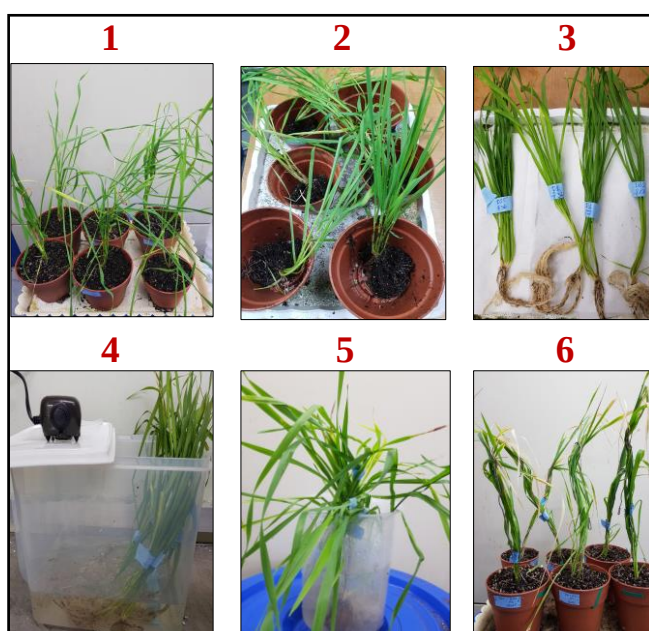


Figure 1

(A)



(B)



(C)



(D)

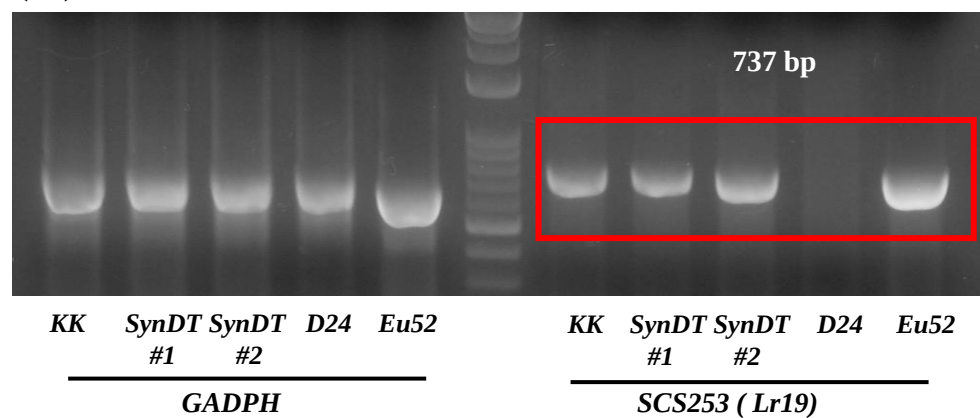
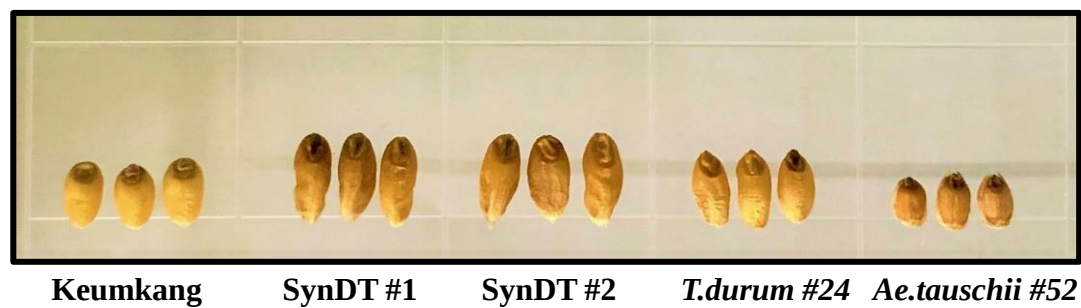
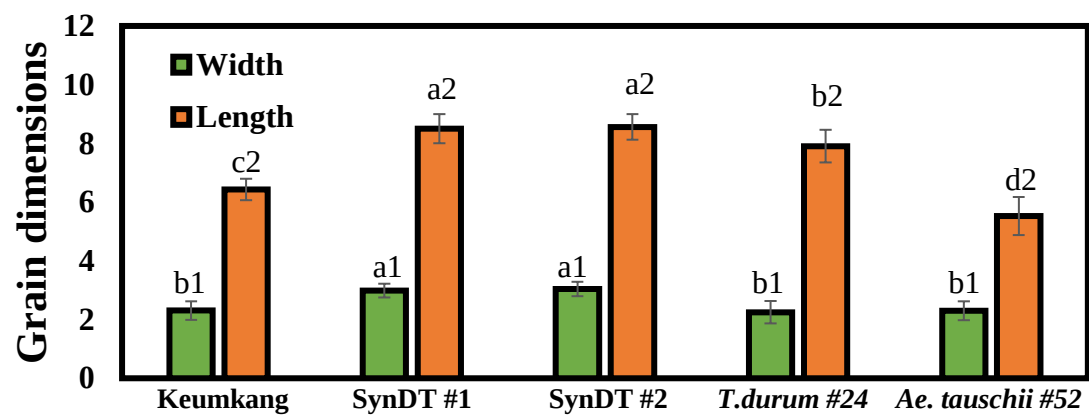


Figure 2

(A)



(B)



(C)

