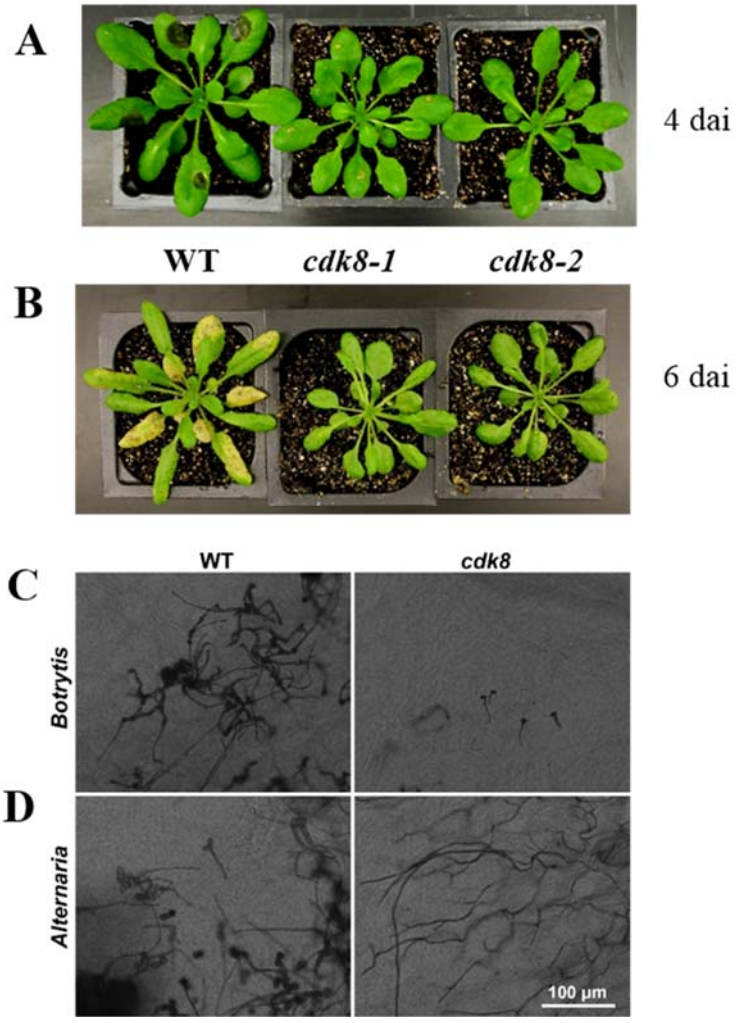
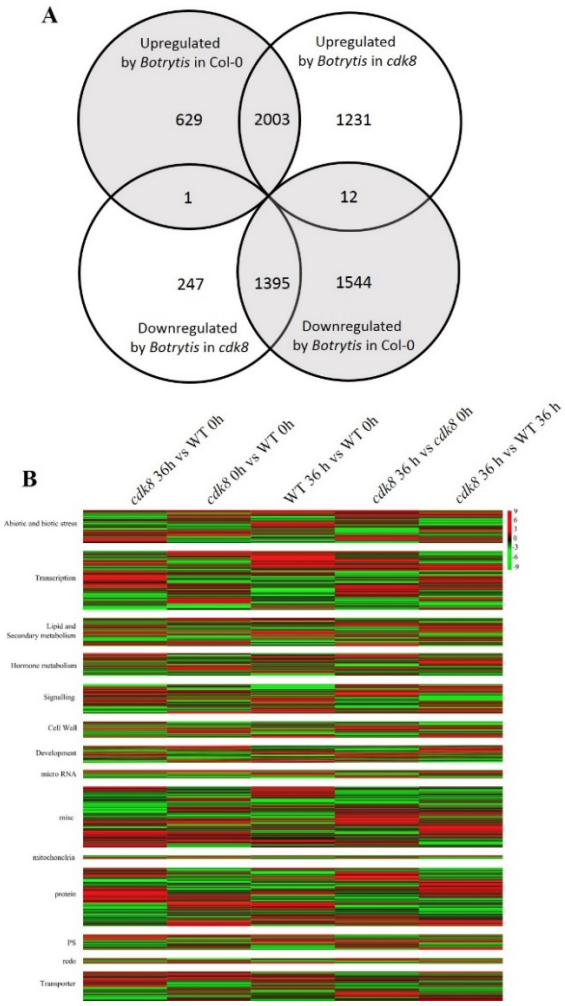
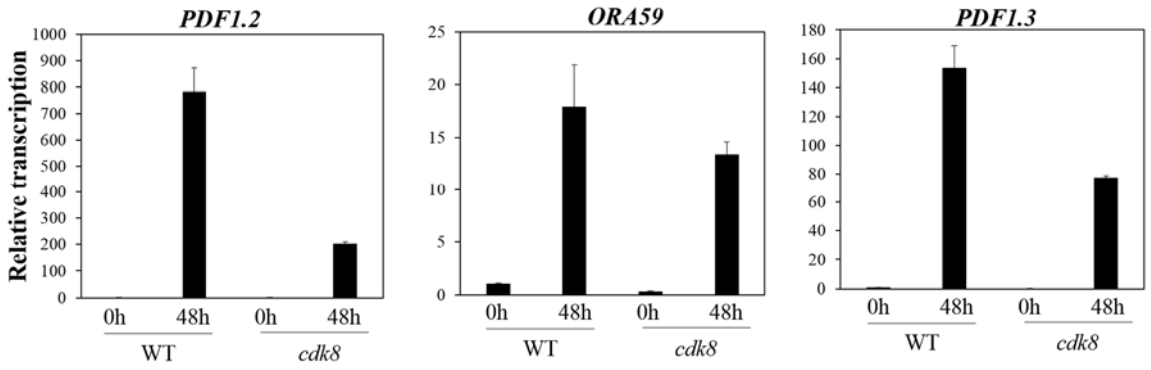


