# Transient virus-induced gene silencing of *MaBAM9b* efficiently suppressed starch degradation during postharvest banana fruit ripening

**Mengting Liu, Meng Li, Yudi Wang, Jingyi Wang, Hongxia Miao, Zhuo Wang, Biyu Xu, Xinguo Li, Zhiqiang Jin and Juhua Liu**

Plant Biotechnology Reports 15: 527–536. 2021.

## Abstract

The genetic basis of metabolic pathways that operate during fruit ripening needs to be understood before the nutritional value of the banana can be improved. The banana is a typical starch conversion fruit, and β-amylase is a key enzyme that may play an important role in starch degradation during the ripening process. *Musa acuminata β-amylase 9b* (*MaBAM9b*) is closely related to starch degradation. However, its exact function in starch degradation has not been demonstrated in banana. Stable genetic transformation to identify gene function is a time- and energy-consuming process. Thus, an efficient and rapid method is needed for functional identification. Virus-induced gene silencing (VIGS) is a reverse-genetics method based on RNA-mediated antiviral plant defense that has been used to rapidly identify gene functions in plants. The aim of this study was to optimize a transient VIGS system and functionally elucidate *MaBAM9b* in postharvest banana fruit. Using 2- to 4-mm-thick fruit slices, vacuum infiltration of suspensions of *Agrobacterium* strains carrying TRV1 and TRV2-*MaBAM9b*, 0.5% iodine-potassium-iodide ($I_2$-KI) staining for 150 s, and 1:3 TRV1:TRV2-*MaBAM9b* cultivation at 30 mmHg for 30 s achieved an optical density (OD) of 0.8 at 600 nm; after being incubated on Murashige and Skoog (MS) media for 5 days (d), starch degradation was efficiently suppressed during postharvest banana fruit ripening, as determined by $I_2$-KI staining, total starch content, β-amylase activity, soluble sugar content, and endogenous *MaBAM9b* expression. The system described here is particularly useful for studying genes and networks involved in starch conversion in fruits, which alone would not produce a visual phenotype. This system will provide a platform for functional genomics and fruit quality improvement in banana.