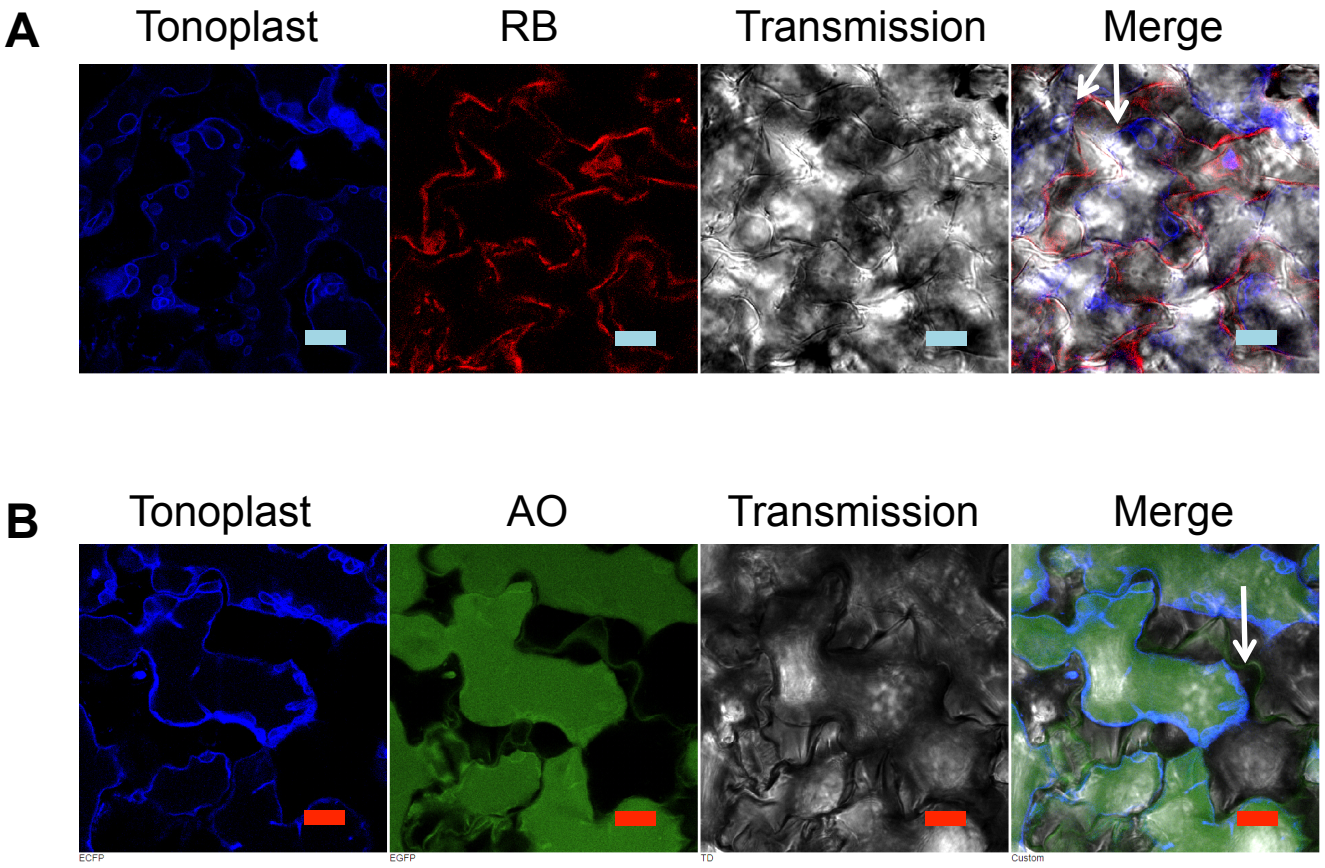
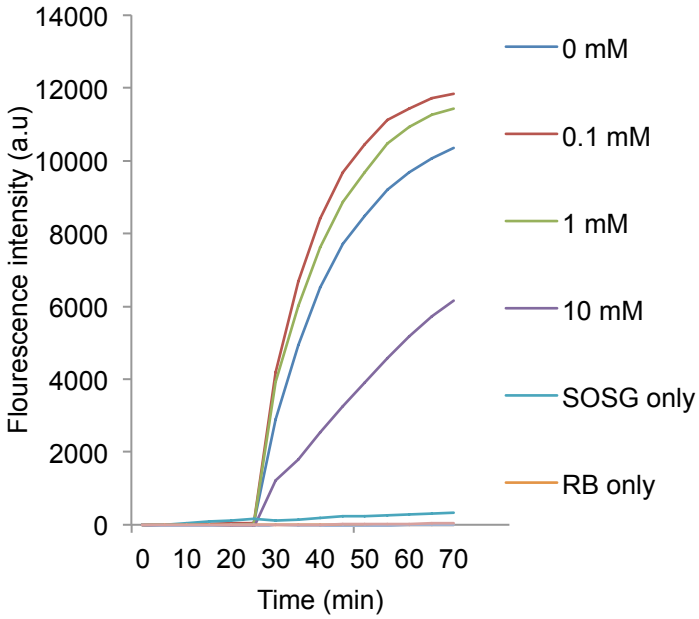
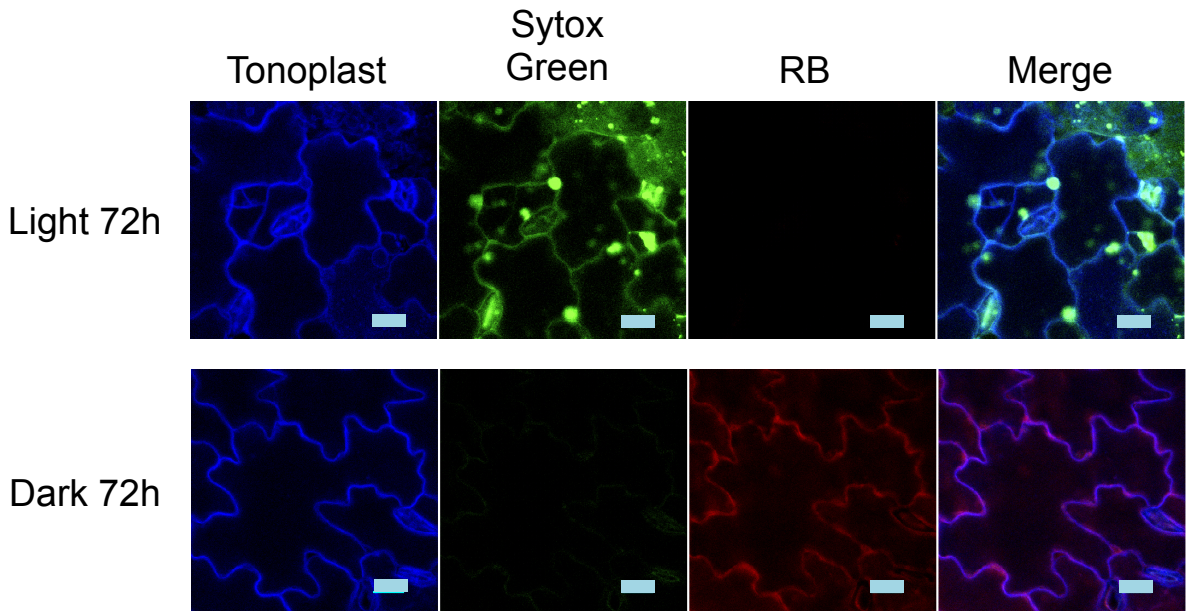


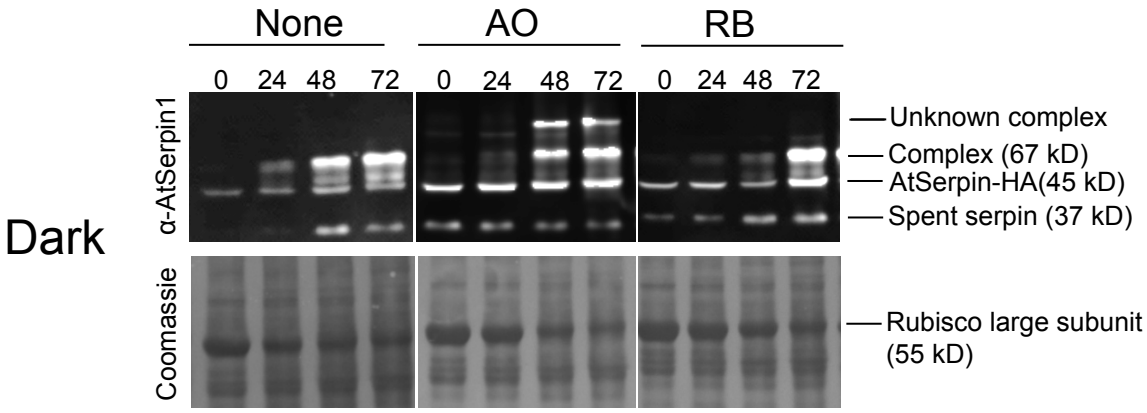
Supplementary Figure S1. Treatment of RB and AO stained recombinant tonoplast marker line with hyperosmotic concentrations of mannitol. Confocal microscopy of Arabidopsis seedlings showing localization of