Supplemental Figure 1. Disease symptoms and fungal growth revealed by trypan blue staining of *B. cinerea* inoculated leaves of wild type and *cdk8* mutant plants.

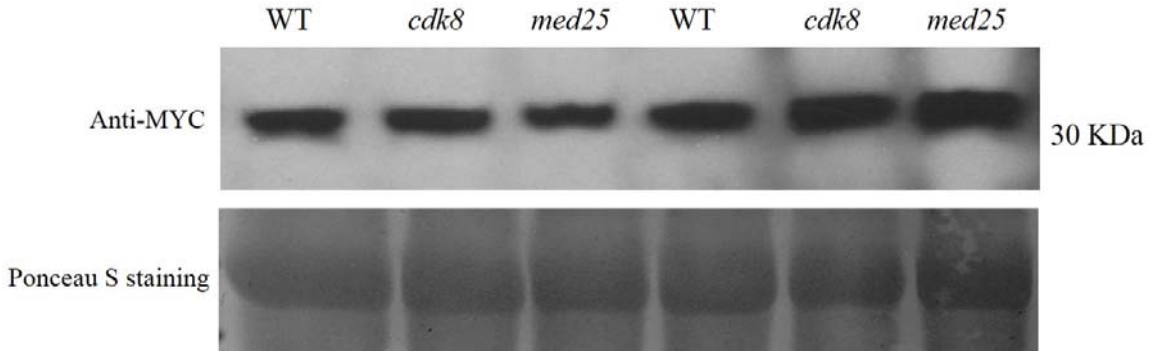
B. cinerea disease symptom in wild-type (Col-0) and *cdk8* mutant plants after (A) drop, and (B) spray inoculation, (C) Trypan blue staining of *B. cinerea* and (D) *A. brassicicola* inoculated leaves of wild type and *cdk8* mutant at 48 hours after inoculation. The disease assays were repeated at least three times with similar results. dai indicates days after inoculation. Scale bars indicate 100 µM in C and D.



