP and its receptor *DORN1* of banana fruit during ripening and in response to low temperature.