RB or AO. Seedlings (5 day old, CFP) were pre-equilibrated with 1% sucrose solution, and treated with 100 µM RB (A) or AO (B) in the presence of 1% sucrose, before mounting on a microscope slide with 1M mannitol for observation by confocal microscopy. Arrows in (A) show separation of plasmalemma membrane, stained with RB, from the cell wall and further contraction of the tonoplast membrane (CFP labeled) from the plasmalemma. Arrow in (B) shows contraction of tonoplast (CFP labeled) and AO staining of the vacuole. Scale bar is 20 µm.



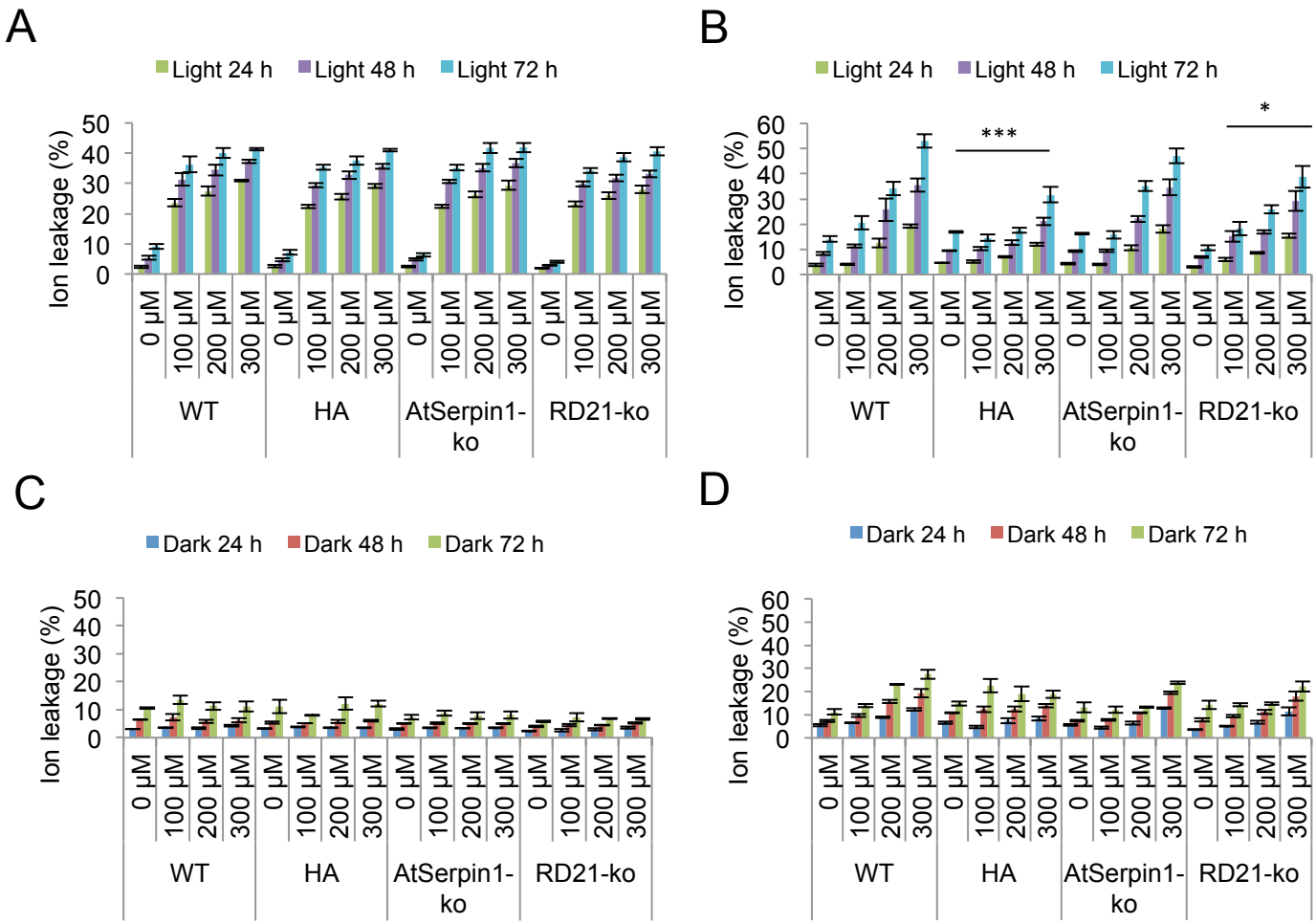
Supplementary Figure S2. *In vitro* assay showing scavenging of Rose Bengal generated singlet oxygen by histidine. Rose Bengal (10 µM) and 1 µM SOSG were