

Figure S1. GWAS for PBN, SBN, and GNPP in *indica* subpanel and *japonica* subpanel. Manhattan plots of GWAS for PBN (A), SBN (C), and GNPP (E) in *indica* subpanel. Manhattan plots of GWAS for PBN (B), SBN (D), and GNPP (F) in *japonica* subpanel. The red boxes indicate three overlapped QTLs.

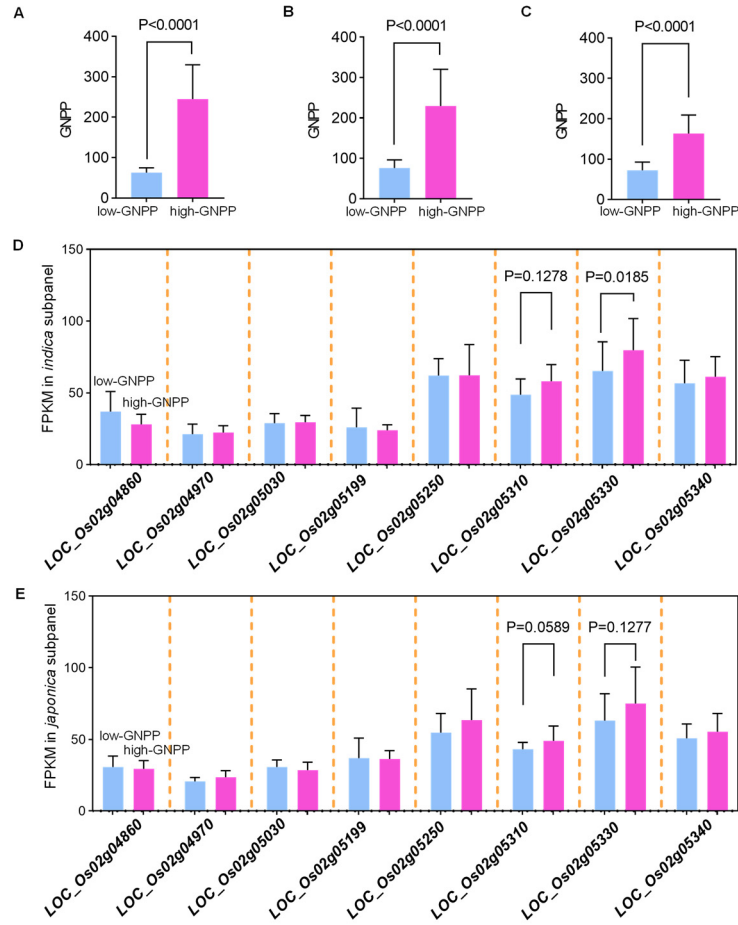


Figure S2. The mean expression levels of eight candidate genes in young panicles of *indica* accessions and *japonica* accessions. (A) Comparison of GNPP between ten high-GNPP and ten low-GNPP accessions from 468 rice accessions. (B) Comparison of GNPP between ten high-GNPP and ten low-GNPP accessions from *indica* subpanel. (C) Comparison of GNPP between ten high-GNPP and ten low-GNPP accessions from *japonica* subpanel. (D) The expression levels of eight candidate genes in young panicles of ten high-GNPP and ten low-GNPP accessions from *indica* subpanel. (E) The expression levels of eight candidate genes in young panicles of ten high-GNPP and ten low-GNPP accessions from *japonica* subpanel. Data represent mean \pm SD (n=10). The p-value is obtained from the T-test.

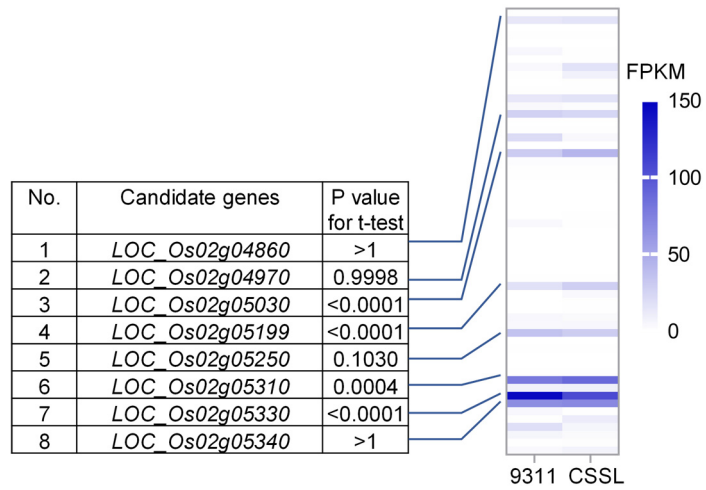


Figure S3. Comparison of the expression levels of 57 genes in *qPSG1* between 9311 and CSSL29. Data represent mean FPKM values from three biological replicates. The p-value is obtained from the T-test.

