Supplemental data

Table S1. Modulation of morophological phenotypes by *AtZAT6* expression. The rosette leaf numbers were assayed from 30-d-old plants, and the other data were assayed from 70-d-old plants. n = 15. Means ± SD are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.

Table S2. Primers used for vector construction.

Table S3. Primers used for quantitative real-time PCR.

Fig. S1. Expression level changes of *AtZAT6* under abiotic and biotic stress conditions. Arabidopsis eFP Browser (http://bar.utoronto.ca/efp/cgi-bin/efpWeb.cgi) was used for characterization of *AtZAT6* gene expression.

Fig. S2. Transactivation activity of AtZAT6 in yeast. The plastids of AtZAT6-pGBKT7, pCL-1-pGBKT7, pGBKT7 were transformed into the yeast strain AH109, and the transformants were then plated on selective SD medium [SD medium lacking Trp, SD medium lacking Trp, Ade and His with 10 mM 3-amino-1,2,4-triazole (3-AT)] and grown for 2 d at 30 ° C. The pCL-1-pGBKT7 and the empty vector pGBKT7 were used as positive and negative controls, respectively.

Fig. S3. Phenotypes of 21-d-old WT and *AtZAT6* overexpressing T_1 generation plants. Top, 21-d-old WT and *AtZAT6* overexpressing T_1 generation plants in soil. Bottom, the relative mRNA level of *AtZAT6* of the above plants. The expression level of *AtZAT6* in WT was normalized as 1.0. Means ± SDs of three independent experiments are shown in the results,

and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.

Fig. S4. The expression level of *AtZAT6* in *AtZAT6* knockdown plants. The expression level of *AtZAT6* in WT was normalized as 1.0. Means ± SDs of three independent experiments are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.

Fig. S5. Phenotypes of 7-d-old WT and *AtZAT6* overexpressing plants on MS plate. (A)(B) 7-d-old WT and *AtZAT6* overexpressing plants on MS plate. Bars = 0.5 cm. (C) Primary root length of 7-d-old WT and *AtZAT6* overexpressing plants on MS plate. Means ± SDs (n = 30) are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.

Fig. S6. Modulation of AtZAT6 expression affects glutathione pool and redox state. (A)-(C) Quantifications of GSH (A), GSSG (B) and GSH redox state (C). Means ± SDs of three independent experiments are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.

Fig. S7. Phenotype of *35S::GFP-ZAT6* transgenic plants. (A)(B) 28-d-old of WT and *35S::GFP-ZAT6* transgenic plants in MS plate (A) and in soil (B). Bars = 1 cm. (C) *AtZAT6* expression levels in WT and *35S::GFP-ZAT6* transgenic plants by real-time PCR. The expression level of *AtZAT6* in WT was normalized as 1.0. (D) Growth of *Pst* DC3000 and *Pst* DC3000(*avrRpt2*) on WT and *35S::GFP-ZAT6* transgenic plants at 0 and 3 dpi of bacterial infection, respectively. Means ± SDs of three independent experiments are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to

WT.

Table S1. Modulation of morophological phenotypes by *AtZAT6* expression.

Morphology	**WT (Col-0)**	***35S::ZAT6-3***	***35S::ZAT6-6***	***35S::ZAT6-8***	**amiR-6**	**amiR-10**
Rosette leaf number	11.13 ± 0.90	11.47 ± 1.11	14.17 ± 1.05*	14.93 ± 1.60*	10.93 ± 1.23	11.20 ± 1.37
Leaf length (cm)	2.39 ± 0.18	2.27 ± 0.11	1.54 ± 0.23*	1.38 ± 0.20*	2.42 ± 0.14	2.38 ± 0.09
Leaf width (cm)	1.42 ± 0.16	1.39 ±0.15	0.90 ± 0.16*	0.85 ± 0.16*	1.45 ± 0.13	1.43 ± 0.11
Plant height (cm)	30.91 ± 3.80	28.77 ± 3.45	16.47 ± 3.52*	14.66 ± 2.62*	31.18 ± 3.47	31.75 ± 3.65
Silique length (cm)	1.42 ± 0.08	1.41 ± 0.08	1.21 ± 0.11*	1.12 ± 0.08*	1.42 ± 0.10	1.40 ± 0.09
Sepal length (mm)	2.02 ± 0.14	2.03 ± 0.15	1.63 ± 0.17*	1.51 ± 0.18*	2.01 ± 0.08	1.99 ± 0.12
Petal length (mm)	3.19 ± 0.14	3.26 ±0.14	2.77 ± 0.17*	2.81 ± 0.16*	3.10 ± 0.17	3.13 ± 0.12
Stamen length (mm)	2.47 ± 0.15	2.46 ± 0.11	2.09 ± 0.12*	2.01 ± 0.14*	2.43 ± 0.11	2.48 ± 0.12
Carpel length (mm)	2.79 ± 0.14	2.73 ±0.12	2.47 ± 0.16*	2.42 ± 0.11*	2.73 ± 0.13	2.77 ± 0.18