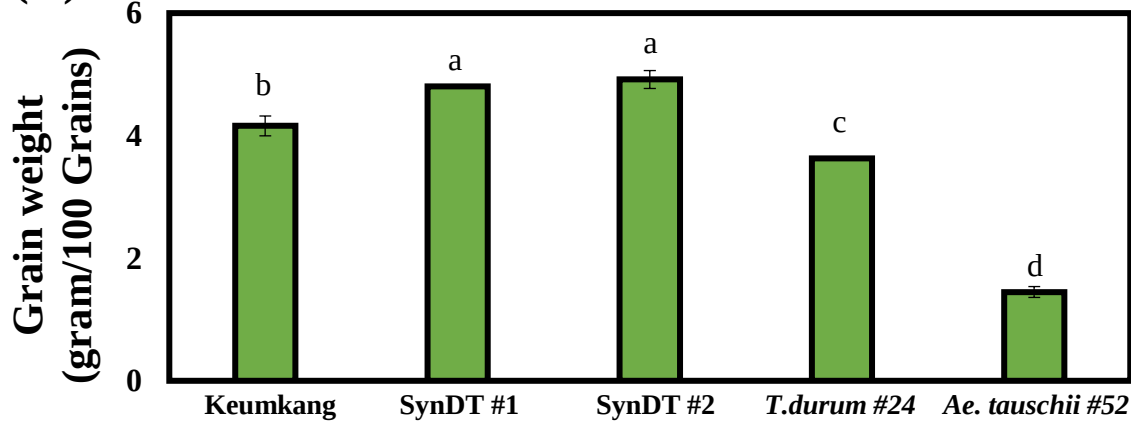


Figure 3

(A)