used with various concentrations of histidine (0, 0.1, 1, 10 mM). Fluorescence was measured at 485/525 nm Ex/Em at 5 min intervals in 30 µE light over 45 min.



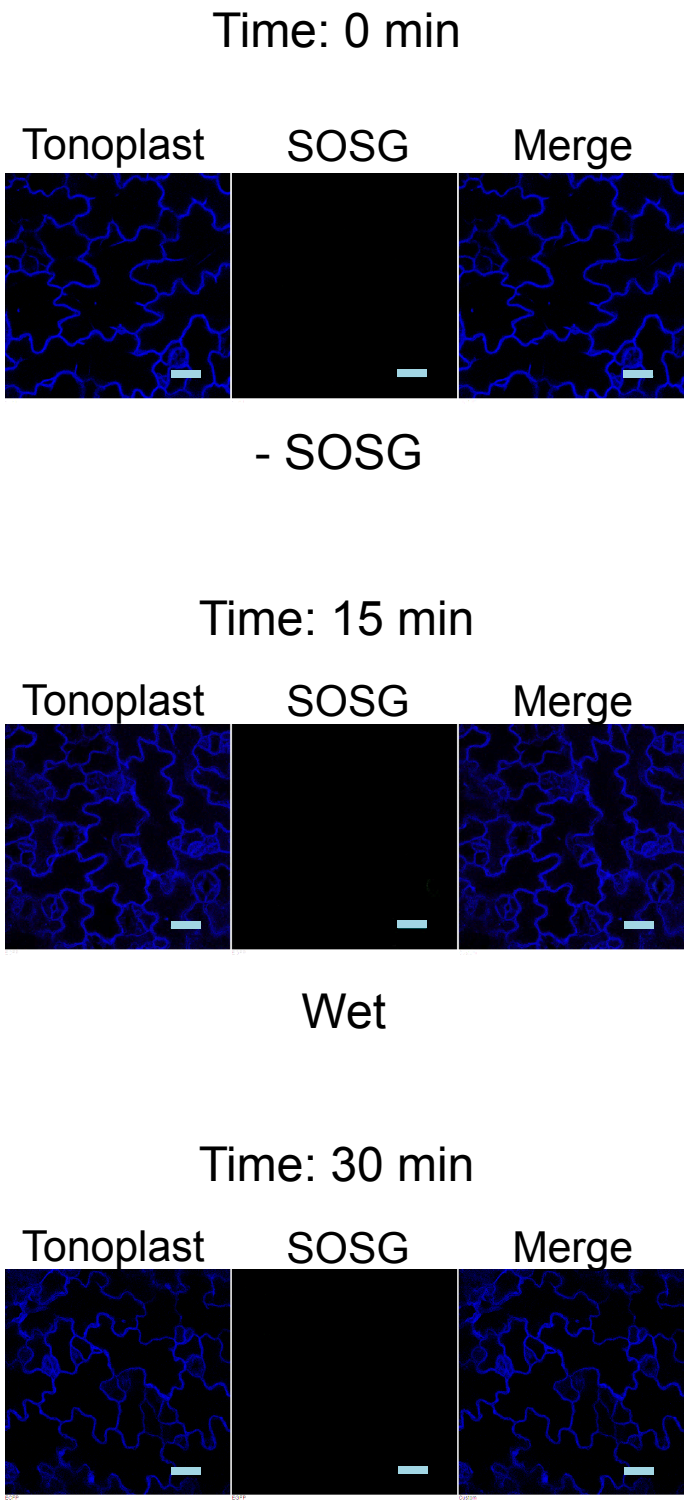
Supplementary Figure S3. Confocal microscopy of Arabidopsis seedlings showing RB-induced permeabilization of cell membrane. Recombinant tonoplast marker line (5 day