The rosette leaf numbers were assayed from 30-d-old plants, and the other data were assayed from 70-d-old plants. n = 15. Means ± SD are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.

Table S2. Primers used for vector construction.

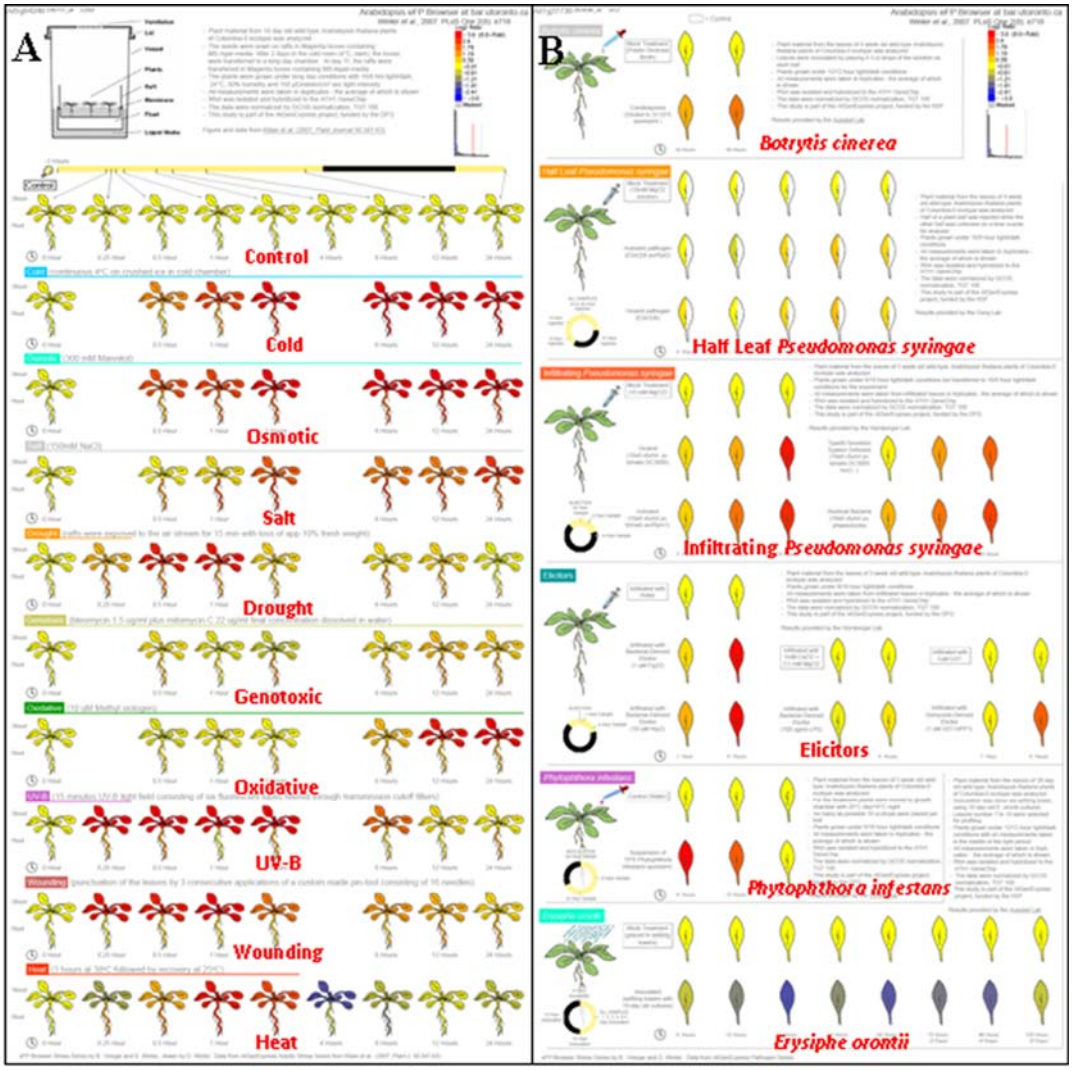
Gene	Primer	Sequence	Specificity
ZAT6	ZAT6OXF	5’-TCCCCCGGGATGGCACTTGAAACTCTTAC-3’	ZAT6-pBIM and 35S::EGFP-AtZAT6 vector construction
	ZAT6OXR	5’-CCGCTCGAGTTAGGGTTTCTCCGGGAAGT-3’	
	ProZAT6F	5’-ACGCGTCGACGGAACTAACAATATGATCAA-3’	ProZAT6-pBI101.2 vector construction
	ProZAT6R	5’-CGGGATCCTATCTTGAAGACTAGCTACT-3’	
	ZAT6I	5’-gaTAAACGTGCGACTTCACGCTTtctctcttttgtattcc-3’	amiR-ZAT6-pBARN vector construction
	ZAT6II	5’-gaAAGCGTGAAGTCGCACGTTTAtcaaagagaatcaatga-3’	
	ZAT6III	5’-gaAAACGTGAAGTCGGACGTTTTtcacaggtcgtgatatg-3’	
	ZAT6IV	5’-gaAAAACGTCCGACTTCACGTTTtctacatatatattcct-3’	
	A	5’-TCATTTCATTTGGAGAGCCCCTGCAAGGCGATTAAGTTGGGTAAC-3’	
	B	5’-AGGATCCGATTCGTACACCCGCGGATAACAATTTCACACAGGAAACAG-3’	
	ZAT6F	5’-CGGGATCCGAATGGCACTTGAAACTCTTAC-3’	ZAT6-pGBKT7 vector construction
	ZAT6R	5’-AACTGCAGTTAGGGTTTCTCCGGGAAGT-3’	
mini35S	mini35SF	5’-GGAAGCTTGATATCTCCACTGACGTAAGGG-3’	mini35S-pCAMBIA1391Z and 4×TACAAT-mini35S-pCAMBIA1391Z vector construction
	mini35SR	5’-CAGGATCCCGTGTTCTCTCCAAATGAAATG-3’	
	TACAAT-mini35SF	5’-GGAAGCTTTACAATTACAATTACAATTACAATGATATCTCCACTGACGTAAGGG-3’	
	TAAAAT-mini35SF	5’-GGAAGCTTTAAAATTAAAATTAAAATTAAAATGATATCTCCACTGACGTAAGGG-3’	