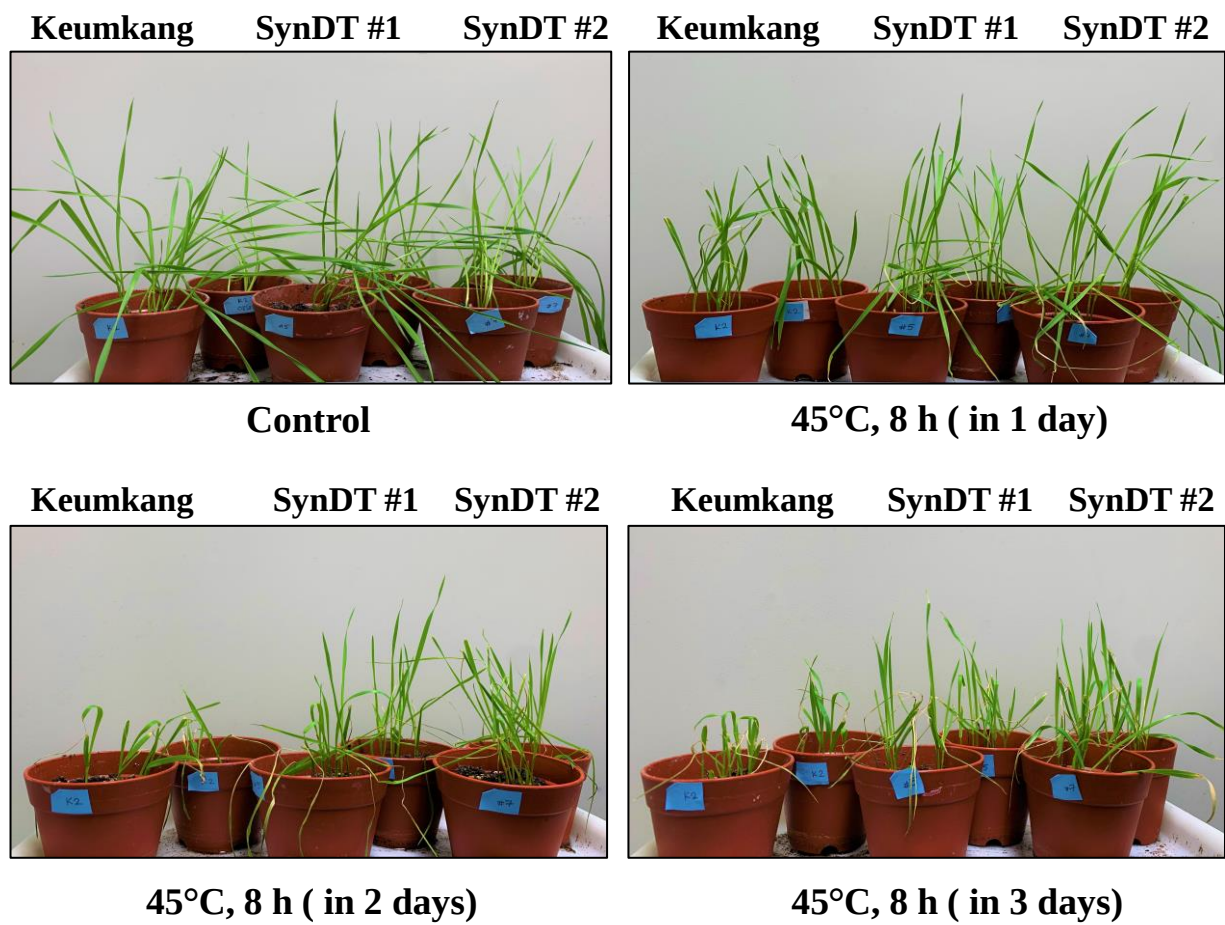


Figure 3

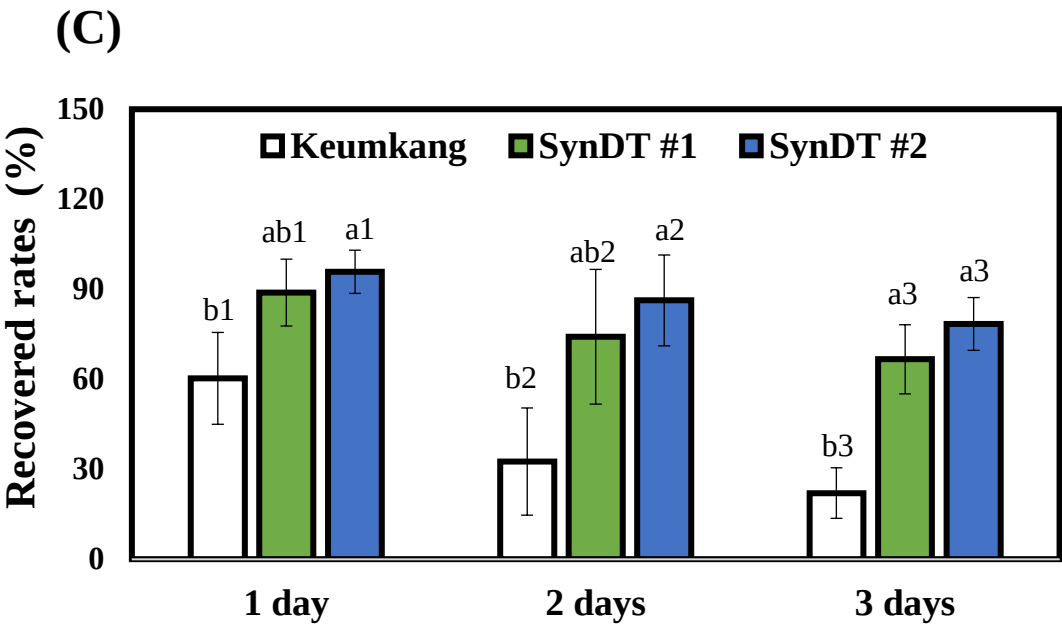
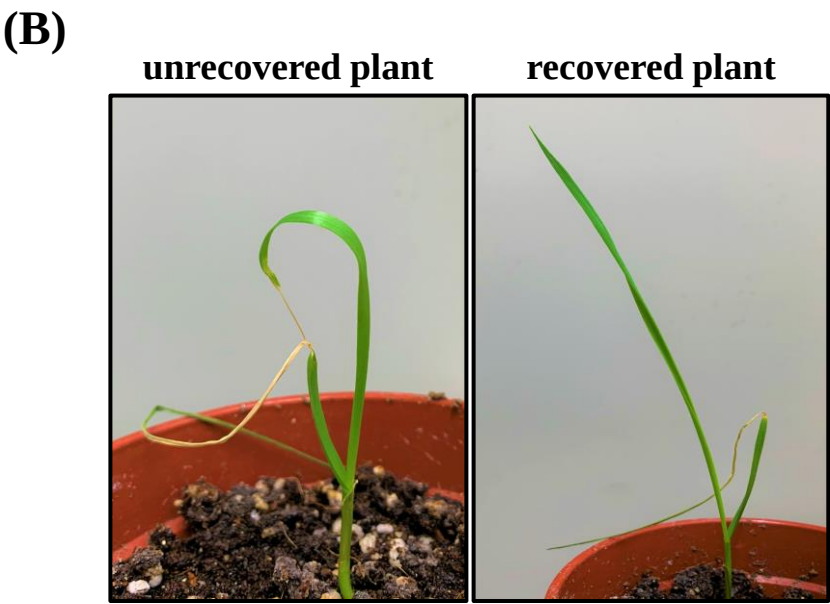