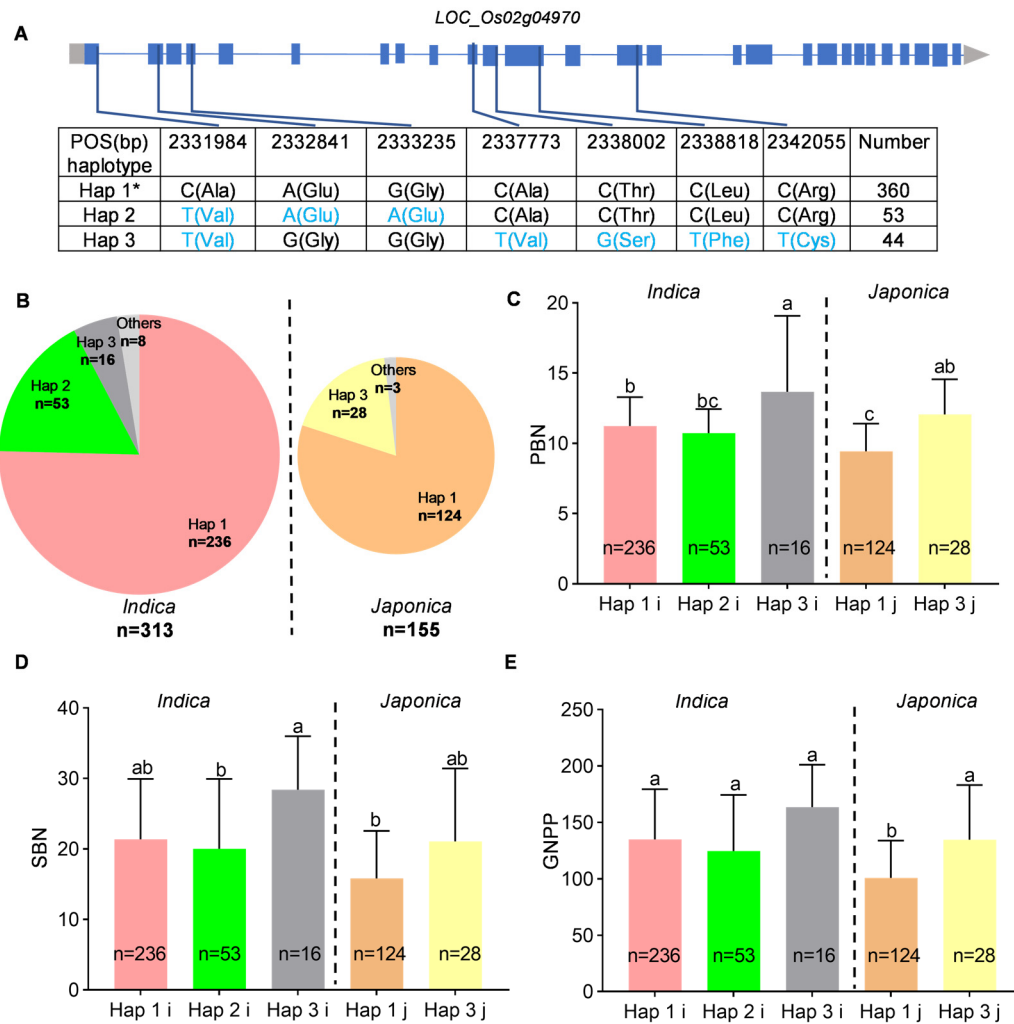


Figure S5. Haplotype analysis of *LOC_Os02g04970*. (A) Schematic representation of *LOC_Os02g04970* structure and the positions of seven nonsynonymous SNPs used for haplotype analysis. SNPs that differ from the reference sequence are marked with blue letters. (B) The haplotype frequency distribution of *LOC_Os02g04970* in two subpanels, *indica* and *japonica*. (C) Comparison of PBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (D) Comparison of SBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (E) Comparison of GNPP among accessions with different haplotypes in two subpanels, *indica* and *japonica*. * indicates the haplotype is the same as NPB. Others in the pie-chart mean the haplotypes with a frequency of less than ten. The i and j behind Hap in (C-E) indicate *indica* accessions and *japonica* accessions with relevant haplotypes, respectively. Different lowercase letters indicate significant differences among accessions with different haplotypes based on Duncan's new multiple-range test ($p < 0.05$).