Table S3. Primers used for quantitative real-time PCR.

Gene	Locus	Primer	Sequence
UBQ10	At4g05320	UBQ10F	5’-TCCGGATCAGCAGAGGCTTA-3’
		UBQ10R	5’-TCAGAACTCTCCACCTCAAG-3’
ZAT6	At5g04340	ZAT6F	5’-AAACCGTGACCTTGACCTGC-3’
		ZAT6R	5’-CTCCGTTCTTTCCTTCGTAGTG-3’
EDS1	At3g48090	EDS1F	5’-TGGAGGGTTCAACGTTTAGAAAG-3’
		EDS1R	5’-CAGAGGAGAATGCGATTTGTGA-3’
PAD4	At3g52430	PAD4F	5’-TCTCCATCCACGACCTCGTT-3’
		PAD4R	5’-AGTAAGTTCCAAAGGGCCAGAAT-3’
PR1	At2g14610	PR1F	5’-ATGAATTTTACTGGCTATTC-3’
		PR1R	5’-AACCCACATGTTCACGGCGGA-3’
PR2	At3g57260	PR2F	5’-CGATACCTTGCCAAGTCCAT-3’
		PR2R	5’-TGTACCGGAATCTGACACCA-3’
PR3	At3g12500	PR3F	5’-ATGAAGATCAGACTTAGCATAAC-3’
		PR3R	5’-AGCTCATTGCCACAGTCGAC-3’
PR4	At3g04720	PR4F	5’-AGTGATCAAACAGAGGAACC-3’
		PR4R	5’-TCTGAAACAGCCGACTCTTC-3’
PR5	At1g75040	PR5F	5’-CGTACAGGCTGCAACTTTGA-3’
		PR5R	5’-GCGTTGAGGTCAGAGACACA-3’
ACTIN2	At3g18780	Promoter-ACTIN2F	5’-TAGTTAACACGAGGGAAAAGGCT-3’
		Promoter-ACTIN2R	5’-AAAGTGAGGAGGACAACGAGACA-3’
EDS1	At3g48090	Promoter-EDS1F	5’-GTTTATCAGATTCCACGTA-3’
		Promoter-EDS1R	5’-GTCTTGGTTCTATCAGCA-3’
PAD4	At3g52430	Promoter-PAD4F	5’-AATGGACCTACCTTTCAC-3’
		Promoter-PAD4R	5’-TGTATCTTCTTGGCTTGT-3’
PR1	At2g14610	Promoter-PR1 I-F	5’-TTGCTTCATCAATCTTAG-3’
		Promoter-PR1 I-R	5’-TACATTAGGTAAACAACG-3’
PR1	At2g14610	Promoter-PR1 II-F	5’-CTGCGTATTAGTGTTTGG-3’
		Promoter-PR1 II-R	5’-AAATCGTATCGGACAGTT-3’
PR1	At2g14610	Promoter-PR1 III-F	5’-CAAACTGTCCGATACGAT-3’
		Promoter-PR1 III-R	5’-ATCTTGTCCTTACACACATT-3’
PR2	At3g57260	Promoter-PR2-F	5’-TTCTATCAAGGGAATGGTA-3’
		Promoter-PR2-R	5’-TACACACGACTTCAGTTT-3’
PR3	At3g12500	Promoter-PR3-F	5’-TGCTTCAGTTTAGGAAAT-3’
		Promoter-PR3-R	5’-CTGCGTGCTATTCTTATG-3’

PR4	At3g04720	Promoter-PR4-F	5’-ACTTCAGCACTCCAATTC-3’
		Promoter-PR4-R	5’-TTTCTTGTGATTCTACGC-3’