Figure 4

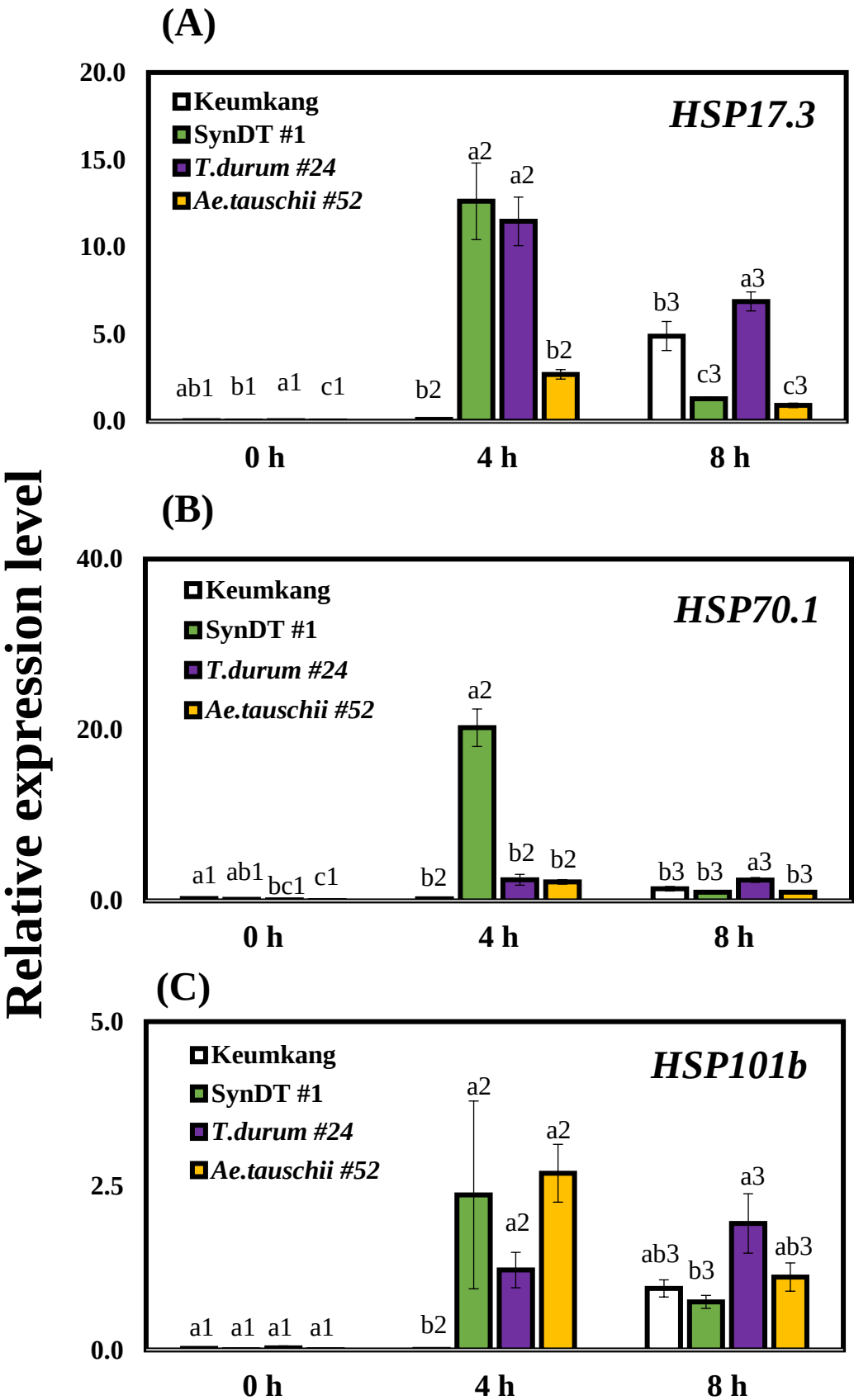


Figure 5

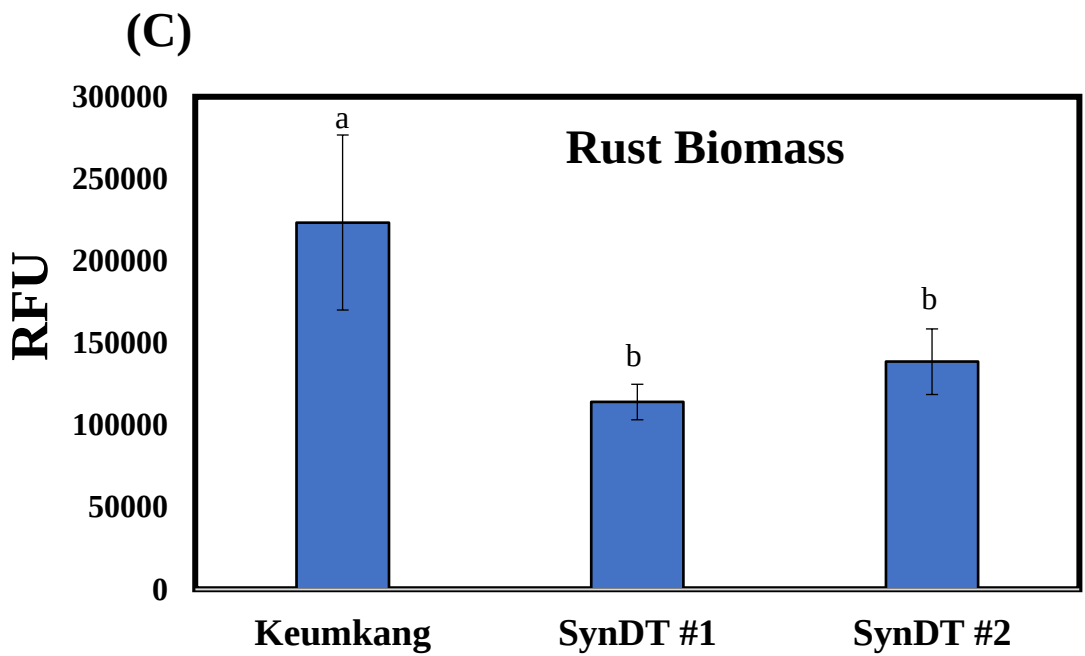
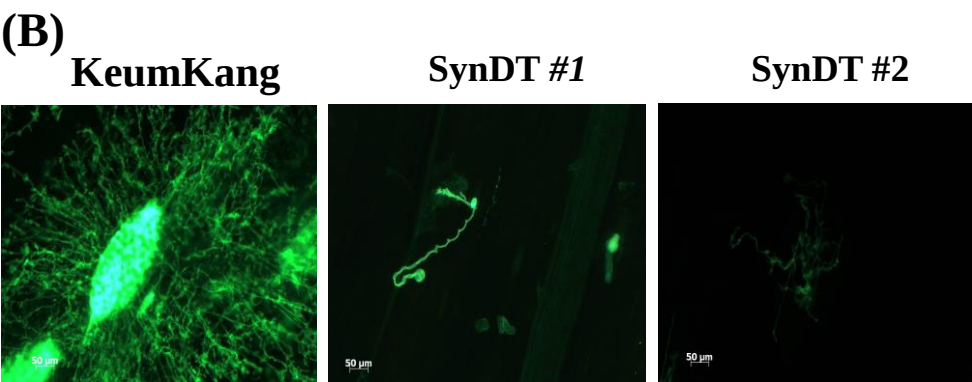
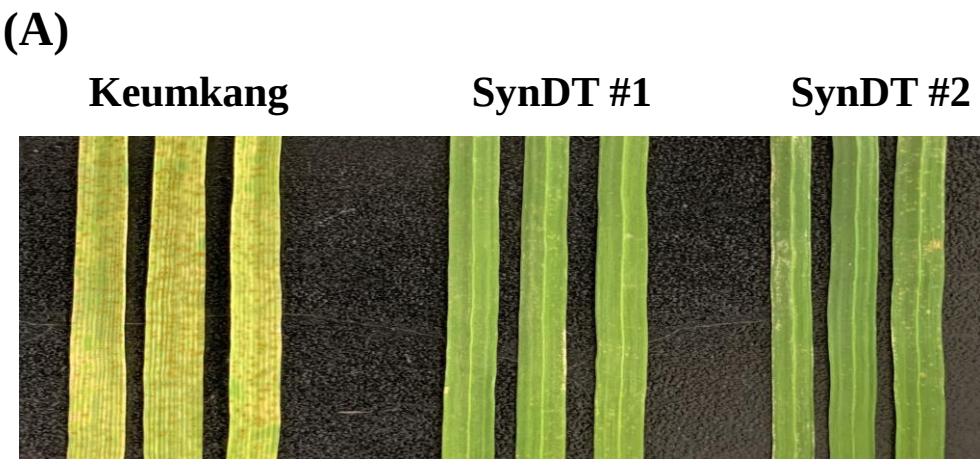