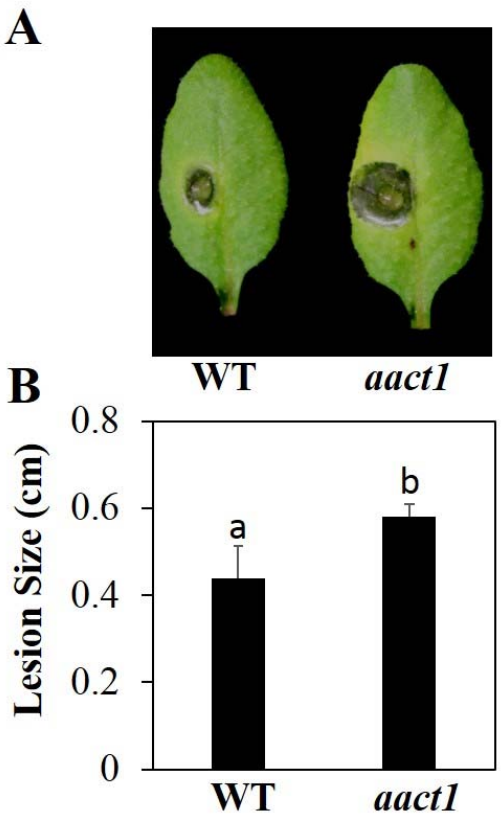
Supplemental Figure 2. Venn diagram and heat map presenting differential expressions in wild type and *cdk8* after mock or *B. cinerea* inoculation. (A) Venn diagram showing differential expression of genes in wild-type and *cdk8* mutant after mock treatment or *B. cinerea* inoculation. **(B)** Heat map presenting differential expressions by functional categories in *cdk8* and wild type plants with mock and *B. cinerea* inoculation. The heat map was generated based on 2-fold changes in gene expression on RPKM transcript counts (FDR≤0.05) using wild type mock (WT 0h) as a reference. Statistically significant changes were determined by R software V3.16.5 (P<0.05, *t* test). Misc is abbreviation of miscellaneous enzyme families and PS indicates photosynthesis.



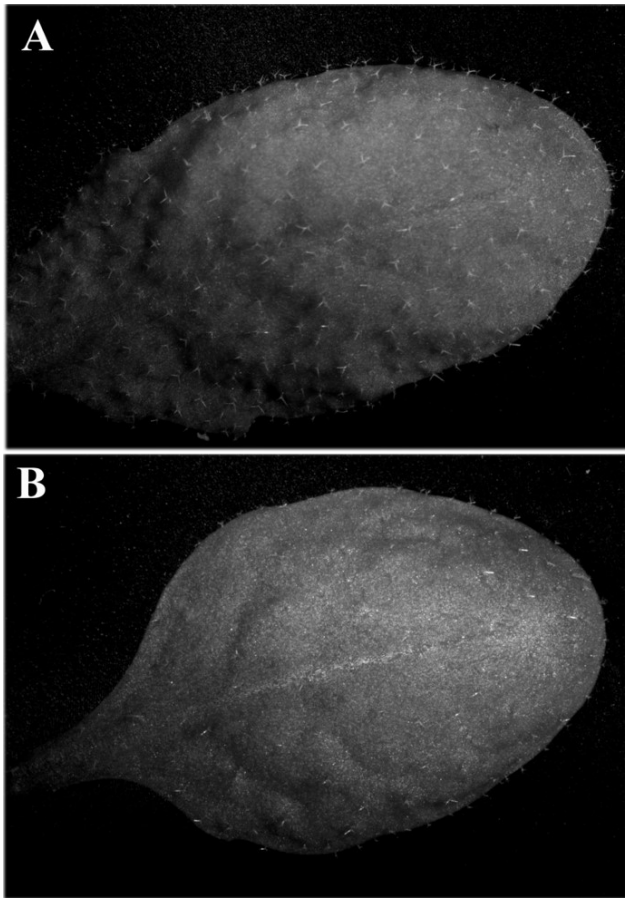
Supplemental Figure 3. CDK8 dependent expression of *PDF1. 2*, *ORA59* and *PDF1.3* genes in response to *A. brassicicola.*
(A) qRT-PCR results demonstrated that the gene inductions of *PDF1.2*, *ORA59* and *PDF1.3* were also reduced in *cdk8* in responses to *A. brassicicola.* Relative transcript levels were normalized with Arabidopsis *Actin2* (*ACT2*). The normalized expression level of wild type was set to 1. Error bars indicate SE of mean value (n=3). Two independent biological replicates were performed.