PR5	At1g75040	Promoter-PR5 I-F	5’-CGTTCAAGTAGCAAATCAGG-3’
		Promoter-PR5 I-R	5’-TGTTGTGAGGTGCGAGTT-3’
PR5	At1g75040	Promoter-PR5 II-F	5’-TGCACTAATCACTCCGTTTC-3’
		Promoter-PR5 II-R	5’-GTACGTTAAATGGTATCGTTATGTAG-3’
PR5	At1g75040	Promoter-PR5 III-F	5’-AGTCCATCTTCTTCCTCTCTGT-3’
		Promoter-PR5 III-R	5’-ACCTGTCGTGTGGCTTTG-3’
PR5	At1g75040	Promoter-PR5 IV-F	5’-AGGTGTATTATATTAGAATTAGAAT-3’
		Promoter-PR5 IV-R	5’-ATGGTCCACACGGTTTCG-3’
CBF1	At4g25490	CBF1F	5’-AACTTCGCTGACTCGGCTTGG-3’
		CBF1R	5’-AACAGACGGCGGCGGTAAA-3’
CBF2	At4g25470	CBF2F	5’-CGGTGATTACAGTCCGAAGC-3’
		CBF2R	5’-CAAGCCGAGTCAGCGAAA-3’
CBF3	At4g25480	CBF3F	5’-CGGTAAGTGGGTTTGTGA-3’
		CBF3R	5’-GTTCCGCCGTGTAAATAG-3’
CBF4	At5g51990	CBF4F	5’-AAACGAGCTGGGAGGAAGAA-3’
		CBF4R	5’-AAGCAGAGCGACCACGAAGA-3’
DREB2A	At5g05410	DREB2AF	5’-AAAGGTAAAGGAGGACCAGA-3’
		DREB2AR	5’-GCCAAAGGACCATACATAGC-3’
DREB2B	At3g11020	DREB2BF	5’-GTATGAAGGGTAAAGGAGGA-3’
		DREB2BR	5’-CTGAGGGAAGTTAAGACGAG-3’
CBF1	At4g25490	Promoter-CBF1 I-F	5’-TTGTTTTGCAGTAAATTAGG-3’
		Promoter-CBF1 I-R	5’-ATTCATGCTTTCGTGGAT-3’
CBF1	At4g25490	Promoter-CBF1 II-F	5’-GATTCGATGAAACATATG-3’
		Promoter-CBF1 II-R	5’-CTTGAAAGCAACTACTAAA-3’
CBF1	At4g25490	Promoter-CBF1 III-F	5’-TGCATATCTTATTGTGAA-3’
		Promoter-CBF1 III-R	5’-ATAGCAAGTTATCTTGAA-3’
CBF2	At4g25470	Promoter-CBF2-F	5’-ATGGTTGTCGTACCCTAT-3’
		Promoter-CBF2-R	5’-AAGTTTCTGACCCTTCAC-3’
CBF3	At4g25480	Promoter-CBF3 I-F	5’-CCACAAAACCTGCATTAC-3’
		Promoter-CBF3 I-R	5’-GTTGCTAGATTCGAGACG-3’
CBF3	At4g25480	Promoter-CBF3 II-F	5’-TTAGGTTTCAGACTCGTT-3’
		Promoter-CBF3 II-R	5’-TAGATCAATTAGAAGCAT-3’
CBF3	At4g25480	Promoter-CBF3 III-F	5’-GAGAATTTTAATTAGCAGTC-3’
		Promoter-CBF3 III-R	5’-GAAATATGGTATTTTGGA-3’
CBF3	At4g25480	Promoter-CBF3 IV-F	5’-ACATGGCAGATCTTAATG-3’

