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Selection of Super High Yield Elite lines Carrying SPIKE(Nal), Ghd7, GW8 Using Marker-assisted Selection in Tong-il type Rice

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[Introduction]

Rice is one of the major staple foods in the world, especially in the developing countries of Asia. To meet the demand for rice to feed the increasing human population, increasing rice yield is essential. Improving the genetic yield potential of rice is one ideal solution. It is imperative to introduce the identified yield-enhancing gene(s) into modern rice cultivars for the rapid improvement of yield potential through marker-assisted breeding.. So, this study was developed super high yield elite lines by the advanced backcross and MAS in rice breeding programs.

[Materials and Methods]

We used Hanareum2/Unkwang BC_2R_8 NILs 686 population to select elite line carrying SPIKE(NAL1), Ghd7, GW8 (OsSPL16) of improving yield gene. The SPIKE(NAL1) gene encoding an unknown function protein regulates grain number per panicle. Either transcription level or three amino acids changes on NAL1 protein are associated with phenotype. The Ghd7 encoding a CCT domain protein is involved in the regulation of heading date, plant height, and grain number per panicle. The GW8(OsSPL16), encoding SQUAMOSA promoter binding protein-like (SPL)16, controls grain width, and higher expression in young panicle promotes grain width. We detected yield genotype of 686 NIL population by using MAS. So, We selected 141 NIL population carrying these gene observed phenotype in the field. And We measured by three replication grain width, length and grain number per panicle of 141 population.

[Results and Discussions]

We selected 12 elite lines of the widest grain and the most numerous grain number per panicle in 141 population. The grain number per panicle of SPIKE(NAL1)-NIL and Ghd7-NIL are 138 and 126, it's very numerous compared to that of not carrying these gene lines is 79. The grain width of GW8-NIL is 2.99mm, it's also pretty width compared to that of not carrying GW8 gene lines. We analyzed Single-locus ANOVA, F Value is 43.71^{**}(SPIKE), 11.24^{**}(Ghd7), 40.36^{**}(GW8). This is recognized that single marker of identified gene is related to phenotype. This results support that this elite line will be useful information for developing varieties overcoming maximum yield limit of super yield Tong-il type rice harvested 800kg/10a in official yield recode.

[Acknowledgements]

This work was carried out with the support of "Cooperative Research Program for Agriculture Science and Technology Development (Project title: Development of elite lines through QTL mapping of yield and cold tolerant in Tongil-type rice, Project No. PJ010999)'', Rural Development Administration, Republic of Korea.

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