

Category	: 8th Rice Genetics Symposium
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Title of Entry	: Enhancement of saccharification yields from rice straws by senescence-inducible expression of cellulase
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Abstract : Cellulose, a main component of plant cell wall, is an indispensable and valuable material for biorefinery that produces biofuels and biochemicals, since it is the most abundant biomass. However, plant cell wall is physically strong and biochemically stable, and these characteristics lead to difficulty of efficient saccharification of cellulosic biomass for production of fermentable glucose and other sugars. To enhance saccharification yields from rice straw, cellulase was expressed in rice. We assumed that the expression of cellulase will bring about nicking of cell wall, and such cell wall will be an efficient material for enzymatic saccharification. When exo-glucanase (cellobiohydase) was constitutively overexpressed, the transgenic rice plants showed enhanced saccharification yields from their straws. Unfavourably, however, the transgenic rice plants also showed sterility. To overcome this problem, we replaced the constitutive promoter used for the expression of exo-glucanase with a senescence-inducible promoter that will be activated after panicle development. The transgenic rice plants showed enhanced saccharification yields, and also set seeds. This indicates that senescence-specific expression of cellulase is one of the ways to enhance saccharification yields from cellulosic biomass. Senescence-inducible expression of endo-glucanase and "hybrid cellulase (fusions of exo- and endo-glucanase)" is underway, and some results will be also presented.

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