Figure S4  Genome-wide association study (GWAS) for the ratio δ- to α-tocopherol (δT/αT) in maize grain. (A) Scatter plot of association results from a unified mixed model analysis of δT/αT and linkage disequilibrium (LD) estimates ($r^2$) across the ZmVTE4 chromosome region. Negative log_{10}-transformed $P$-values (left y-axis) from a GWAS for δT/αT and $r^2$ values (right y-axis) are plotted against physical position (B73 RefGen_v2) for a 7 Mb region on chromosome 5 that encompasses ZmVTE4. The blue vertical lines are −log_{10} $P$-values for SNPs that are statistically significant for δT/αT at 5% false discovery rate (FDR), while the gray vertical lines are −log_{10} $P$-values for SNPs that are non-significant at 5% FDR. Triangles are the $r^2$ values of each SNP relative to the peak SNP (indicated in red) at 200,367,532 bp. The black horizontal dashed line indicates the −log_{10} $P$-value of the least statistically significant SNP at 5% FDR. The black vertical dashed lines indicate the positions of four genes (from left to right): a WYRKY transcription factor (GRMZM5G823157), ZmVTE4 (GRMZM2G035213), a pentatricopeptide repeat-containing protein (GRMZM2G325019), and an amino acid permease (GRMZM2G161641). (B) Scatter plot of association results from a conditional unified mixed model analysis of δT/αT and LD estimates ($r^2$) across the ZmVTE4 chromosome region, as in (A). The three SNPs (ss196416269, S5_200369534, and S5_200369481) from the optimal multi-locus mixed model (MLMM) model were included as covariates in the unified mixed model to control for the ZmVTE4 effect. (C) Gene model diagram for ZmVTE4 with δT/αT associated SNPs. Blue vertical lines indicate the physical position (RefGen_v2) of SNPs within +/− 3 kb of the open reading frame start or stop position for ZmVTE4 that are significantly associated with δT/αT at 5% FDR. Significant SNPs at 10% FDR are shown as gray vertical lines. The peak SNP is indicated by a red triangle, while the three SNPs included in the optimal MLMM model are indicated by inverted red triangles.