Promoter-CBF3 IV-R 5’-TTAGAGGCAAAAGAAAAG-3’



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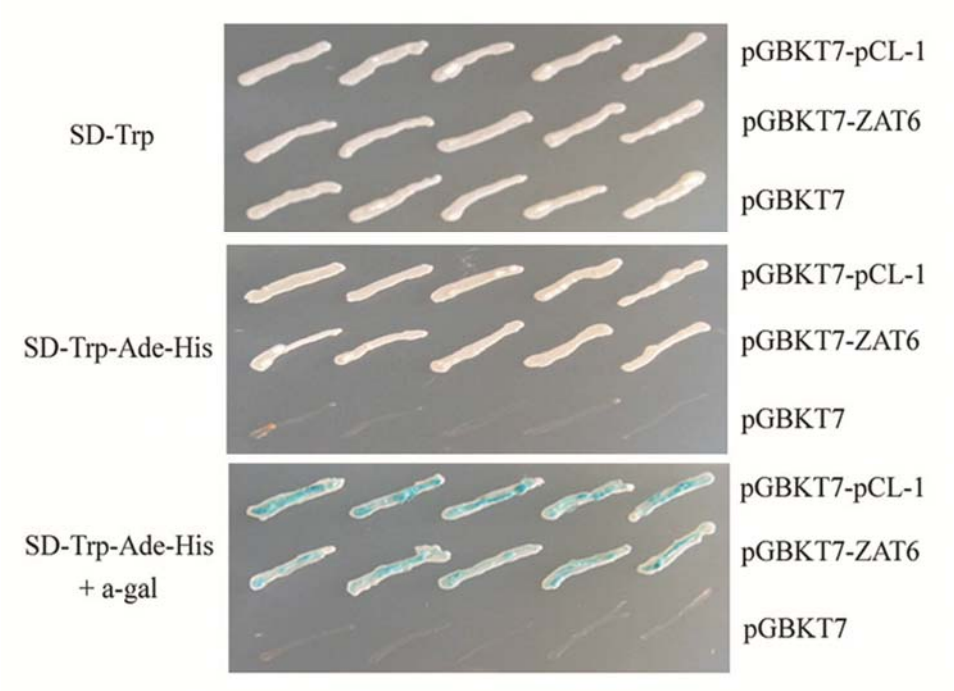


Fig. S2. Transactivation activity of AtZAT6 in yeast. The plastids of AtZAT6-pGBKT7, pCL-1-pGBKT7, pGBKT7 were transformed into the yeast strain AH109, and the transformants were then plated on selective SD medium [SD medium lacking Trp, SD medium lacking Trp, Ade and His with 10 mM 3-amino-1,2,4-triazole (3-AT)] and grown for 2 d at 30 ° C. The pCL-1-pGBKT7 and the empty vector pGBKT7 were used as positive and negative controls, respectively.