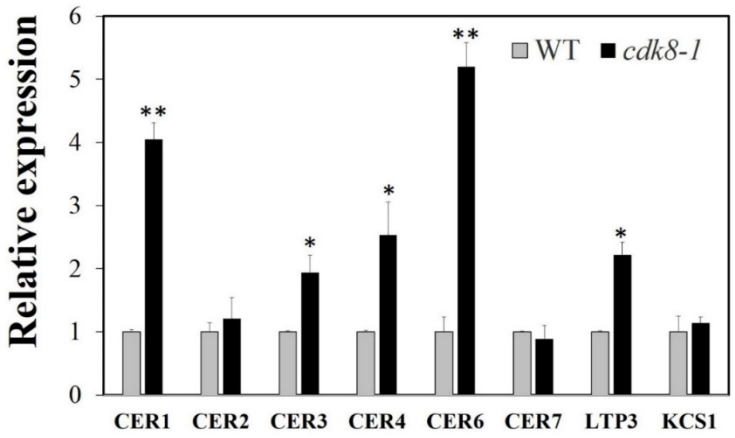
Supplemental Figure 4. Western blot confirming equal protein amounts used in wild type and mutant protoplasts for activation assays. Western blots show comparable protein levels of transcription factor 35S:ERF1-MYC in wild type, *cdk8* and *med25* protoplasts. The protein was extracted from protoplasts transformed with 35S:ERF1-MYC and *PDF1.2pro*-GUS as well as 35S:FLuc.



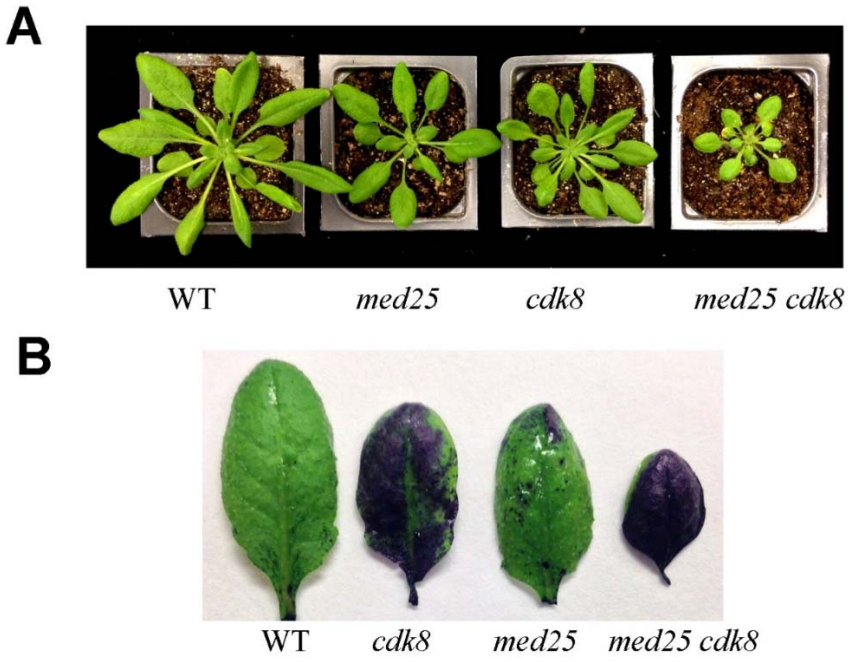
Supplemental Figure 5. The CDK8 target gene *AACT1* is required for resistance to *B. cinerea*.
(A) Diseases symptom and (B) Disease lesion sizes in wild type (Col-0) and *aact1* mutants at 3 day after drop inoculation with *B. cinerea*. The means marked with a and b are significantly different from each other (Student's *t* test, P< 0.01). Error bars indicate mean values ±SE from at least 12 disease lesions.



