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Iron Accumulation in Transgenic Rice Endosperm with Ferritin Chimeric Genes by *Agrobacterium*-mediated Transformation

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Objectives

To improve iron content of rice grains, we have introduced the soybean and rice ferritin genes with the grain specific promoters derived from globulin, zein, glutelin genes by *Agrobacterium*-mediated transformation.

Materials and Methods

1. Materials

- Rice variety : Hwashinbyeo, Donganbyeo, Daeripbyeo I , - Vector : pMJ21(MAR)
- Promoter : Globulin, Zein, Glutelin

2. Methods

- Ferritin vector construction with three grain specific promoters
- *Agrobacterium*-mediated transformation

Results and Discussion

The recombinant DNAs using soybean and rice ferritin genes

have constructed with the promoters derived from seed proteins, globulin, glutelin, and zein, to be transformed into rice plant. The recombinant ferritin genes were transformed into rice plant by *Agrobacterium*-mediated transformation.

The introduction of ferritin gene in putative transgenic rice plants were confirmed by PCR and Southern blot analysis. Northern blot showed that transcripts of ferritin gene were detected in the various tissues of transgenic rice plants. Also, the ferritin proteins obtained from leaves of transgenic plants were immunologically detected by Western blot analysis using rabbit antiferritin polyclonal antibody. The iron accumulation of transgenic rice grain in the T1 generation were ranged from 55.5 mg to 171.4 mg, which showed the increments of 2 to 6 times higher than that of wild type rice. The transgenic rice plant, T1-2, with zein promoter and ferritin gene contained 171.4 ppm showing 6.4 times higher than 26.7 ppm of Hwashinbyeo seed as wild type rice. However, rest of the transgenic plants had a bit higher iron contents with a range from 2.1 to 3.0 times higher than that of wild type seed.

Table 1. Iron contents and ratios of rice grains of transgenic plants at T1 generation.

Plant type	Line	Recombinant gene	Iron content (ppm)	Ratio (times)
Wild type	Donganbyeo	-	22.1 ± 2.4	1.0
	Hwashinbyeo	-	26.7 ± 0.8	1.0
Transformant	T1-2(H)*	pZ4F-S12	171.4 ± 6.9	6.4
	T1-11(H)	pGBF-R4	55.5 ± 0.6	2.1
	T1-36(D)	pGTF-S12	58.2 ± 4.6	2.6
	T1-39(D)	pGBF-S12	62.6 ± 4.3	2.8
	T1-43-1(D)	pGTF-S12	66.7 ± 2.4	3.0
	T1-43-5(D)	pGTF-S12	65.5 ± 4.0	3.0
	T1-45(D)	pZ4F-S12	60.9 ± 0.9	2.8

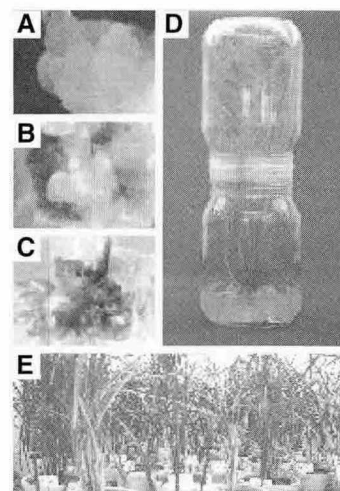


Figure 1. Transgenic rice plants

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