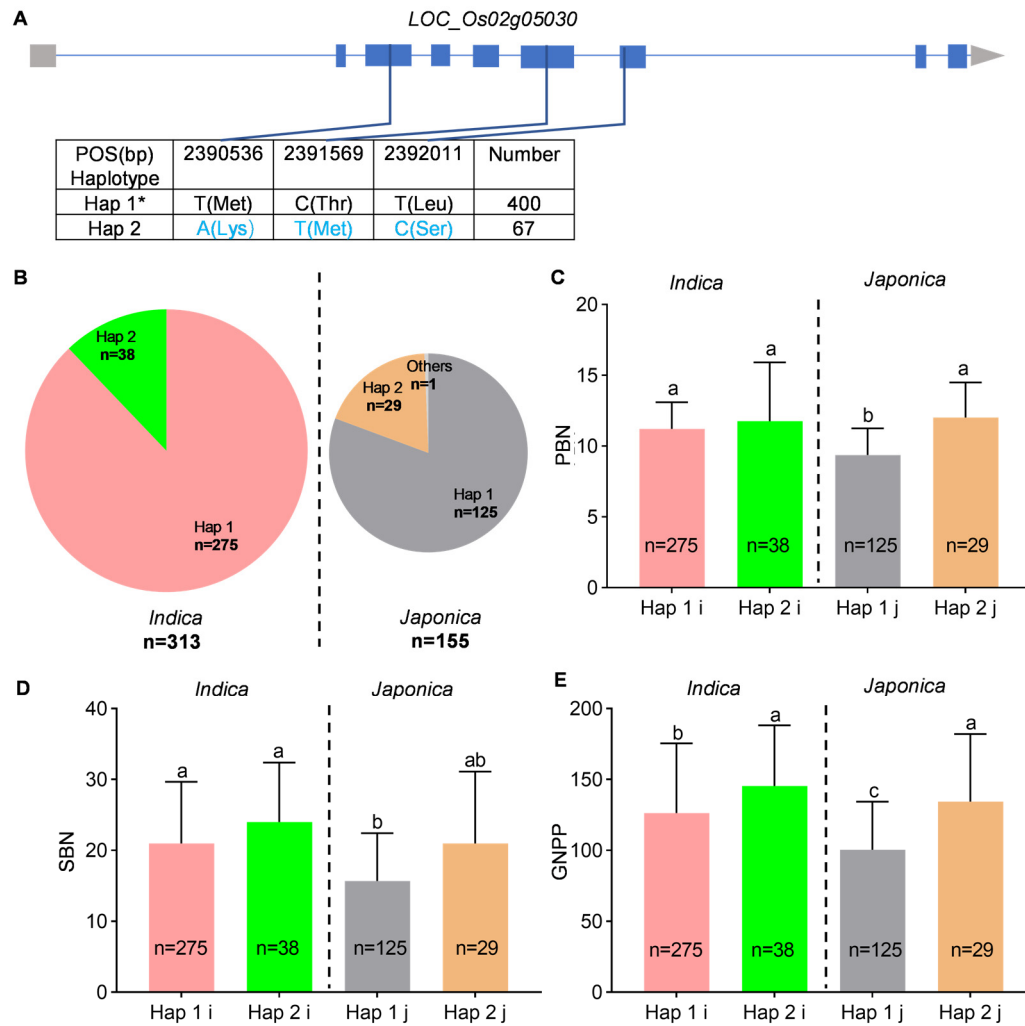


Figure S6. Haplotype analysis of *LOC_Os02g05030*. (A) Schematic representation of *LOC_Os02g05030* structure and the positions of three nonsynonymous SNPs used for haplotype analysis. SNPs that differ from the reference sequence are marked with blue letters. (B) The haplotype frequency distribution of *LOC_Os02g05030* in two subpanels, *indica* and *japonica*. (C) Comparison of PBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (D) Comparison of SBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (E) Comparison of GNPP among accessions with different haplotypes in two subpanels, *indica* and *japonica*. * indicates the haplotype is the same as NPB. Others in the pie-chart mean the haplotypes with a frequency of less than ten. The i and j behind Hap in (C-E) indicate *indica* accessions and *japonica* accessions with relevant haplotypes, respectively. Different lowercase letters indicate significant differences among accessions with different haplotypes based on Duncan's new multiple-range test ($p < 0.05$).