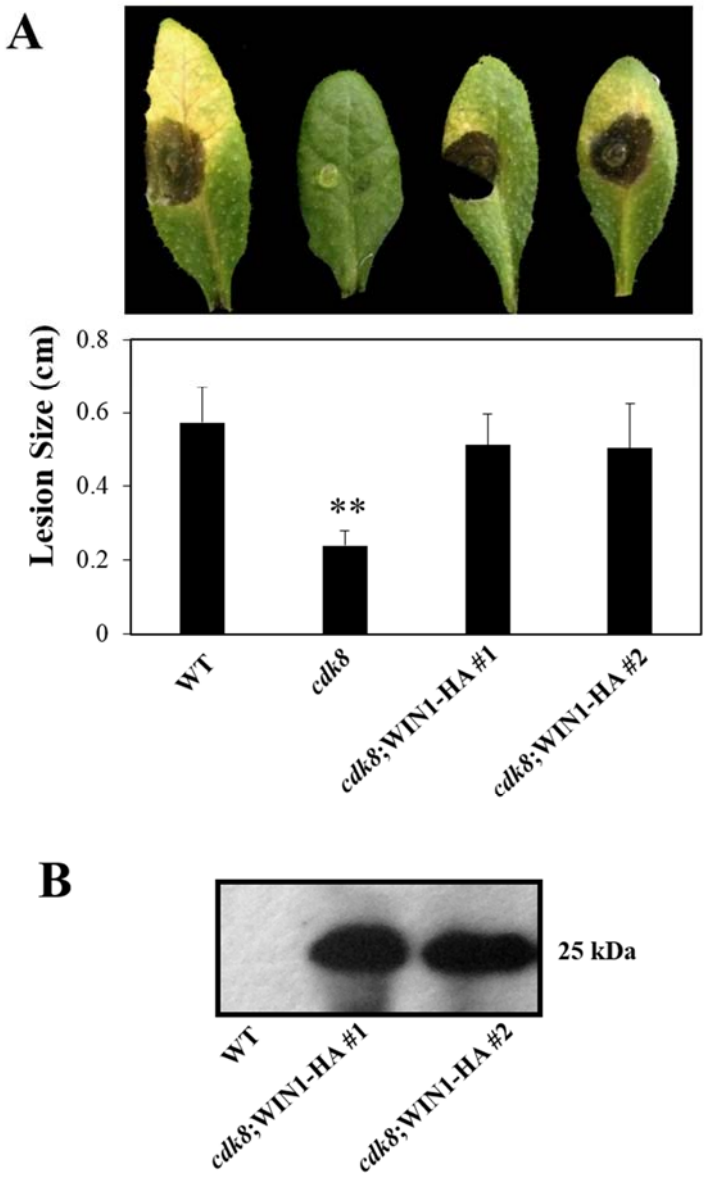
Supplemental Figure 6. The leaf surface phenotypes of *cdk8* and wild type plants.
(A) Wild type plants, (B) The glossy leaf surface of *cdk8* mutant.



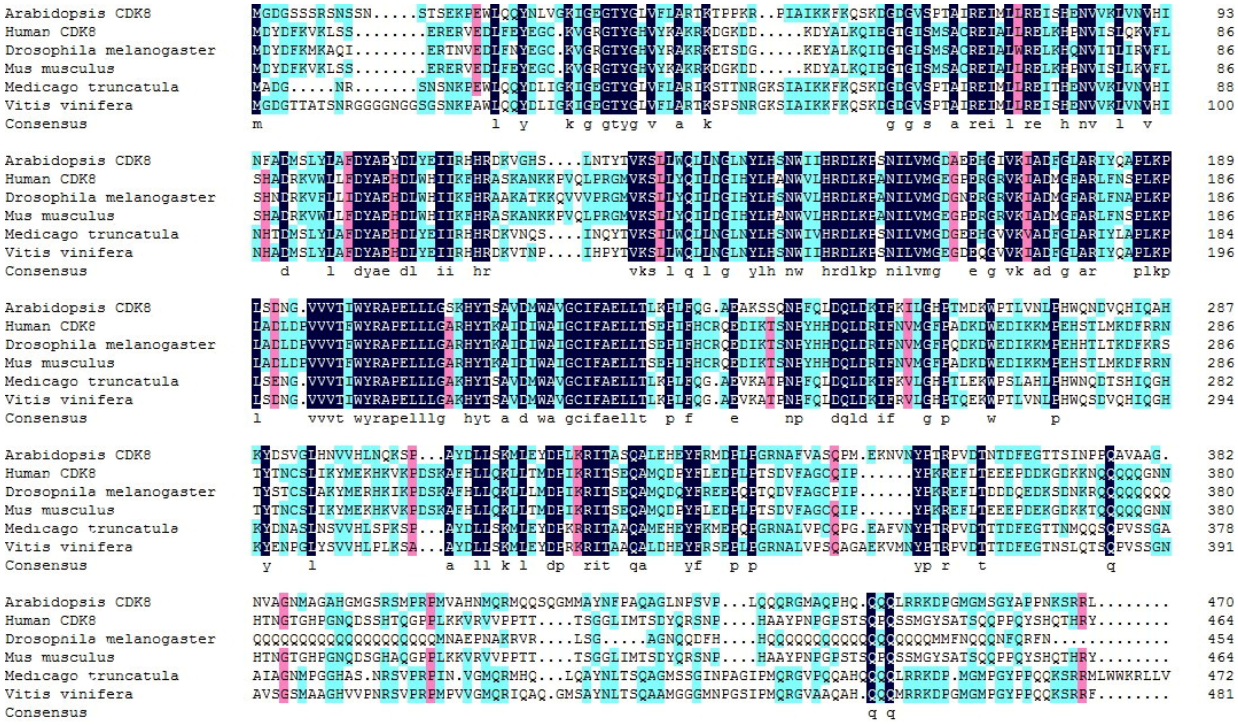
Supplemental Figure 7. The expression of cuticle wax biosynthesis genes in wild type and *cdk8* mutant.
Relative transcript levels were normalized with Arabidopsis *Actin2* (*ACT2*). The normalized expression level of wild type was set to 1. Error bars indicate SE of mean value (n=3). Three independent biological replicates were performed. Significance between the mean values were analyzed statistically (Student's *t* test, ** P< 0.01).