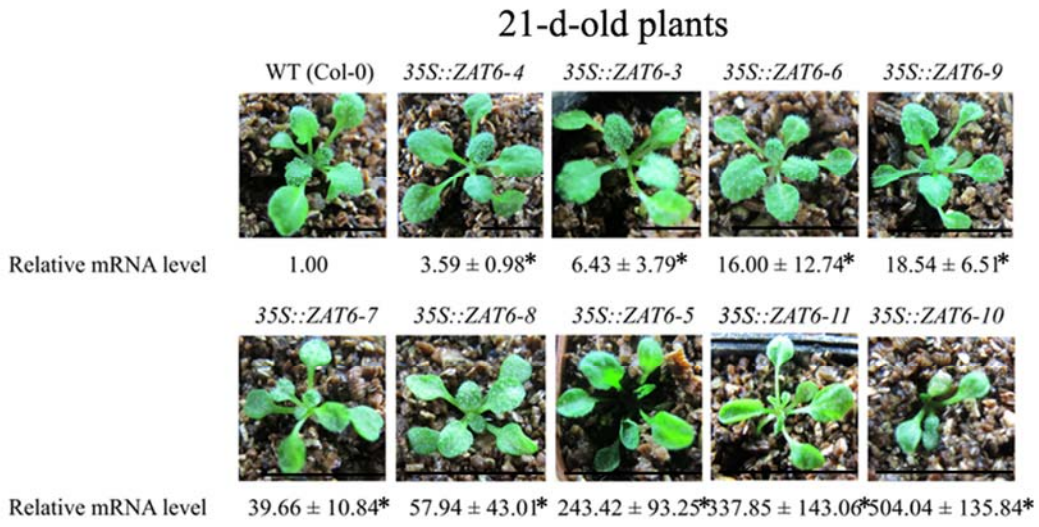


Fig. S3. Phenotypes of 21-d-old WT and *AtZAT6* overexpressing T_1 generation plants. Top, 21-d-old WT and *AtZAT6* overexpressing T_1 generation plants in soil. Bars = 1 cm. Bottom, the relative mRNA level of *AtZAT6* of the above plants. The expression level of *AtZAT6* in WT was normalized as 1.0. Means ± SDs of three independent experiments are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.

