Agrobacterium-mediated transformation of pMDC140 plasmid containing the wheatwin2 gene into the Tadong rice genome

ABSTRACT

Blast disease resulting from Magnaporthe oryzae fungal infection reduces annual rice yield by up to 30% globally. The wheatwin2 (wwin2) is a pathogenesis-related (PR) gene that encodes for a PR-4 protein with chitinase properties that is capable of degrading chitin, a major constituent of certain fungal cell walls. However, the potential for wwin2 to contribute to M. oryzae resistance in rice is unclear. This study reports the construction of a pMDC140 vector carrying the wwin2 gene and its Agrobacterium-mediated transformation into the Tadong rice genome. In brief, the wwin2 gene was synthesized and integrated into a pMDC140 vector using Gateway cloning technology and was transformed into the Tadong rice genome. Our results show a promising high transformation rate, with more than 90% of the transformed rice calli expressing β-glucuronidase (GUS), the reporter gene marker. The expression of the wwin2 gene in transformed rice calli was further confirmed using quantitative real-time polymerase chain reaction. In conclusion, a pMDC140-wwin2 vector was constructed, which had a high transformation rate and could consistently induce expression of the GUS and wwin2 genes in Tadong rice. Data of this study is beneficial for subsequent in vitro and M. oryzae-infected field experiments to confirm the defense mechanism of the wwin2 gene towards blast disease in rice.