

Cite this as: Wenbo PAN, Zhentao CHENG, Zhiguo HAN, Hong YANG, Wanggen ZHANG, Huawei ZHANG. Efficient genetic transformation and CRISPR/Cas9-mediated genome editing of watermelon assisted by genes encoding developmental regulators[J]. Journal of Zhejiang University Science B, 2022, 23(4): 339-344.
<https://doi.org/10.1631/jzus.B2200119>

Efficient genetic transformation and CRISPR/Cas9-mediated genome editing of watermelon assisted by genes encoding developmental regulators

Key words: Genetic transformation; developmental regulator; GRF5; watermelon; Cucurbitaceae; genome editing

Introduction

This Correspondence mainly focused on the establishment of efficient transformation and CRISPR/Cas9 genome editing systems in watermelon

- Watermelon is economically important fruit crop
- Efficient transformation is the bottleneck for watermelon studies (usually ~1%)
- The CRISPR/Cas9 genome editing system is a promising tool for watermelon



Innovation points

- ✓ ***AtGRF5* gives the highest transformation efficiency (24.73%) among the developmental regulators we tested.**

Vector	DR gene(s)	Efficiency (%)
pW501	-	0.69
pW502	<i>AtGRF5</i>	24.73
pW503	<i>TaGRF4-OsGIF1</i>	13.78
pW504	<i>ZmWUS</i>	1.75
pW505	<i>ZmWUS</i> + <i>ZmBBM</i>	22.1
pW506	<i>ZmWUS</i> + <i>ipt</i>	0

<i>Agrobacterium</i> strain	Number of explants	Positive transformants	Efficiency (%)
GV3101	126	36	28.12
EHA105	116	8	6.9
LBA4404	76	0	0

- ✓ **GV3101 is the most appropriate *Agrobacterium* stain to deliver *AtGRF5***

Innovation points

- ✓ **AtGRF5 facilitated efficient genome editing of watermelon gene *CIPDS*.**
- ✓ **Homozygous mutants were obtained in the T0 generation.**

Target	Positive lines	Mutant plant		Mutation efficiency
		T1	T2	
<i>CIPDS</i>	11	1 Homo (D1)	2 Biallic (D2D5, D2D1); 1Hetro (D1)	3/11 (27.30%)

