

# Elucidating the mechanism of *MaGWD1*-mediated starch degradation cooperatively regulated by *MaMADS36* and *MaMADS55* in banana

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## Abstract

Banana (*Musa acuminata*) is a common starch-conversion fruit. Starch is rapidly degraded and converted to soluble sugars during postharvest banana fruit ripening. The conversion efficiency directly influences fruit firmness, sweetness, and shelf life. Glucan, water dikinase (GWD) is the first rate-limiting enzyme of starch metabolism. *Musa acuminata* glucan water dikinase 1 (*MaGWD1*) plays an important role in banana starch metabolism and its expression is regulated by transcription factors (TFs). However, the regulation of *MaGWD1* by MADS-box TFs remains unclear. In this study, the molecular mechanism underlying the cooperative regulation of *MaGWD1*-mediated starch degradation by *MaMADS36* and *MaMADS55* was investigated. The results indicated that *MaMADS36* interacts with *MaMADS55*. Both *MaMADS36* and *MaMADS55* could directly bind to the same position on the CAVT(r)G box within the *MaGWD1* promoter. *MaMADS36* and *MaMADS55* cooperatively regulate banana fruit starch degradation via transcriptional control of *MaGWD1*. These findings improve our understanding of how TFs regulate starch degradation; this information may be used for banana fruit quality improvement and to support the development of the banana industry.