Figure 6

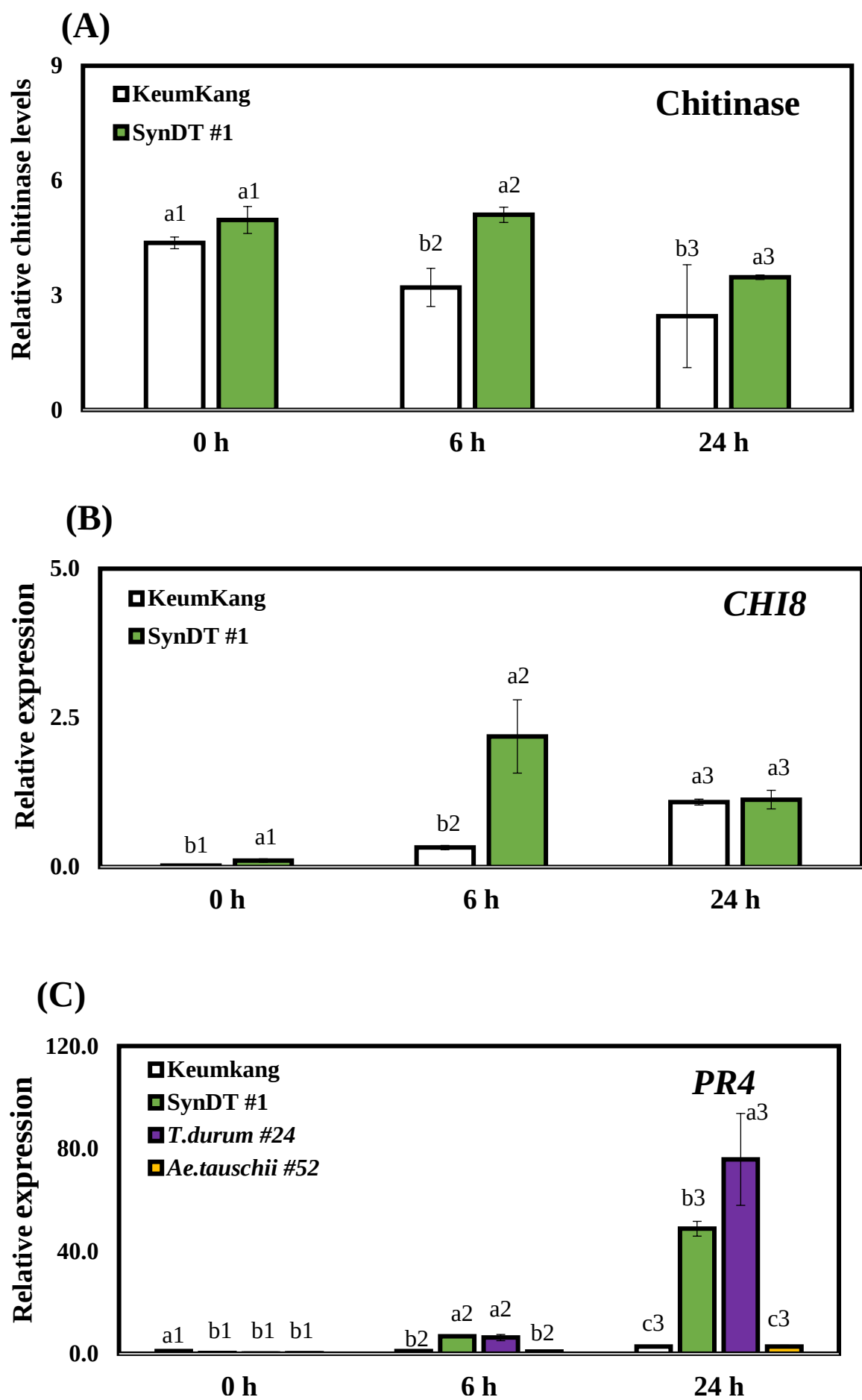


Figure 7

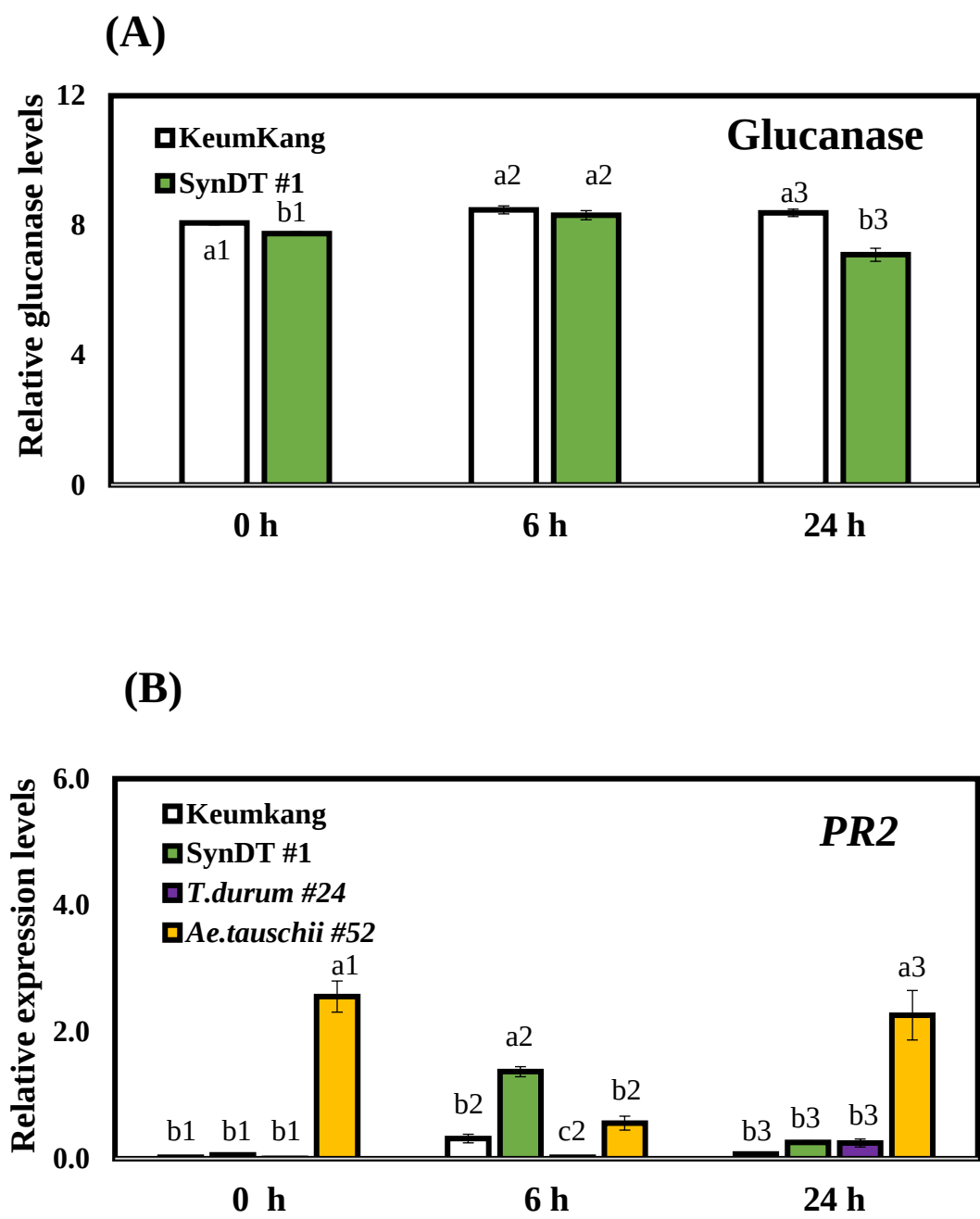


Figure 8

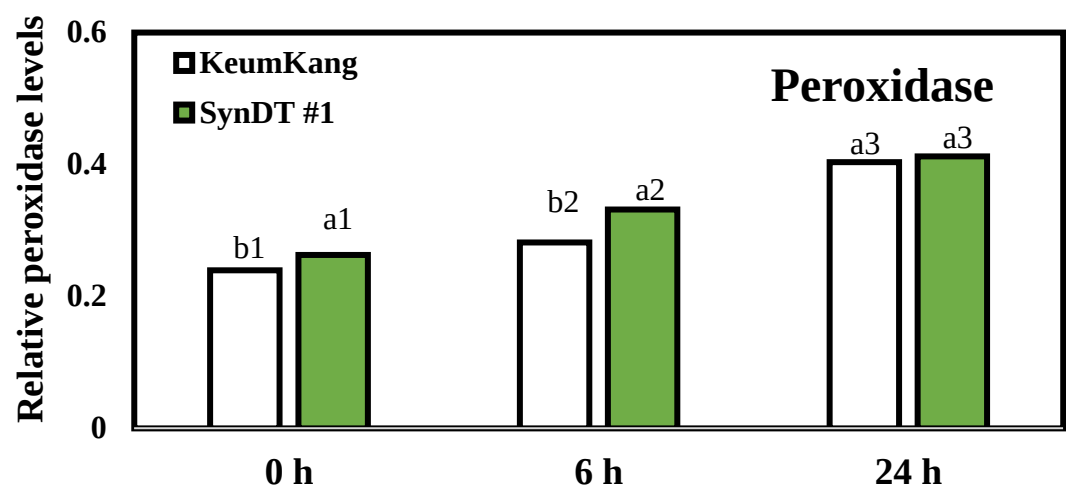


