

## **Plant development of new ecological model related to yield with QTL analysis**

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### **[Introduction]**

We used Cheongcheong/Nagdong doubled haploid (CNDH) genetic map to develop early flowering furthermore heavy panicle variety. Conspicuous three lines were selected among 120 CNDH population by QTL analysis two years of data on CNDH heading date and panicle weight. The casein kinase I (PCKP) gene, which is related to early heading gene, was found by physical gene mapping and map-based cloning. PCKP is involved in the control of rice flowering time by modulating the day-length response. PCKP acts as an inhibitor in the rice flowering pathway by enhancing the photoperiod response. In northern part, rice is harvested on October, however rice yield is reduce due to the frequent typhoon during September. However, if the rice varieties developed in this study are used, they can be harvested with high yield before environmental disaster, which will be efficient for safely cope with food.

### **[Materials and Methods]**

The Cheongcheong/Nagdong Doubled Haploid (CNDH) population used for constructing genetic map were developed by anther culture of the F1 derived from a cross between Cheongcheong and Nagdong. Cheongcheong is a Tongil type rice variety that has resistance to brown planthopper with high yield and a complete abscission layer originated from *Oryza nivara*, while Nagdong leading variety in the regional area with a partial abscission layer on the pedicel tissues has been planted for over 20 years. The CNDH population was cultivated on paddy field in three years after developed in 2010 first. The current study has been carried out on the experimental fields of Kyungpook National University at Gunwie in Korea.

### **[Results and Discussions]**

We conducted growth surveys in the CNDH population. The results of the heading date showed that in CNDH, 9 lines were early rice, 46 lines were mid-season rice, and 74 lines were late rice. The frequency distribution for growth survey in CNDH population. And have found the most breeding value is CNDH17, CNDH83. QTL analysis was conducted using heading date data. Two QTLs were identified on chromosome 1, named qHd1-1 and qHd1-2, respectively. 24 of ORF are includes cell function, plant defense, redox signaling and hormone signaling. PCKP was selected and cloned by map-based cloning. The results of the motif search, hydrophobicity survey and phylogenetic tree analysis of the PCKP gene showed that PCKP was most similar to Hd16. Similar protein sequences were analyzed at NCBI and the same amino acids were labeled. Found three motifs. Phylogenetic tree analysis of Similar PCKP proteins from plants and organisms was constructed. Protein structure prediction results show that there are two Helixes, four Sheets, three Turn, two Coils. In the ovary and in the root vegetative, PCKP highest expression product. PCKP, a gene for casein kinase I, is involved in the control of rice flowering time by modulating the day-length response. PCKP acts as an inhibitor in the rice flowering pathway by enhancing the photoperiod response as a result of the phosphorylation of Ghd7.

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