

PB-10

Marker-assisted Selection to Develop Low Lignin-whole Crop Silage Rice for the Improvements of Forage DigestibilityEok-Keun Ahn^{1*}, Kyung-Ho Kang¹, Hyang-Mi Park¹, Kuk-Hyun Jung¹, Woong-Jo Hyun¹, Yoon-Sung Lee¹¹National Institute of Crop Science, RDA, Suwon 16429, Republic of Korea**[Introduction]**

When developing new rice varieties for feed, the main goals are to enhance biomass production and lodging resistance as well as to improve feed digestibility. And so 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). We are now introgressing CAD and selecting a high-biomass and low-lignin WCS lines for developing WCS rice variety improved digestibility.

[Materials and Methods]

The 55 Jungmo1038/J.collection lines (F₆) including parental cultivar were grown and harvested 5-internode at 20 days after heading. We measured acid detergent fiber (ADF), lignin and total digestible nutrient (TDN) calculated from ADF (TDN=88.9-(0.79% × ADF). Also, we developed gene specific marker using J.collection cultivar CAD(Os2g0187800) gene first intron region and applied it to the 55 promising lignin-deficient lines.

[Results and Discussion]

To identify lines harboring mutated CAD gene(*gh2*), we performed marker-assisted selection. As results, among total 55 Jungmo1038/J.collection lines(F₆) including parental cultivar, *gh2* were introgressed into 44 lines. Also, 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% and 5-internode dry matter weight from 0.123 to 0.723g compared to ‘Jungmo1038’(1.53, 20.7, 72.6%, 0.357g), ‘J.collection’(0.98, 12.8, 78.8%, 0.724g), ‘Yeongwoo’(2.22, 31.8, 63.8%, 0.107g), ‘Gowoo’(3.35, 26.5, 68.0%, 0.382g), ‘Mogyang’(2.92, 28.7, 66.3%, 0.163g) and ‘Mogwoo’(2.60, 26.1, 68.3%, 0.263g). Based on genotype and low-lignin phenotype, we finally selected 19 promising high biomass-low lignin elite lines that the ADF content is relatively low, even though the dry matter weight is high. These studies will provide new strategies for improving forage digestibility and fermentation in whole crop silage(WCS) rice.

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