Figure 9

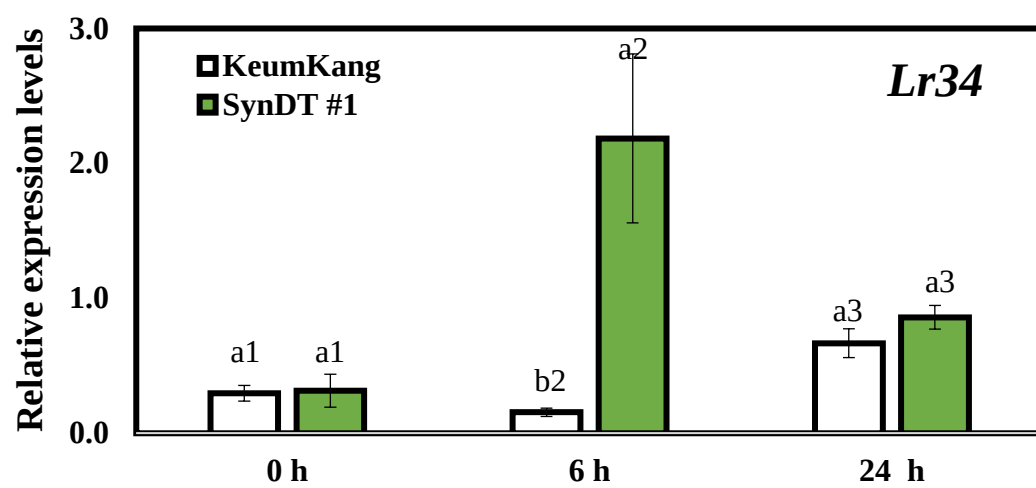
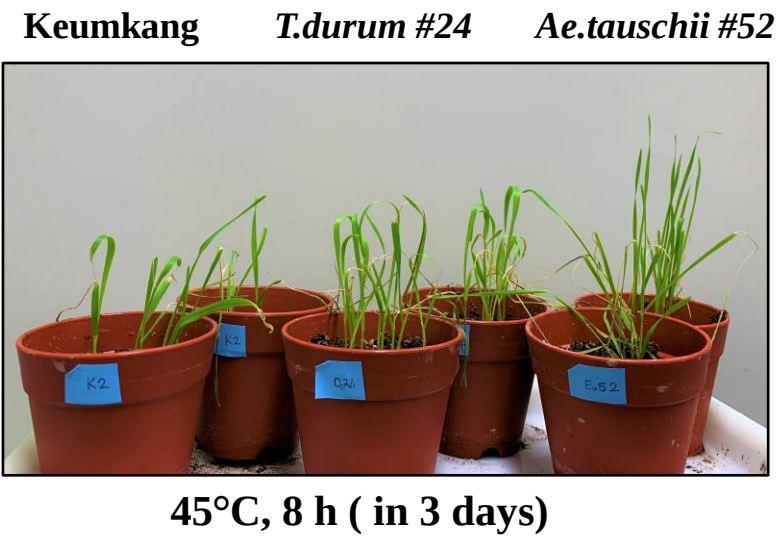


Figure S1

(A)



(B)

