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Functional properties of an alternative, tissue-specific promoter for rice NADPH-dependent dihydroflavonol reductase

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[Introduction]

A deletion analysis of the Oryza sativa dihydroflavonol reductase (DFR) promoter defined a 25 bp region (-386 to -362) sufficient to confer pericarp-specific expression of a β-glucuronidase (GUS) reporter gene in transgenic rice. Site-specific mutagenesis of these conserved sequences and subsequent expression analysis in calli which transiently expressed the mutated promoter::GUS gene showed that both bHLH (-386 to -381) and Myb (-368 to -362) binding sites in the DEL3 (-440 to 70) promoter were necessary for complete expression of the GUS gene including the tissue-specific expression of DFR::GUS gene. The GUS gene was expressed well in the mutated Myb (-368 to -362) binding site, but not as strong as in normal condition, implying that the Myb is also necessary to express GUS gene fully. Also, we found the non-epistatic relation between Rc and DFR. There were no changes of expression patterns GUS under the Rc and rc genotypes. Thus, DFR expression might be independent of the presence of functional Rc gene and suggested that Rc and Rd (DFR) share the same pathway controlling the regulation of flavonoid synthesis but not a direct positive transcriptional regulator of DFR gene.

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