

PB-98

Molecular Identification and Fine Mapping of a Major Quantitative Trait Locus, *OsGPq3* for Seed Low-Temperature Germinability in Rice

Nari Kim¹, Rahmatullah Jan^{1,2}, Jae-Ryoung Park^{2,3}, Saleem Asif¹, Kyung-Min Kim^{1,2*}

¹Department of Applied Biosciences, Kyungpook National University, Daegu, 41566, Korea

²Coastal Agriculture Research Institute, Kyungpook National University, Daegu 41566, Republic of Korea

³Crop Breeding Division, National Institute of Crop Science, Rural Development Administration, Wanju, 55365, Republic of Korea

[Abstract]

Abiotic stresses such as high/low temperature, drought, salinity, and submergence directly or indirectly influence the physiological status and molecular mechanisms of rice which badly affect yield. Especially, the low temperature causes harmful influences in the overall process of rice growth such as uneven germination and the establishment of seedlings, which has become one of the main limiting factors affecting rice production in the world. It is of great significance to find the candidate genes controlling low-temperature tolerance during seed germination and study their functions for breeding new rice cultivars with immense low-temperature tolerance during seed germination. In this study, 120 lines of Cheongcheong/Nagdong double haploid population were used for quantitative trait locus analysis of low-temperature germinability. The results showed significant difference in germination under low different temperature conditions. In total, 4 QTLs were detected on chromosome 3, 6, and 8. A total of 41 genes were identified from all the 4 QTLs, among them, 25 genes were selected by gene function annotation and further screened through quantitative real time polymerase chain reaction. Based on gene function annotation and level of expression under low-temperature, our study suggested *OsGPq3* gene as a candidate gene controlling viviparous germination, ABA and GA signaling under low-temperature. This study will provide a theoretical basis for marker-assisted breeding.

[Acknowledgement]

This work was supported from agency of LMO environmental risk assessment (PJ015787022022), Rural Development Administration, Republic of Korea.

*Corresponding author: E-mail, kkm@knu.ac.kr Tel. +82-53-950-5711