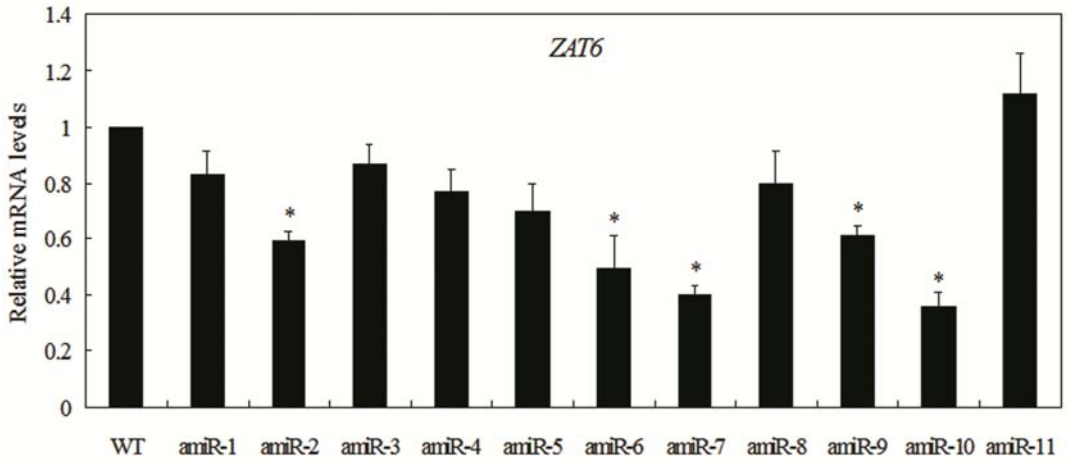
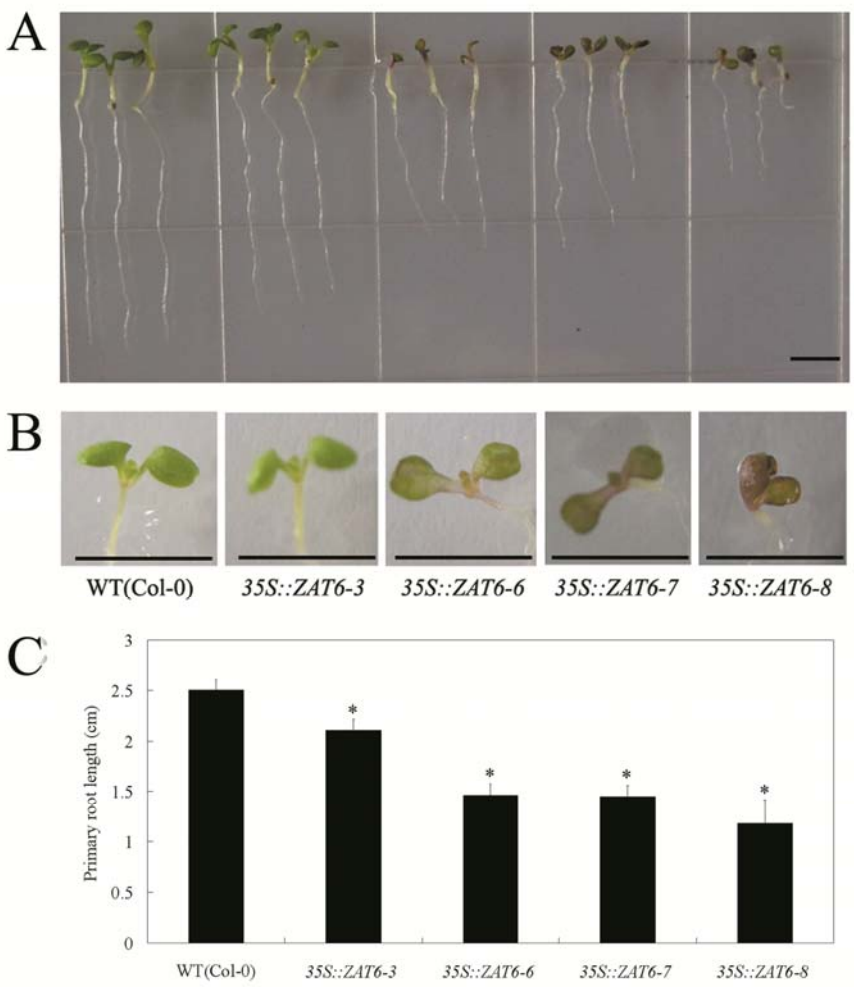


Fig. S4. The expression level of *AtZAT6* in *AtZAT6* knockdown plants. The expression level of *AtZAT6* in WT was normalized as 1.0. Means ± SDs of three independent experiments are shown in the results, and asterisk symbols (*) indicates the significant difference of $p<0.05$ compared to WT.



