

Transgenic Rice Plants Expressing a Novel Antifreeze Glycopeptide Possess Resistance to Cold and Disease

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Freezing injury and disease are both restrictive factors in crop production. In order to improve the tolerance ability to these stresses, a better way is to carry out genetic engineering by transferring dualfunctional genes. A predicted rice antifreeze glycopeptide gene was purposefully selected from rice blast-induced cDNA library. Northern blot demonstrated that the gene is expressed not only in blast-infected rice leaves, but also in low temperature-treated rice. In addition, the expressed protein in *Escherichia coli* exhibits strong antifreeze activities. The gene was overexpressed in rice plants transformed via *Agrobacterium tumefaciens* EHA105. Overall 112 T0 transformants were obtained in this research. Cold tolerance and disease resistance of T1 transformants were, respectively, investigated. The results showed that plants containing overexpressed transgene can withstand -1°C for 24 h without severe chilling injury after thawed, and that disease symptoms of the parallel transformants are highly reduced in response to blast infection, when compared with controls. The relationship of the gene and several pathogenesis-related protein genes to be chosen was analyzed and discussed. All these results confirmed the dual role of the cloned gene, and implied that genetic engineering using this kind of gene is a promising method to reduce biotic and abiotic stresses.

Key words: Antifreeze Glycopeptides, Cold Tolerance, Disease Resistance