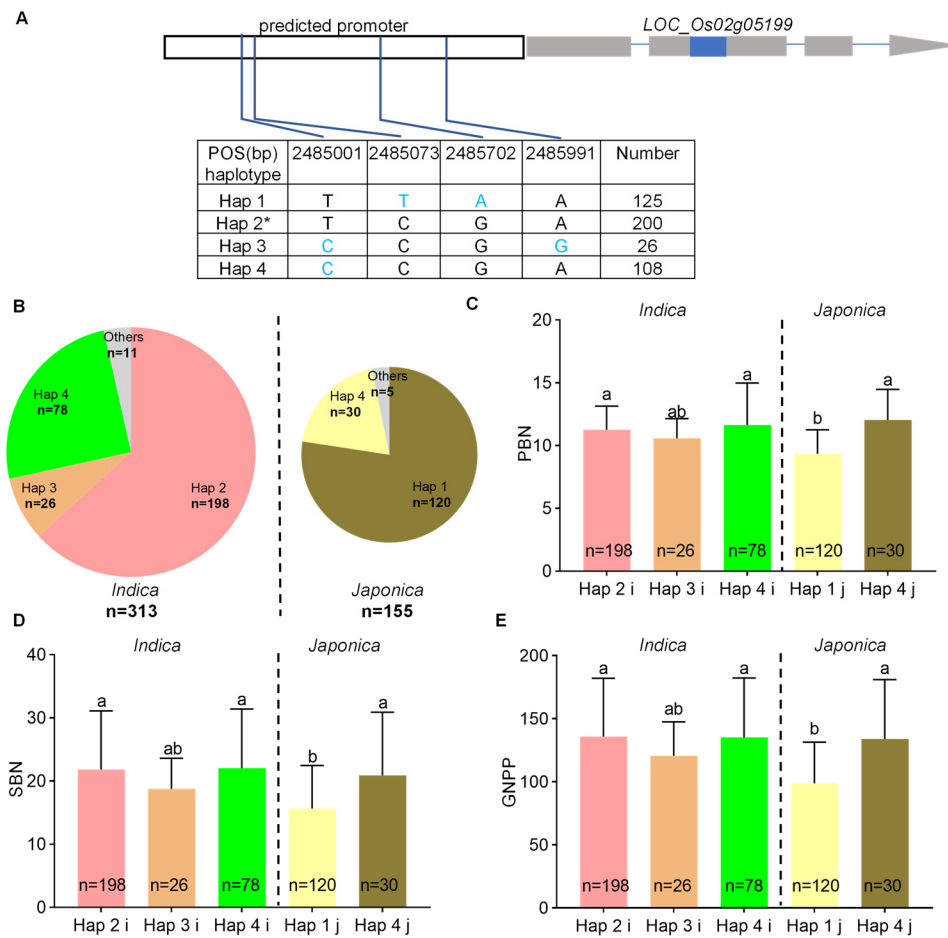


Figure S7. Haplotype analysis of *LOC_Os02g05199*. (A) Schematic representation of *LOC_Os02g05199* structure and the positions of four SNPs used for haplotype analysis. SNPs that differ from the reference sequence are marked with blue letters. (B) The haplotype frequency distribution of *LOC_Os02g05199* in two subpanels, *indica* and *japonica*. (C) Comparison of PBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (D) Comparison of SBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (E) Comparison of GNPP among accessions with different haplotypes in two subpanels, *indica* and *japonica*. * indicates the haplotype is the same as NPB. Others in the pie-chart mean the haplotypes with a frequency of less than ten. The i and j behind Hap in (C-E) indicate *indica* accessions and *japonica* accessions with relevant haplotypes, respectively. Different lowercase letters indicate significant differences among accessions with different haplotypes based on Duncan's new multiple-range test ($p < 0.05$).

