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The intergenic region of the maize defensin-like protein genes Def1 and Def2 functions as an embryo-specific asymmetric bidirectional promoter

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Bidirectional promoters are identified in diverse organisms with widely varied genome sizes, including bacteria, yeast, mammals, and plants. However, little research has been done on any individual endogenous bidirectional promoter from plants. Here, we describe a promoter positioned in the intergenic region of two defensin-like protein genes, Def1 and Def2 in maize (Zea mays). We examined the expression profiles of Def1 and Def2 in 14 maize tissues by qRT-PCR, and the results showed that this gene pair was expressed abundantly and specifically in seeds. When fused to either green fluorescent protein (GFP) or β-glucuronidase (GUS) reporter genes, P ZmBD1 , P ZmDef1 , and P ZmDef2 were active and reproduced the expression patterns of both Def1 and Def2 genes in transformed immature maize embryos, as well as in developing seeds of transgenic maize. Comparative analysis revealed that PZmBD1 shared most of the expression characteristics of the two polar promoters, but displayed more stringent embryo specificity, delayed expression initiation, and asymmetric promoter activity. Moreover, a truncated promoter study revealed that the core promoters only exhibit basic bidirectional activity, while interacting with necessary cis-elements, which leads to polarity and different strengths. The sophisticated interaction or counteraction between the core promoter and cis-elements may potentially regulate bidirectional promoters.

Biography

Liu xiaoqing got the PostDoc position in the BRI, CAAS, in 2014. Research field is focus on the plant biotechnology. He try to explore a multiple expression system which use tissue specific bidirectional promoter and 2A piptide as key factors. This system could expressing 10 structure genes, at least, in one stable transformation that could apply for plant biotechnology and study and reconstruct of complex motablic pathways.

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