Supplemental information

Convergent evolution of AP2/ERF III and IX subfamilies through recurrent polyploidization and tandem duplication during eudicot adaptation to paleoenvironmental changes

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Article title: Convergent evolution of AP2/ERF III and IX subfamilies recurrently through polyploidization and tandem duplication in eudicot adaptation to paleoenvironmental changes

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The following Supporting Information is available for this article:

Supplemental Figure 1. The well-acknowledged WGD events in the major branches of eudicot phylogeny.

Supplemental Figure 2. The statistics of gene numbers in the diversified subfamilies of AP2/ERF genes generated by WGD or TD.

Supplemental Figure 3. The expansion of cold-specific CBF-dependent regulatory network of G. max and P. trichocarpa.

Supplemental Figure 4. The statistical difference of the number of R-WGD and R-TD duplicates between R-WGD-Y and R-WGD-N in the top cold-responsive 20 gene families.

Supplemental Figure 5. Calculation of synonymous substitution rate per site per year (r) in different taxa.

Supplemental Table 1. The timing and Ks ranges of well-acknowledged WGD events in the studied 22 plants.

Supplemental Table 2. The detailed information of 496 gene-rich families in the studied 22 plants.
Supplemental Table 3. The retention differences of the 496 gene-rich families following independent R-WGD events in the plants of R-WGD-Y group.

Supplemental Table 4. Cold response differences of the 496 gene-rich families in the selected four different plant lineages.

Supplemental Table 5. The WGD duplicates of AP2/ERF family genes generated during the two periods (A-WGD and R-WGD) before and after the radiation of the studied 22 plants.

Supplemental Table 6. The duplication modes of AP2/ERF family genes in the studied plants.

Supplemental Table 7. The inferred times of TD events for expanding III and IX subfamilies.

Supplemental Table 8. The detailed information of cold-specific CBFs-dependent regulatory network analyzed from RNA-seq, DAP-seq, and ChIP-seq datasets in *A. thaliana*.

Supplemental Table 9. List of significantly co-expressed genes with *CBFs* in *G. max*, *P. trichocarpa*, *B. pendula* and *C. illinoinensis*.

Supplemental Table 10. The duplicates in the cold-specific CBFs-dependent regulatory network through TD and/or WGD events during similar period of global cooling.

Supplemental Table 11. The RNA-seq expression values of AP2/ERF genes in the five cold-treated species at four time points (0, 2, 24, and 168 h) of cold stress.

Supplemental Table 12. List of AP2/ERF family genes in the studied 22 plants.

Supplemental Table 13. The inferred synonymous substitution rate per site per year (*r*) for each of the studied 22 plants.
Supplemental Figure 1. The well-acknowledged WGD events in the major branches of eudicot phylogeny. The shaded areas indicate independent recent WGDs (R-WGDs) occurred during or after K-Pg boundary (Wu et al., 2020). The plants colored in blue indicate the species with recent WGD event (R-WGD-Y) during or after K-Pg boundary, whereas the ones in red indicate the species without recent WGD (R-WGD-N) during the indicated period.

Supplemental Figure 2. The statistics of gene numbers in the diversified subfamilies of AP2/ERF genes generated by WGD or TD. The color scale represents the gene number of each subfamily generated by WGD or TD divided by the relative size value of the AP2/ERF (Number of AP2/ERF family genes in corresponding species/Average number of AP2/ERF family genes of 22 plants) in corresponding species.
Supplemental Figure 3. The expansion of cold-specific CBF-dependent regulatory network of *G. max* and *P. trichocarpa*. Some targets are highlighted with different colors, which were identified to be generated by WGD and/or TD events in the global cooling period as well as CBF.

Supplemental Figure 4. The statistical difference of the number of R-WGD and R-TD duplicates between R-WGD-Y and R-WGD-N in the top cold-responsive 20 gene families. (A) The number of duplicates of the top cold-responsive 20 gene families duplicated through R-WGD and R-TD. (B) The statistical difference of the number of TD duplicates between R-WGD-Y and R-WGD-N in AP2/ERF, AAA, NAC, LEA_2 family were assessed by nonparametric Mann-Whitney test.
Supplemental Figure 5. Calculation of synonymous substitution rate per site per year ($r$) in different taxa. The 95 percent confidence interval was calculated by Student’s test.