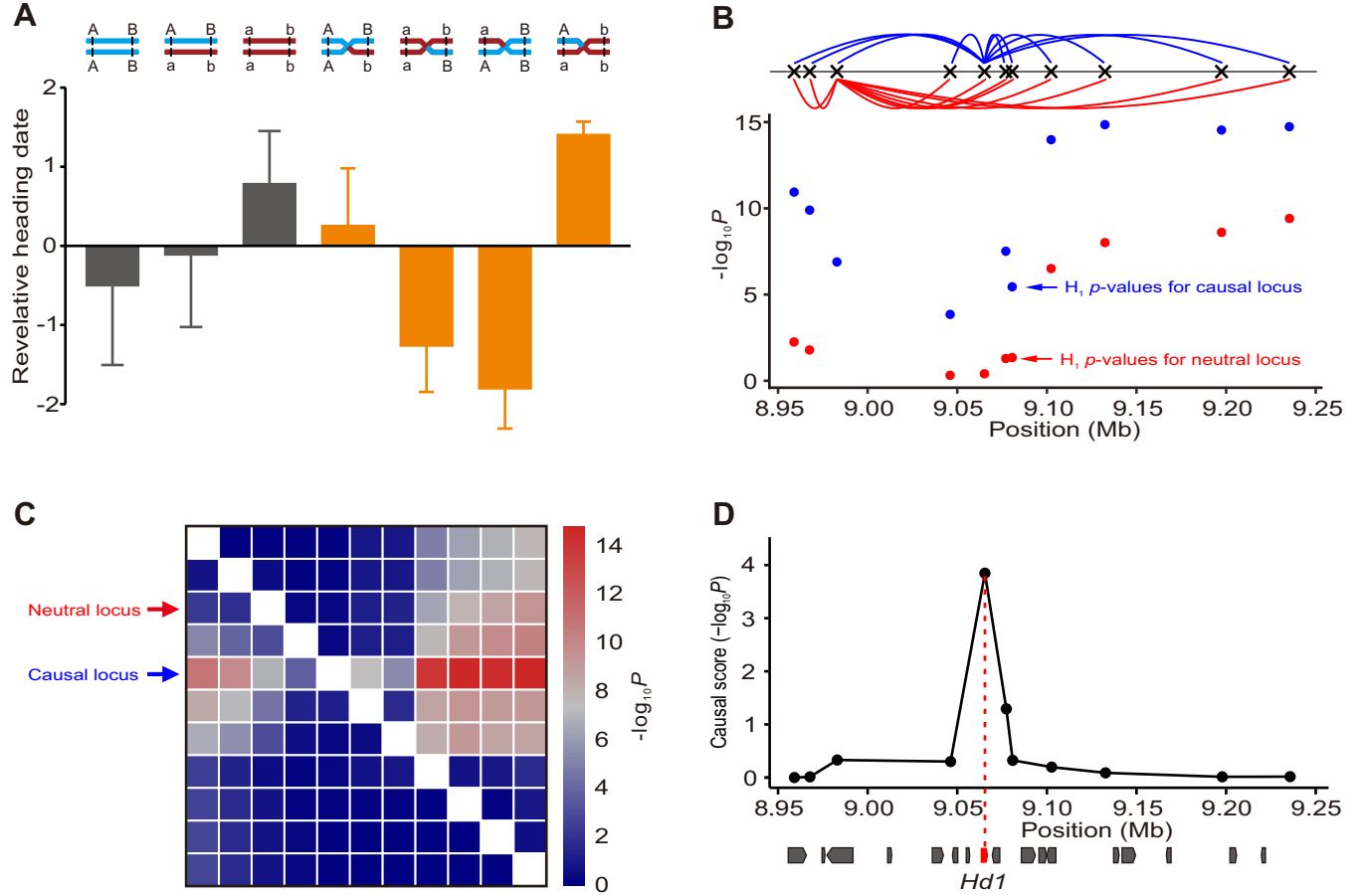

Figure S9 Principle of mapping causal gene for *qHD6-2* for controlling heading date. (A) All seven genotypic combinations between a pair of loci in the candidate gene region. While most of the F_2 individuals have same genotype between two loci (1st, 2nd and 3rd column), a small fraction have recombination between homozygous and heterozygous genotypes (4th, 5th, 6th and 7th column). We evaluated a null hypothesis H_0, that the locus on the left co-segregated with causal gene. The alternative hypothesis H_1, that the locus on the right co-segregated with causal gene, requires swapping the genotype on the left locus should not lead to phenotypic change (such as 6th column deviate from the distribution of 1st column, 7th column deviate from the distribution of 3rd column, 4th or 5th column deviate from 2nd column). The probability of H_1 occurring by chance is determined by using one-way ANOVA analysis followed by Tukey-Kramer multiple comparisons test. Conversely, if the null hypothesis H_0 is that the locus on the right co-segregated with causal gene and the alternative hypothesis H_1 is that the locus on the left co-segregated with causal gene, the H_1 means swapping the genotype on the right locus should be neutral. (B) The alternative hypothesis H_1 *p-values* for causal locus co-segregated with causal gene (row 5 in (C), colored in blue). The alternative hypothesis H_1 *p-values* for neutral locus co-segregated with causal gene (row 3 in (C), colored in red). (C) Heatmap shows *p-values* from pairwise comparisons between all pairs of loci in the candidate gene region. For position (i,j) in the heatmap, the null hypothesis H_0 suggests $locus_i$ co-segregated with causal gene versus the alternative hypothesis H_1 that the $locus_j$ co-segregated with causal gene. Transformed *p-values* for the alternative hypothesis H_1 are displayed. (D) Causal score illustration for a causal gene in the candidate gene region of *qHD6-2*. Previously cloned gene (*Hd1*) controlling the heading date is labeled with red color.