

PB-92

Selection of Low Lignin-high Biomass Whole Crop Silage Rice Elite Line for the Improvements of Forage Digestibility and Fermentation

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[Abstract]

Lignin modification has been a breeding target for the improvements of forage digestibility and fermentation in whole crop silage(WCS) rice. In rice, gold hull and internode 2 (*gh2*) was identified as a lignin-deficient mutant. *gh2* exhibits a reddish-brown pigmentation in the hull and the internode is located on the short arm of chromosome 2 and codes for cinnamyl-alcohol dehydrogenase (CAD). To develop WCS rice variety improved digestibility and fermentation, we measured acid detergent fiber (ADF), lignin and total digestible nutrient (TDN) calculated from ADF (TDN=88.9-(0.79% × ADF) and performed marker-assisted selection using CAD(Os2g0187800) gene first intron region specific marker with 55 Jungmo1038/J.collection lines. Those lines had lignin content range from 0.82 to 6.61%, ADF from 15.8 to 45.8%, TDN from 52.7 to 78.8 compared to ‘Jungmo1038’(1.53, 20.7, 72.6), ‘J.collection’(0.98, 12.8, 78.8%) and *gh2* were introgressed into 44 lines. Considering on these genotype and low-lignin phenotype, we finally selected 2 elite lines(Suweon668, Suweon669). Suweon668 and Suweon669 line are high biomass-low lignin lines that the ADF content is relatively low, even though the dry matter weight is high. Also they have lodging and shattering resistance and glabrous leaf and hull important to improve cattle palatability. Our results will provide that rice can be improved for forage digestibility and fermentation with low lignin concentration.

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