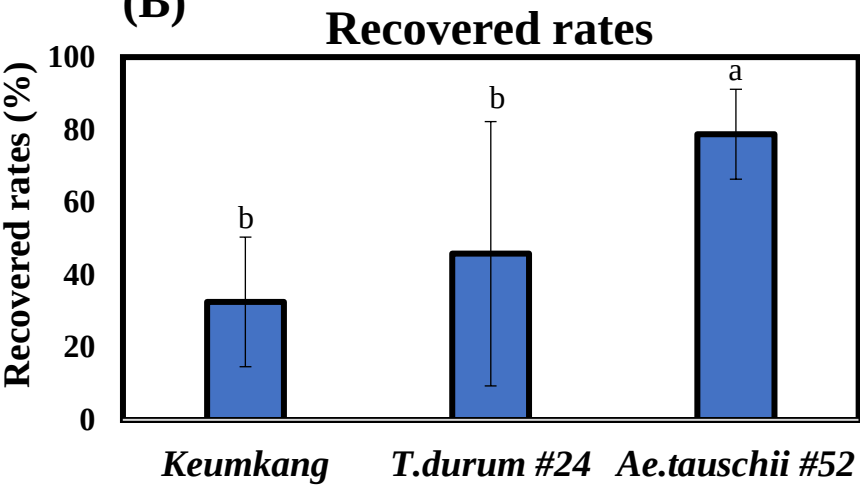


Figure S2

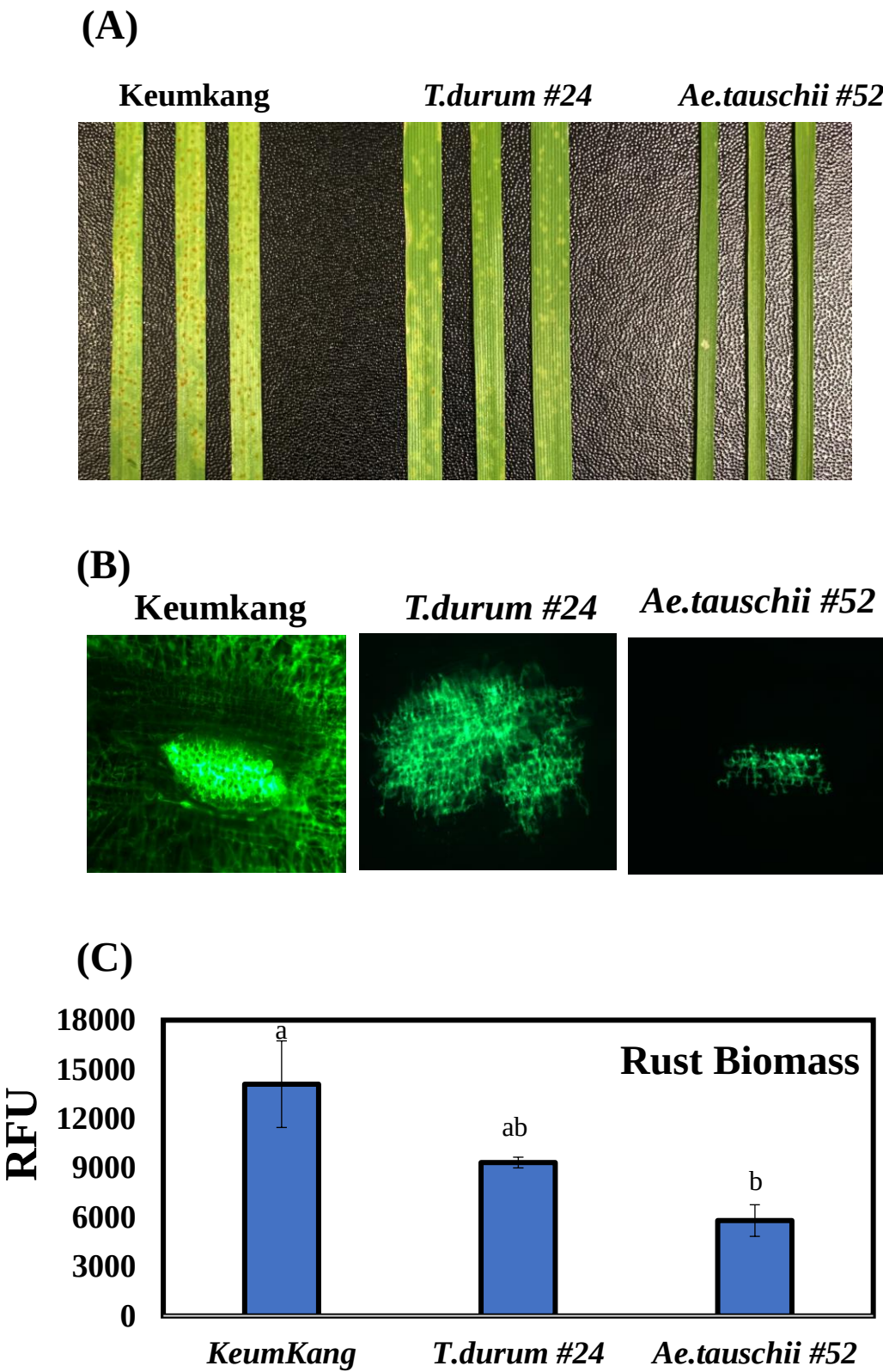


Table S1

Genes	Primer Sequences (5'-3')
<i>Actin eu97 – F</i>	GGT ATC GTT CTC GAC TCT GGT
<i>Actin eu 97 - R</i>	TTA CAA TTT CCC GCT CGG CT
<i>HSP17.3 - F</i>	AGA ACG CCG ACA TGG AGA AG
<i>HSP17.3 - R</i>	CAC GAT GCA TCT CAG GCG A
<i>HSP70.1 - F</i>	TTA CCA ACG ACA AGG GTC GG
<i>HSP70.1 - R</i>	AGT TCT CCA GGG CGT TCT TG
<i>HSP101b - F</i>	GCT GGA CGT CAT CCT GTC TC
<i>HSP101b - R</i>	CCA CCC GCT TCT CGA TCC
<i>CHI8 – F</i>	AAT ATC ATC AAC GGC GGG CT
<i>CHI8 – R</i>	TGC AGT AGC GCG TGT AGT AG
<i>PR2 – F</i>	CTC GAC ATC CGT AAC GAC CAG
<i>PR2 – R</i>	GCG GCG ATG TAC TTG ATG TTC
<i>PR4 – F</i>	CGC GGT GAG CGC CTA CTG
<i>PR4 - R</i>	CCG ATC CCG TTG GTG