Supplemental Figure 8. Growth and cuticle permeability of *cdk8* and *med25* single and double mutants.
(A) Five-week-old wild-type (Col-0), *med25*, *cdk8* and *med25 cdk8* double mutant.
(B) Cuticle permeability as revealed by toluidine-blue staining. At least 10 leaves for each genotypes were stained at room temperature for 1 h for each staining experiment.

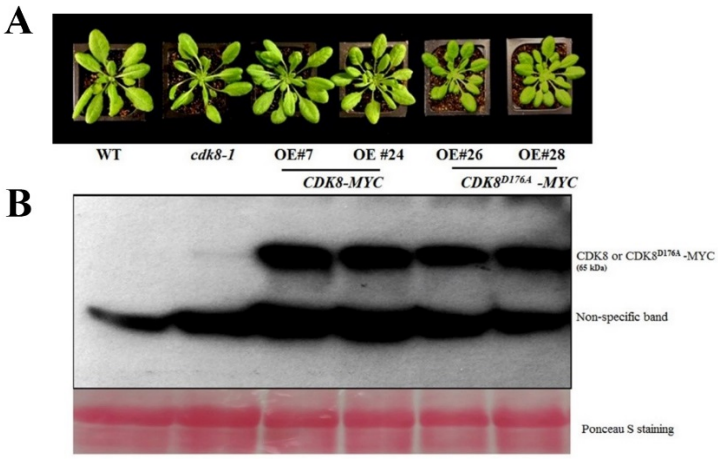


Supplemental Figure 9. Disease symptoms of *cdk8*;WIN1-HA plants to *B. cinerea*.
(A) The *cdk8*;WIN1-HA plants exhibit WT level of resistance to *B. cinerea* and (B) Western Blots demonstrate the WIN1-HA expressions. In A, the error bars indicate the mean ± SE from at least 20 disease lesions. Significance between the mean values were analyzed statistically (Student's *t* test, ** P< 0.01).