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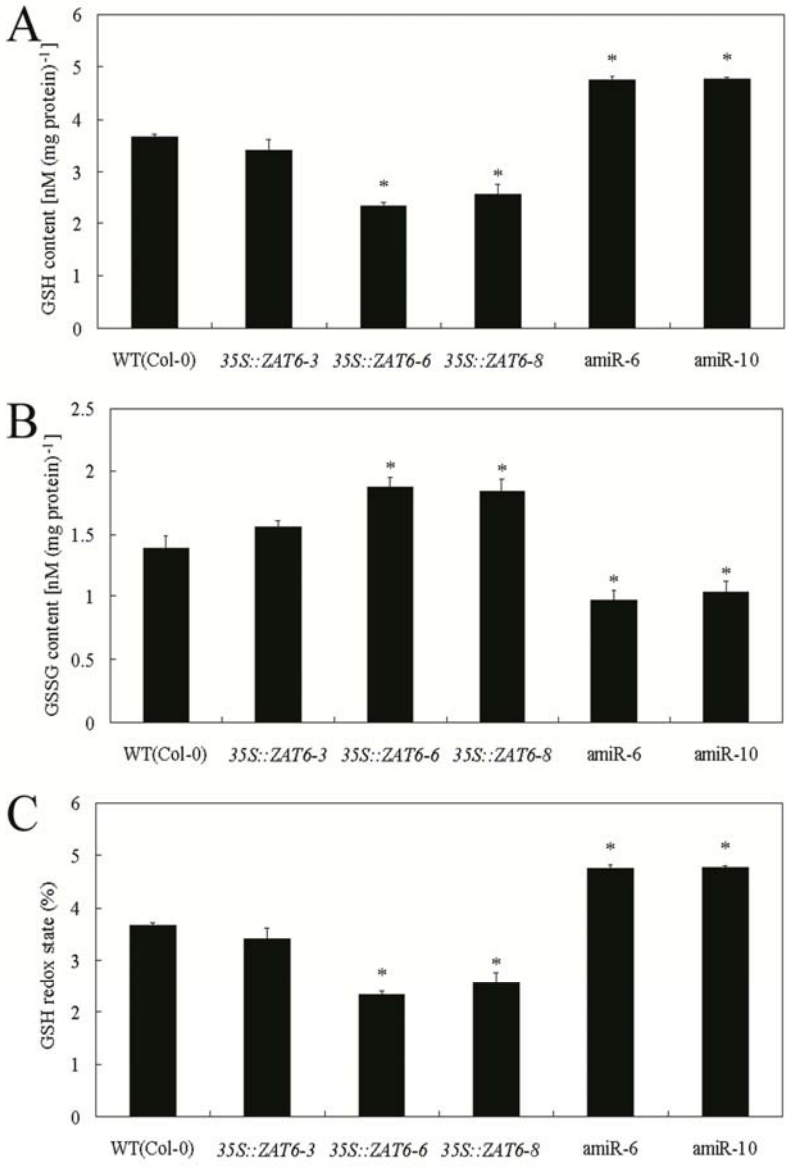

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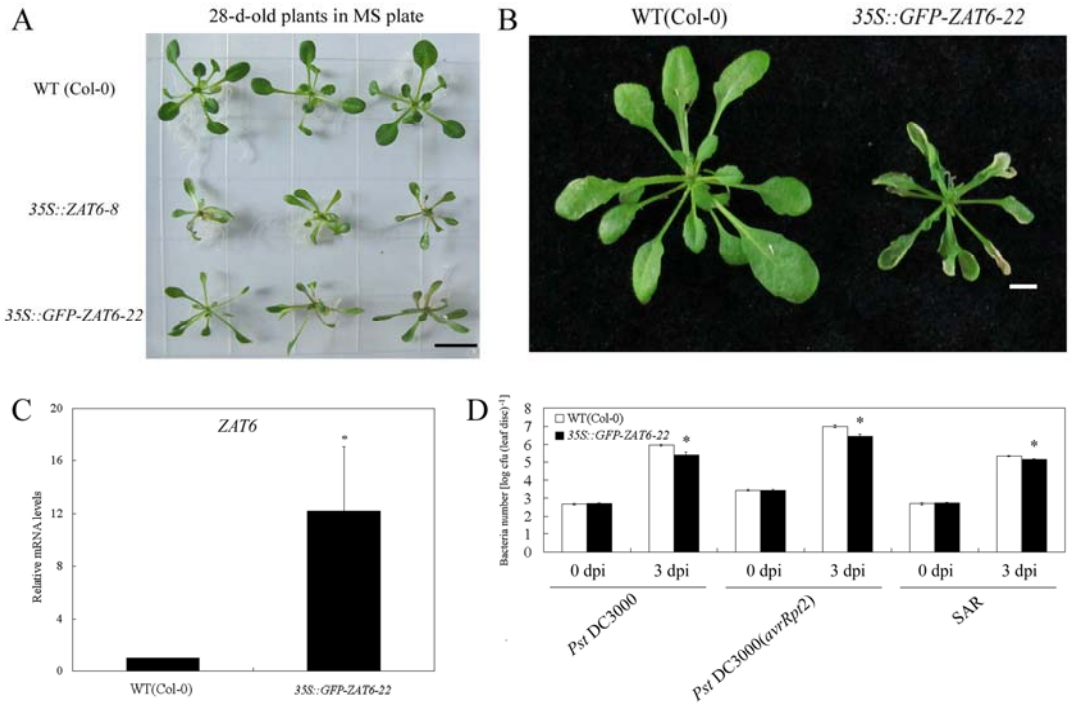

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