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Improvement of Abiotic Stress Resilience for Stable Rice Production

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[Abstract]

Recently, stable crop production is threatened by the effects of climate change. In particular, it is difficult to consistently maintain agricultural policies due to large price fluctuations depending on the difference in total domestic rice production from year to year. For stable rice production amid changes in the crop growing environment, development of varieties with improved disease resistance and abiotic stress stability is becoming more important. In here, drought and cold tolerant trait have been studied. First, for the development of drought tolerant varieties, we analyzed which agricultural traits are mainly affected by domestic drought conditions. As a result, it was observed that drought caused by the lack of water during transplanting season inhibits the development of the number of tiller and reduces the yield. 'Samgang' was selected as a useful genetic resource with strong drought tolerant and stable tiller number development even under drought conditions by phenotype screening. Three of drought tolerant QTLs were identified using doubled haploid (DH) population derived from a cross between Nacdong and Samgang, a drought sensitive and a tolerant, respectively. Among these QTLs, when *qVDT2* and *qVDT11* were integrated, it was investigated that the tiller number development was relatively stable in the rainfed paddy field conditions.

It is known that the high-yielding Tongil-type cultivars are severely affected by cold stress throughout the entire growth stage. In this study, we established conditions that can test the cold tolerance phenotype with alternate temperature to treat low temperatures in indoor growth conditions similar to those in field conditions at seedling stage. Three cold tolerant QTLs were explored using population derived from a cross between Hanareum2 (cold sensitive variety, Tongil-type) and Unkwang (cold tolerant variety, Japonica). Among these QTLs, *qSCT12* showed strong cold tolerant phenotype. and when all of three QTLs were integrated, it was investigated that cold tolerant score was relatively similar to its donor parent, Unkwang, in our experimental conditions. We are performing that development of new variety with improved cold tolerant through the introduction of these QTLs.

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