old, CFP tonoplast marker) were treated with 100 µM Rose Bengal, and incubated in the light or dark for 72 h. The samples were treated with 250 nM Sytox Green in the dark and mounted on a microscope slide for observation by confocal microscopy. Scale bar is 20 µM.



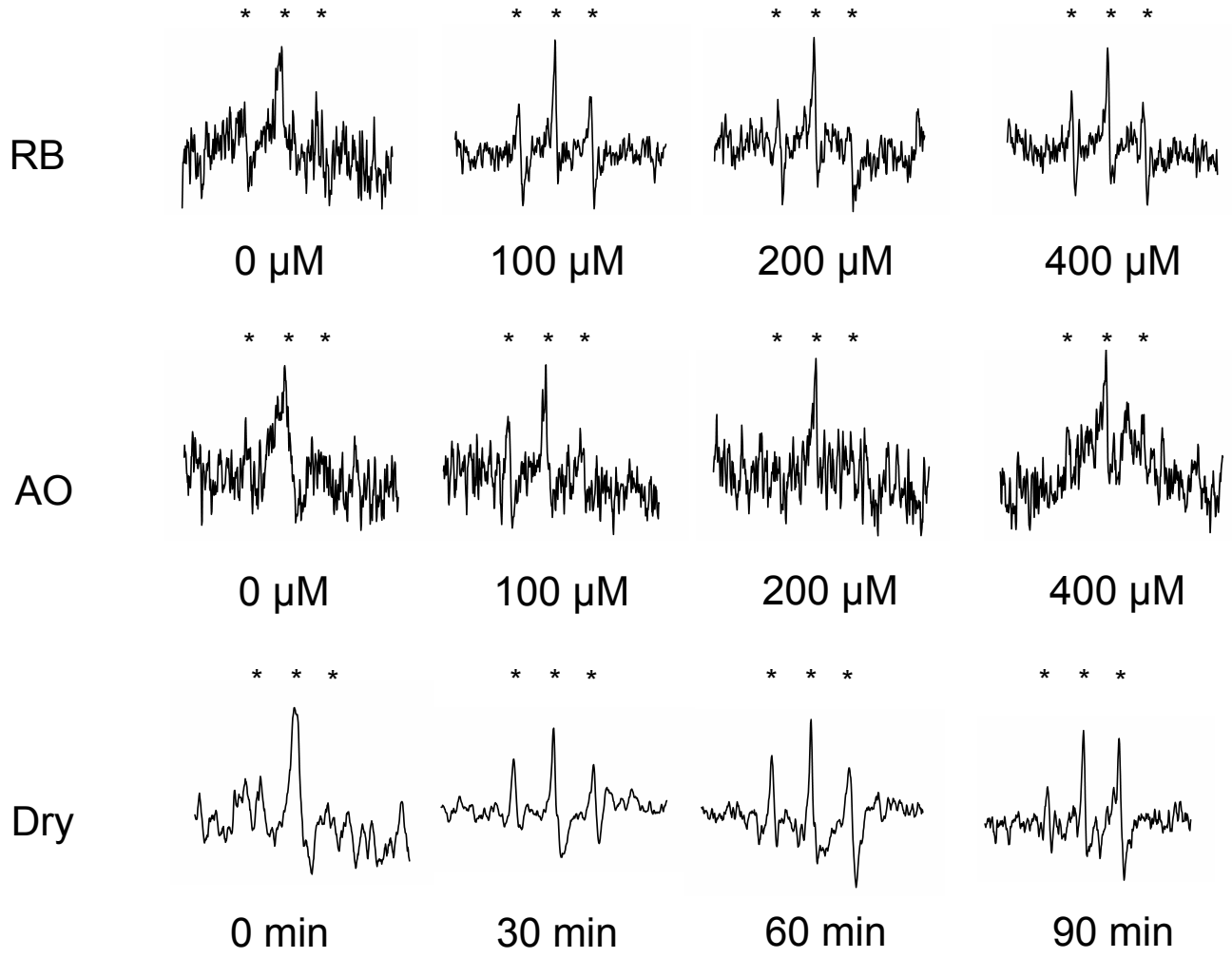
Supplementary Figure S4. Immunoblots of photosensitizer treated samples in the dark. Arabidopsis leaf discs from AtSerpin1 overexpression (HA) lines were treated with 100 μM AO or RB or mock treated (None) and incubated in the dark for 0, 24, 48, 72 h. Extracts were treated with 50 μM E64 and fractionated on non-reducing SDS-PAGE and developed with α-AtSerpin1 antibody. The bottom images show the corresponding Coomassie staining.



