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Rice BRITTLE CULM 6 gene is required for cellulose synthesis in secondary cell walls

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Cell wall polysaccharide are synthesized by actions of glycosyltransferases including cellulose synthases in plants. Brittle culm 6 (Bc6) is a semi-dominant rice mutant with easily breakable plant bodies, and expected to have defects in the formation of secondary cell walls. In this study, Bc6 gene was isolated, and appeared to encode a cellulose synthase catalytic subunit, OsCesA9. Bc6 mutation reduced the cellulose content by 31%, while it increases the hemicellulose content by 48%. Introduction of the mutant Bc6 gene into wild-type rice significantly reduced cellulose content, causing brittle phenotypes. Expression of BC6 gene was observed in the culms, nodes, and flowers, and related to that of BC1, which encodes a COBRA-like protein involved in cellulose synthesis in secondary cell walls in rice. We might regulate the cellulose synthesis using BC1 and BC6 genes.

Keywords: cell wall, rice, cellulose, polysaccharide