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QTL Analysis of Seed Germination under Different Temperature Conditions in Rice using CNDH Population

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[Introduction]

Seed germinability under different temperature conditions is significant to the growth and development of rice as well as direct seeding. In this research, the CNDH population derived from anther culture of Cheongcheong/Nagdong was used. The different temperatures which were 20 °C and 15 °C was considered low temperatures. Through the QTL analysis, the final goal of this study was to identify the genes related to germination under the different temperatures. Therefore, in this research, germination related genes under the different temperature conditions were screened through QTL mapping.

[Materials and Methods]

In this study, total 120 Cheongcheong/Nagdong double haploid (CNDH) population were used to analyze germination. To calculate the germination percentage (GP), the 30 seeds of each CNDH population (three replicates per line) were counted every day for 12 days at different temperatures which were 15 °C and 20 °C, respectively. When the radicle length reached approximately 2 mm, the seeds were considered germinated.

[Results and Discussion]

According to the daily variation for 12 days of GP, Nagdong was germinated more rapidly and indicated higher GP than Cheongcheong among the parental lines under both temperature conditions. In the CNDH population, CNDH71, CNDH77, and CNDH85 is the highest GP lines whereas CNDH30, CNDH31, CNDH50 is the lowest GP. As a result of QTL mapping related to GP, total 4 QTLs were identified in chromosomes 3, 6, and 8 for two years. Among them, twenty-five germination related genes mapped in RM7197-RM15063 on chromosome 3. Finally, *OsGPq3* gene which is related to endosperm development was selected as a target gene. *OsGPq3* can be used as basic data in further studies associated with seed germination.

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