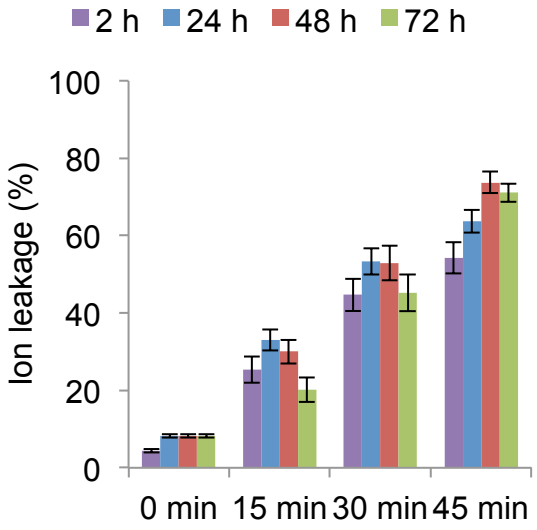
Supplementary Figure S5: Ion leakage assay of various Arabidopsis plant lines treated with RB and AO. Arabidopsis leaf discs were treated with Rose Bengal (A, C) or Acridine Orange (B, D), and incubated in the light (A, B) or dark (C, D) for 0, 24, 48, 72 h. Means and SE are presented. Data was analyzed by repeated-measures two-way ANOVA. Significance was further confirmed using pairwise comparisons to the WT line using a post hoc Dunnett test. (*** - $p < 0.001$, * - $p < 0.05$)



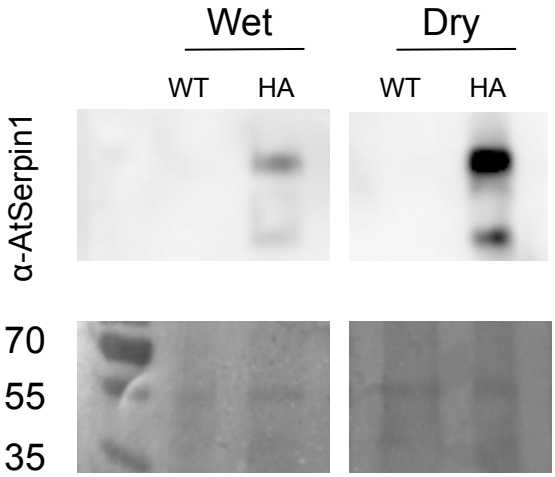
Supplementary Figure S6. Confocal imaging of Arabidopsis seedlings in the dark as a control for dehydration treatment (Figure 6B). Seedlings (5 day old, CFP tonoplast marker) were placed in ddH_2O for 0, 15, 30 min, and incubated with 100 µM SOSG in the dark, and mounted on a microscope slide for observation by confocal microscopy as described in the Materials and Methods. Scale bar is 20 µm.



Supplementary Figure S7. Representative EPR spectra of samples from Figure 6D. Stars represent the positions of the triplet peaks of the nitroxide EPR spectrum.



Supplementary Figure S8. Arabidopsis plants under dehydration treatment. Cell death assay. Arabidopsis WT (5 day old) seedlings were subjected to various dehydration treatments and incubated under continuous light (30 µE). Ion conductance readings were taken at 0, 2, 24, 48, 72 h.



Supplementary Figure S9. Immunoblots of dehydration treated plant lines. Arabidopsis seedlings (3 week old, 15-20 seedlings per sample) were treated on dry blotting paper for 1 h, replaced on agar plates and incubated for 24 h before harvesting. Extracts were treated with 50 μM E64 and fractionated on non-reducing SDS PAGE and developed with α-Serpin1 antibody. The bottom image shows the corresponding Coomassie staining.

Singlet oxygen	Sequence (Forward)	Sequence (Reverse)
At3g61190 (Bonsai-associated protein BAP1)	5'-GGAGAAGCTAAAATCCCAACGA-3'	5'-CCACACTTATCACCAAACTCATCTCT3'
At5g64870 (nodulin-like protein)	5'-GACTATGGAAGAGGTCTTCAAAGGA-3'	5'-GCTGCTTCACATTGGCGT-3'
At3g01830 (calmodulin like protein)	5'-GCTTTGACAAGAGCCACCAA-3'	5'-CTACTGCACGTTTGCCAGACTT-3'

Superoxide / hydrogen peroxide	Sequence (Forward)	Sequence (Reverse)
At5g01600 (ferritin1)	5'-TCATTGTTCTCTGAGGCCACTT-3'	5'-ACATGCTGAAAAAGGAGATGCTT-3'
At4g21870 (heat-shock protein17–like protein)	5'-CTTTCTCTGTTGATCTTCCTGGGT-3'	5'-CATAGGGGTTGCCTCCGT-3'
At1g71030 (myb family transcription factor)	5'-CTTCGTGCTCTCTCCCCA-3'	5'-GCGTTGTTTAACTTCTGGCCTT-3'

Supplementary Table S1. Primers used for qRT-PCR.