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A *PCKP*, Encoding for Casein Kinase I and Regulates Flowering Time via *Ghd7* Phosphorylation

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[Introduction]
The flowering of plants was triggered by the appropriated photoperiodic response. With respect to genome-edited rice, the genes that the photoperiod response has an influence upon have been identified and their genetic pathways elucidated. The photoperiod pathway of rice promotes flowering in response to a short photoperiod and involves the *Ehd1*, *RFT1*, *Hd3a*, *Hd1*, and *OsPRR95* genes. And suppress flowering in response to a long photoperiod and involves the *OsGI*, *Ghd7*, *Predicted CKI protein* (*PCKP*), *OsPRR37*, *Hd1*, and *OsPRR95*. In this research, *PCKP* genome-edited (*PCKP*-G_1) plants were developed, morphological changes were compared with Ilmi, the mother plant, and the homology of flowering-related genes was analyzed.

[Materials and Methods]
In this research, a CRISPR/Cas9 mediated system was used to generate *PCKP*-G_1 lines. Major agricultural traits (plant height, culm length, panicle length, number of tillers) including the heading date of the *PCKP*-G_1 lines were investigated, and the coefficient of variation (CV) of the traits was investigated. And the sequence homology between *PCKP* and reported flowering-related genes was analyzed.

[Results and Discussion]
The days to heading of *PCKP*-G_1 lines were shorter for 3 days than Ilmi. The plant height, culm length, panicle length, and number of tillers in *PCKP*-G_1 lines were similar to Ilmi, with no phenotypic differences. The CV (%) of plant height, culm length, panicle length, and a number of tillers were 3.7, 4.1, 9.9, and 12.7. PCKP was most similar to Hd16 and the sequence identity was 82.0%. The flowering time of *PCKP*-G_1 lines was faster than Ilmi, but there was no difference in the other agronomic traits. Collectively, these results indicate that *PCKP*-G_1 rice can contribute to obtaining stable yields using a double-cropping system by promoting flowering in long-day conditions.

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