Table S2

Gene names	IWGSC RefSeqv1.1 gene names
<i>HSP17.3</i>	TraesCS3A02G113100
<i>HSP70.1</i>	TraesCS4A02G097900 TraesCS4D02G207500 TraesCS4B02G206700
<i>HSP101b</i>	TraesCS1D02G342100, TraesCS1A02G340100, TraesCS1B02G352400
<i>CHI8</i>	TraesCS1D02G207100
<i>PR2</i>	TraesCS2D02G108200
<i>PR4</i>	TraesCS3B02G584700
<i>Lr34</i>	TraesCS7D02G080300

Table S3

	Accession number	Sources
<i>T. durum</i> #24	CWI 31114	http://wgb.cimmyt.org/gringlobal/AccessionDetail.aspx?id=41764
<i>Ae. tauschii</i> #52	TA 1616	https://npgsweb.ars-grin.gov/gringlobal/accessiondetail?id=1556576

Table S4

Grain morphology Wheat lines	Grain weight (g ± SD)	Grain width (mm ± SD)	Grain length (mm ± SD)
Keumkang	4.16 ± 0.16	2.31 ± 0.32	6.43 ± 0.36
SynDT #1	4.80 ± 0.03	2.99 ± 0.24	8.5 ± 0.49
SynDT #2	4.91 ± 0.14	3.04 ± 0.24	8.56 ± 0.44
<i>T.durum</i> #24	3.63 ± 0.01	2.25 ± 0.38	7.91 ± 0.56
<i>Ae. tauschii</i> #52	1.45 ± 0.09	2.3 ± 0.32	5.53 ± 0.65

Table S5

Survival rates Wheat lines	1 day HS (% ± SD)	2 days HS (% ± SD)	3 days HS (% ± SD)
Keumkang	60.32 ± 15.31	32.54 ± 17.87	22.02 ± 8.43
SynDT #1	88.89 ± 11.11	74.16 ± 22.40	66.66 ± 11.54
SynDT #2	95.83 ± 7.22	86.30 ± 15.17	78.43 ± 8.77

Table S6

Genes	Time Wheat lines	0 h	4 h	8 h
<i>HSP17.3</i>	Keumkang	0.032 ± 0.002	0.119 ± 0.012	4.888 ± 0.830
	SynDT #1	0.027 ± 0.004	12.620 ± 2.195	1.294 ± 0.075
	<i>T.durum</i> #24	0.040 ± 0.007	11.467 ± 1.389	6.873 ± 0.541
	<i>Ae.tauschii</i> #52	0.003 ± 0.001	2.691 ± 0.269	0.914 ± 0.134
<i>HSP70.1</i>	Keumkang	0.284 ± 0.049	0.245 ± 0.022	1.421 ± 0.250
	SynDT #1	0.182 ± 0.019	20.274 ± 2.197	1.008 ± 0.064
	<i>T.durum</i> #24	0.114 ± 0.023	2.479 ± 0.631	2.445 ± 0.276
	<i>Ae.tauschii</i> #52	0.032 ± 0.002	2.224 ± 0.257	1.032 ± 0.151
<i>HSP101b</i>	Keumkang	0.026 ± 0.007	0.009 ± 0.010	0.937 ± 0.130
	SynDT #1	0.004 ± 0.002	2.360 ± 1.430	0.731 ± 0.098
	<i>T.durum</i> #24	0.034 ± 0.029	1.217 ± 0.0270	1.927 ± 0.452
	<i>Ae.tauschii</i> #52	0.003 ± 0.001	2.691 ± 0.441	1.110 ± 0.214

Table S7

Wheat lines	Rust biomass (RFU ± SD)
Keumkang	223464.5 ± 53319.39
SynDT #1	114167.3 ± 10855.66
SynDT #2	138683 ± 20010.51

Table S8

	Time Wheat lines	0 h	6 h	24 h
Chitinase	Keumkang	4.367 ± 0.153	3.200 ± 0.500	2.450 ± 1.344
	SynDT #1	4.967 ± 0.351	5.100 ± 0.200	3.467 ± 0.058
CHI8	Keumkang	0.022 ± 0.002	0.324 ± 0.035	1.087 ± 0.05
	SynDT #1	0.107 ± 0.031	2.186 ± 0.614	1.127 ± 0.156
PR4	Keumkang	1.000 ± 0.091	1.012 ± 0.275	2.781 ± 0.451
	SynDT #1	0.269 ± 0.061	6.840 ± 0.474	48.772 ± 2.885
	T. durum #24	0.063 ± 0.015	6.299 ± 1.221	75.760 ± 17.943
	Ae. eauschii #52	0.229 ± 0.051	0.819 ± 0.087	2.785 ± 0.484

Table S9

	Time Wheat lines	0 h	6 h	24 h
Glucanase	Keumkang	8.073 ± 0.057	8.480 ±0.123	8.387 ± 0.115
	SynDT #1	7.750 ± 0.050	8.313 ± 0.140	7.097 ± 0.200
PR2	Keumkang	1.000 ± 0.103	14.852 ± 3.141	3.524 ± 0.675
	SynDT #1	2.915 ± 0.294	64.019 ± 3.739	11.979 ± 1.237
	<i>T. durum</i> #24	0.132 ± 0.014	0.962 ± 0.370	11.549 ± 2.934
	<i>Ae. tauschii</i> #52	119.161 ± 11.484	26.211 ± 5.114	105.541 ± 18.224

Table S10

Time Wheat lines	0 h	6 h	24 h
Keumkang	0.239 ± 0.002	0.282 ± 0.002	0.403 ± 0.003
SynDT #1	0.263 ± 0.001	0.332 ± 0.002	0.412 ± 0.002

Table S11

Time Wheat lines	0 h	6 h	24 h
Keumkang	0.296 ± 0.058	0.155 ± 0.032	0.667 ± 0.106
SynDT #1	0.315 ± 0.121	2.186 ± 0.627	0.859 ± 0.088