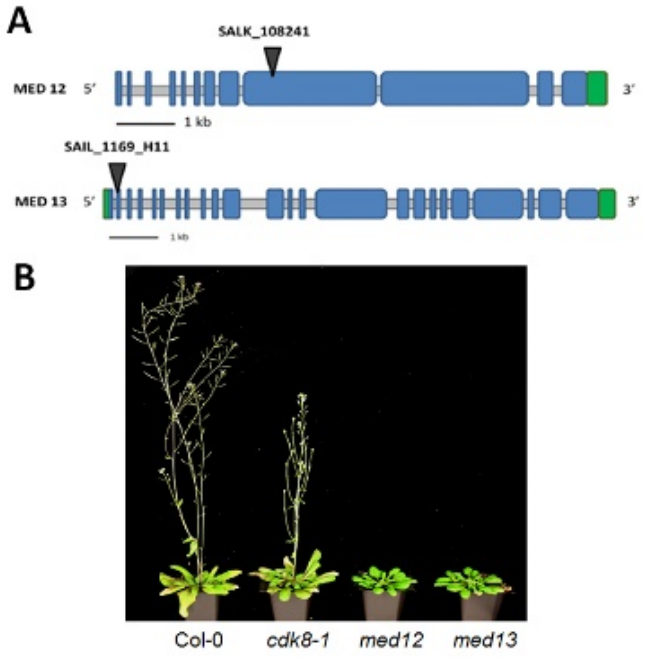


Supplemental Figure 10. Amino acid sequence comparisons between full length Arabidopsis, human, Drosophila, mouse and plant CDK8 proteins.

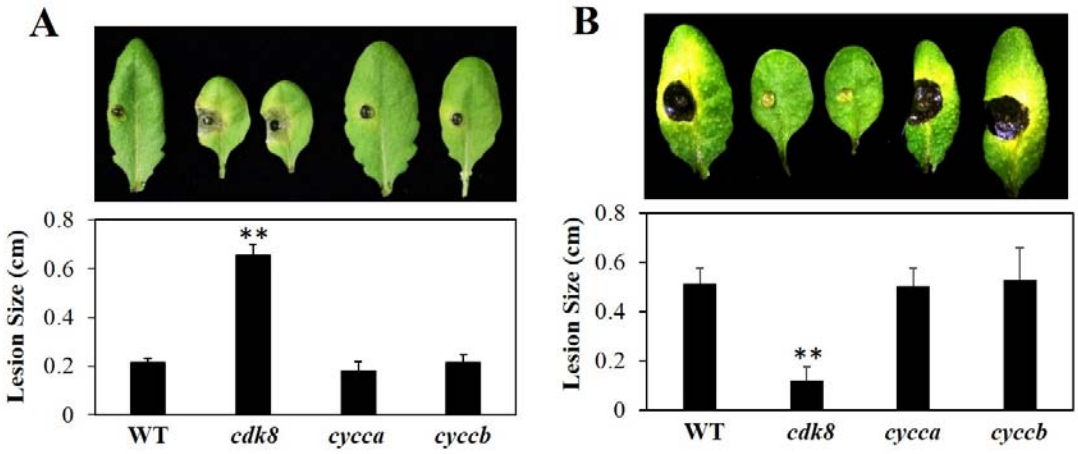
The highly conserved domains are in blue. The protein sequence were aligned by DNAMAN8 software with default setting.



Supplemental Figure 11. **Western blot showing plants expressing wild type CDK8 and the kinase-dead CDK8 driven by the CaMV 35S promoter.**
(A) Morphology of five-week-old wild-type (Col-0), *cdk8-1*, and *35S:CDK8-MYC* overexpression lines #7and #24, and *35S:CDK8^{D176A}-MYC* overexpression lines #26 and #28. OE, overexpression.
(B) Western blot analysis of CDK8 or CDK8^{D176A}-MYC protein expressions in transgenic plants. The western blot was probed with polyclonal anti-MYC antibody and equal loading was confirmed by Ponceau S staining.



Supplemental Figure 12. Arabidopsis mutants *med12* and *med13* in CDK8 kinase-module have altered growth responses.
(A) Diagram showing positions of T-DNA insertion in *MED12* and *MED13* genes.
(B) Delayed flowering in *med12* and *med13.* Pictures were taken at 50 days after sowing seeds on soil.



Supplemental Figure 13. Disease symptoms in *cycca* and *cyccb* single mutants after inoculation with *B. cinerea* and *A. brassicicola*.

Disease symptom and lesion size in wild-type (Col-0), *cdk8* mutant, *cycca* and *cyccb* plants inoculated with (A) *A. brassicicola,* and (B) *B. cinerea* at 4 days after drop inoculation. The lesion sizes are mean of values ±SE from at least 20 disease lesions and the double asterisk indicate that P<0.01 using Student's *t* test compared to WT.