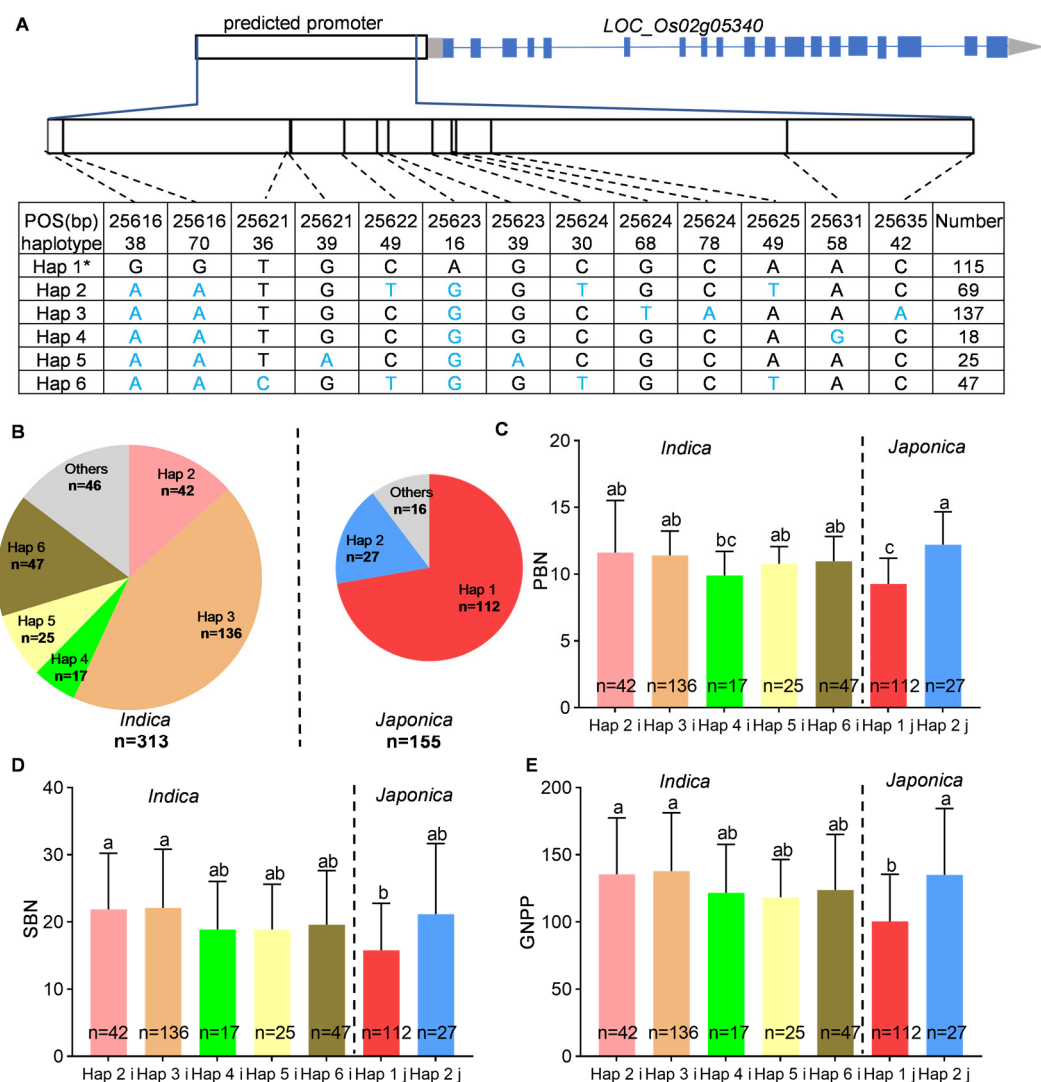


Figure S8. Haplotype analysis of *LOC_Os02g05340*. (A) Schematic representation of *LOC_Os02g05340* structure and the positions of 13 SNPs used for haplotype analysis. SNPs that differ from the reference sequence are marked with blue letters. (B) The haplotype frequency distribution of *LOC_Os02g05340* in two subpanels, *indica* and *japonica*. (C) Comparison of PBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (D) Comparison of SBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (E) Comparison of GNPP among accessions with different haplotypes in two subpanels, *indica* and *japonica*. * indicates the haplotype is the same as NPB. Others in the pie-chart mean the haplotypes with a frequency of less than ten. The i and j behind Hap in (C-E) indicate *indica* accessions and *japonica* accessions with relevant haplotypes, respectively. Different lowercase letters indicate significant differences among accessions with different haplotypes based on Duncan's new multiple-range test ($p < 0.05$).

