



Molecular cloning, functional verification, and evolution of *TmPm3*, the powdery mildew resistance gene of *Triticum monococcum* L.

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ABSTRACT. Powdery mildew (Pm) is one of the most harmful diseases in wheat. Three *Pm*-resistance genes, *Pm3*, *Pm21*, and *Pm8*, have been cloned but most *Pm3/Pm8* alleles have lost their resistance to Pm in hexaploid wheat. In this study, a new *Pm3* homolog gene (*TmPm3*) was isolated from *Triticum monococcum* L. using a homology-based cloning strategy, being the first report of a functional *Pm3* homolog gene from a diploid wheat species. The transient expression of *TmPm3* in leaf epidermal cells showed that over-expressed *TmPm3* could significantly inhibit the penetration of *Blumeria graminis* f. sp. *tritici*

conidia spores and the formation of haustoria. Sequence analysis of *Pm3* alleles shed new light on the evolution of *Pm3* genes, providing a better understanding of the molecular basis of disease resistance. This study also suggested that homology-based cloning of resistance genes is a feasible method for the isolation of functional resistance genes from wheat germplasm.

Key words: Plant resistance breeding; *Pm3*; Powdery mildew; Resistance gene; *Triticum monococcum*; Wheat