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Transgene expression of 2A-mediated polyproteins consisting of cell wall degrading enzymes in plant cell

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Low-cost supply of various plant cell wall degrading enzymes and efficient bioconversion of lignocellulosic materials to fermentable sugars were required for bioethanol production. Plant-based and simultaneous expressions of multiple enzymes were applied to achieve these demands due to advantages of large-scale production and induction of synergistic effects. Expression vectors of 2A-mediated polyprotein consisting of cell wall degrading enzymes (β-glucosidase, BglB; xylanase, XylII; exoglucanase, E3; endoglucanase, Cel5A), fused with chloroplast targeting transit peptides, were constructed. The enzymes expressed were targeted to chloroplasts in tobacco cells and their activities were confirmed. Cel5A of the [RsXylII-2A-RaCel5A] transgenic tobacco plant was expressed higher than that of Cel5A placed at the same position in the [RsBglB-2A-RaCel5A] and [RsE3-2A-RaCel5A] transgenic lines. This result indicated that XylII is favorable to expression of the enzymes placed at backward position of 2A sequence. The [RsBglB-2A-RaCel5A] lines exhibited greater efficiency (35–74 % increase) of CMC hydrolysis when the exoglucanase CBHII was exogenously added. According to supplementing tests with various recombinant exoglucanases expressed in *E. coli* or yeast, E3 showed higher activity with the crude extract of the [RsBglB-2A-RaCel5A] transgenic line. In this study, transgenic expression of 2A-mediated multiple enzymes have proven to induce synergistic effects and lead to more efficient hydrolysis of lignocellulose.

Biography

Dae-Seok Lee has completed his PhD at the age of 36 years from Chonnam National University. He has published 11 papers in reputed journals. He is currently working for Bioenergy Research Center in the same University as postdoctoral.

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