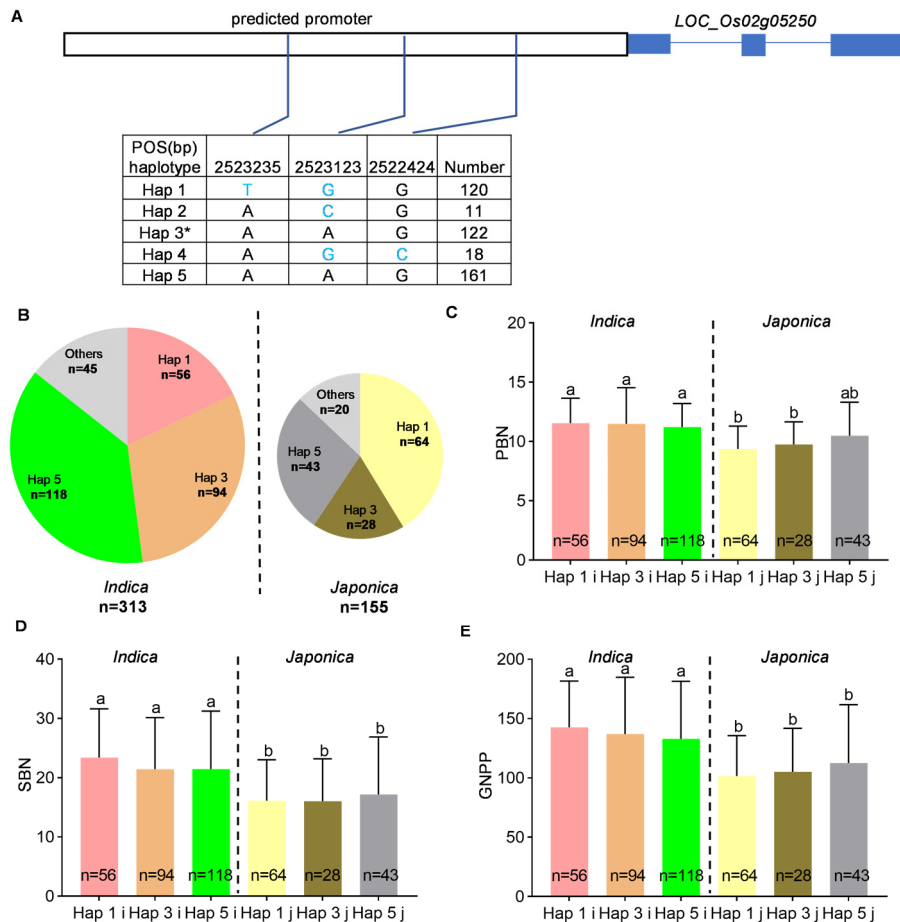


Figure S9. Haplotype analysis of *LOC_Os02g05250*. (A) Schematic representation of *LOC_Os02g05250* structure and the positions of three SNPs used for haplotype analysis. SNPs that differ from the reference sequence are marked with blue letters. (B) The haplotype frequency distribution of *LOC_Os02g05250* in two subpanels, *indica* and *japonica*. (C) Comparison of PBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (D) Comparison of SBN among accessions with different haplotypes in two subpanels, *indica* and *japonica*. (E) Comparison of GNPP among accessions with different haplotypes in two subpanels, *indica* and *japonica*. * indicates the haplotype is the same as NPB. Others in the pie-chart mean the haplotypes with a frequency of less than ten. The i and j behind Hap in (C-E) indicate *indica* accessions and *japonica* accessions with relevant haplotypes, respectively. Different lowercase letters indicate significant differences among accessions with different haplotypes based on Duncan's new multiple-range test ($p < 0.05$).